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THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 384

U.S. Army
Program Manager for
Chemical Demilitarization

Project Manager for
Non-Stockpile Chemical Materiel

Defense Distribution Depot
Memphis Transportation Plan

Final

June 1999

EXECUTIVE SUMMARY

The U.S. Army Program Manager for Chemical Demilitarization (PMCD) is responsible for the destruction of all United States chemical warfare materiel (CWM). The Project Manager for Non-Stockpile Chemical Materiel (PMNSCM) is responsible for destroying non-stockpile chemical materiel (NSCM). The PMNSCM and the U.S. Army Technical Escort Unit (TEU) will support the Defense Depot Memphis, Tennessee (DDMT) in the transport of recovered CWM from DDMT to Pine Bluff Arsenal (PBA), Arkansas.

The Transportation Plan has been written in accordance with Public Law 103-337, Section 143, Transportation of Chemical Munitions, (b) Transportation of Chemical Munitions Not in the Chemical Weapons Stockpile. In the case of chemical munitions that are discovered or otherwise come within the control of the Department of Defense (DoD) and that do not constitute part of the chemical weapons stockpile, the Secretary of Defense may transport such munitions to the nearest chemical munitions stockpile storage facility that has necessary permits for receiving and storing such items if the transportation of such munitions to that facility (1) is considered by the Secretary of Defense to be necessary; and (2) can be accomplished while protecting the public health and safety. PBA satisfies the requirement of Public Law 103-337 because it is the nearest chemical stockpile storage facility that has the necessary permits for receiving and storing these items.

The PMNSCM Public Outreach and Information Office (POIO) continues to forge two-way communications with stakeholders. Coordination between PMNSCM, DDMT Public Affairs Office (PAO), and Pine Bluff Chemical Activity (PBCA) PAO is critical to establishing and maintaining timely, effective, and accurate information exchange among all interested parties and affected agencies. PMNSCM POIO should be consulted prior to all public outreach initiatives (that is, public meetings, official meetings, press releases, etc.).

Telephone numbers and points of contact for DDMT and PBCA Public Affairs are located in section 9 of this Transportation Plan.

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DDMT is the generator of the recovered CWM and will be accountable for the waste until the PBCA accepts accountability at PBA. PMNSCM is responsible for ensuring that the transport of recovered CWM is done in a safe and environmentally acceptable manner. TEU, under the direction of the U.S. Army Soldier and Biological Chemical Command (SBCCOM), will have physical custody of the recovered CWM and will conduct the transport operations. PBA will store the recovered CWM in the PBA interim status Resource Conservation and Recovery Act (RCRA)-permitted hazardous waste storage facility until final disposition.

This Transportation Plan is based on one trip from DDMT to PBA with two Department of Transportation-approved multiple round containers (MRCs) containing bottles of mustard agent (H, HD, HS) and lewisite (L). The exact quantities and kinds of CWM to be transported will be determined before this plan is implemented. Recovered CWM from DDMT will be transported to PBA in two segments: (1) transport by helicopter from the DDMT helipad to the PBA helicopter landing zone and (2) transport by truck from the PBA helicopter landing zone to the PBCA storage facility.

The Hazard Analysis (HA), presented in annex A, examines the risk of transporting recovered CWM from DDMT to PBA. Incidents that could occur during transportation operations are discussed qualitatively. To assign quantitative values to potential risk, risk assessment codes (RACs) were identified for each hazard or hazardous condition. This HA encompasses only the risks associated with transporting CWM and does not address the risks associated with recovering, packaging, or storing the CWM. Descriptions of ways to eliminate or mitigate likely system failures are included.

Analysis of all potential hazards involved in transport of recovered CWM from the interim holding facility (IHF) at DDMT to PBA yields a total carrier accident probability of 6.7×10^{-5}. According to the System Safety Management Plan (SSMP), this accident is improbable, but could have catastrophic results, resulting in a RAC of 3 for the transportation.

The maximum credible event (MCE) for this operation is judged to be a helicopter accident without fire resulting in the evaporative release of 1.34 liters of HD. The release results in a "no deaths" distance of 6 meters and a "no effects" distance of 84 meters.

Transporting recovered CWM from DDMT to PBA can be performed safely by implementing the recommended mitigating steps.

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SECTION 1
INTRODUCTION

1.1 Introduction

The Department of Defense (DoD) has designated the Department of the Army (DA) as the Defense Executive Agent for the destruction of United States chemical warfare materiel (CWM). The U.S. Army Program Manager for Chemical Demilitarization (PMCD) has, in turn, been given responsibility for destroying the CWM. The Project Manager for Non-Stockpile Chemical Materiel (PMNSCM) is responsible for destroying the five categories of NSCM, including buried CWM. This Transportation Plan discusses the transportation of CWM recovered at Defense Depot Memphis, Tennessee (DDMT) to Pine Bluff Arsenal (PBA), Arkansas. It describes transportation procedures and packaging, monitoring, emergency response, inspection, training, and security procedures associated with transportation. In addition, the roles and responsibilities of the government organizations associated with the transportation operation are described.

1.2 Objectives

The objective of this Plan is to provide decision-makers and site personnel information and direction for safe, secure, and environmentally sound onsite and offsite transportation of recovered CWM. A description of the plans to perform onsite storage at the interim holding facility (IHF) prior to transport to PBA is presented in the DDMT Interim Holding Facility Plan (PMCD, 1999).

This Transportation Plan provides guidance for the safe transportation of CWM from DDMT to PBA. Transportation will start at the DDMT IHF where the recovered CWM, overpacked in multiple round containers (MRCs), will be loaded onto a UH-1N helicopter and flown to the PBA helicopter landing zone. At the PBA landing zone, the cargo will be placed onto a truck and driven to the interim status Resource Conservation

and Recovery Act (RCRA)-permitted hazardous waste storage facility at Pine Bluff Chemical Activity (PBCA). The CWM will be stored at PBA until final disposition. Figure 1-1 provides a flow chart of the transportation activities associated with the recovered CWM.

To support the premise that CWM can be safely transported, a hazard analysis (HA) was performed to evaluate the plans and procedures presented in this Transportation Plan. The HA determined that the plans and procedures can provide for the onsite and offsite transportation of recovered CWM in a safe, secure, and environmentally sound manner. The complete HA is presented in annex A.

In preparing this Plan, the following assumptions about site conditions and regulations applicable to CWM storage and transportation activities were made:

a. The CWM has been identified, labeled, and packaged in MRCs that allow for normal handling.

b. The CWM is classified as hazardous waste and will be managed in accordance with applicable environmental laws and regulations. Security will be equivalent to that required for shipment of any other hazardous waste.

c. All recovered CWM at DDMT will be transported to PBA in one shipment. A UH-1N helicopter carrying a crew of three plus two Technical Escort Unit (TEU) personnel with approximately 250 pounds of equipment has sufficient lift to carry an additional 1,000 pounds of internal cargo on a flight from DDMT to PBA.

d. Based on the history of the DDMT site and experience at other sites, the most likely scenario is that only one or two MRCs will need to be

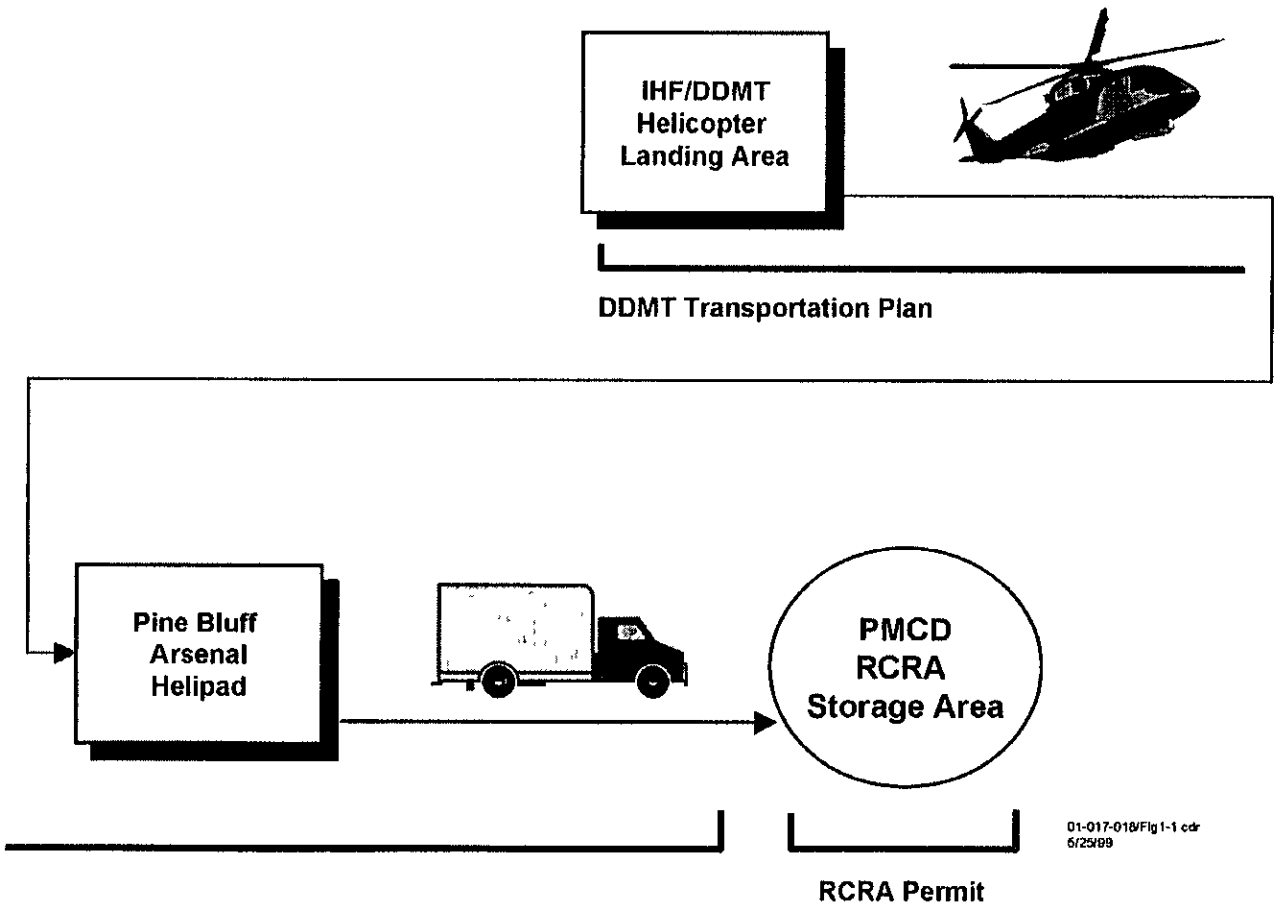

Figure 1-1. Transportation Flow Process for DDMT

transported. Two MRCs plus packing material, tie-downs, and bracing weigh approximately 300 pounds, well within the load limit of the helicopter.

e. The exact number and types of items to be transported will not be known until recovery operations are complete. Therefore, in order to perform the HA, a list of chemical agent identification set (CAIS) items was postulated based on site history and past experience. Table 1-1 shows a breakdown of these items. The 13 bottles of HD would be packed inside one MRC and the other 26 bottles would be packed inside the second MRC. Based on this example, a maximum credible event (MCE) was calculated for the evaporative release of all the contents of the 13 bottles of distilled mustard (HD) (45.5 ounces or 1.34 liters of HD). If the actual quantity or types of items to be transported are markedly different from this example, the MCE distances should be re-calculated using numbers for the actual items to be transported.

f. Once the CWM leaves the IHF at DDMT, it will not be stored until it reaches its final destination at PBA.

g. All required environmental studies will be completed by DDMT and the necessary documentation, permits, and approvals will be obtained prior to the execution of this Transportation Plan.

Table 1-1. Example CAIS Items to be Transported

CAIS Type	Number of Bottles	Contents Per Bottle
K941	13	3 5 ounces of HD
K955	17	25 milliliters of HS adsorbed onto charcoal
K955	9	25 milliliters of L adsorbed onto charcoal

h. The transportation of recovered CWM will be in accordance with all applicable regulations.

1.3 Background

The DDMT, located in the southern portion of the city of Memphis, is approximately 6 miles north of the Tennessee-Mississippi border and 8 miles east of the Mississippi River (figure 1-2). The DDMT covers 642 acres and is the principal distribution center for the Defense Logistics Agency in shipping and receiving hazardous materials, textile products, food products, electronic equipment, construction materials, and industrial, medical, and general supplies.

CAIS were used by the military from the 1920s to the 1960s to train service members how to identify chemical agents and decontaminate equipment in the field. At DDMT, the remains of CAIS have been identified in Dunn Field. Items from the following types of CAIS may have been disposed of in the landfill: K941, K942, and K955.

Items from these CAIS may be recovered from the landfill during remediation. If CWM is recovered, it will be inspected, identified, packaged in MRCs, labeled, and manifested according to applicable Tennessee Department of Environmental Conservation (TDEC) requirements. The CWM will be temporarily stored in an IHF until implementation of this Transportation Plan.

1.4 Potential Chemical Warfare Materiel

The CWM reported to have been buried at DDMT are components of CAIS. A description of CAIS items that may be transported follows:

a. *K941, Toxic Gas Set, M1.* Consists of 24 glass bottles, each containing 3.5 ounces of mustard (H and HS) or HD for a total of 84 ounces per set.

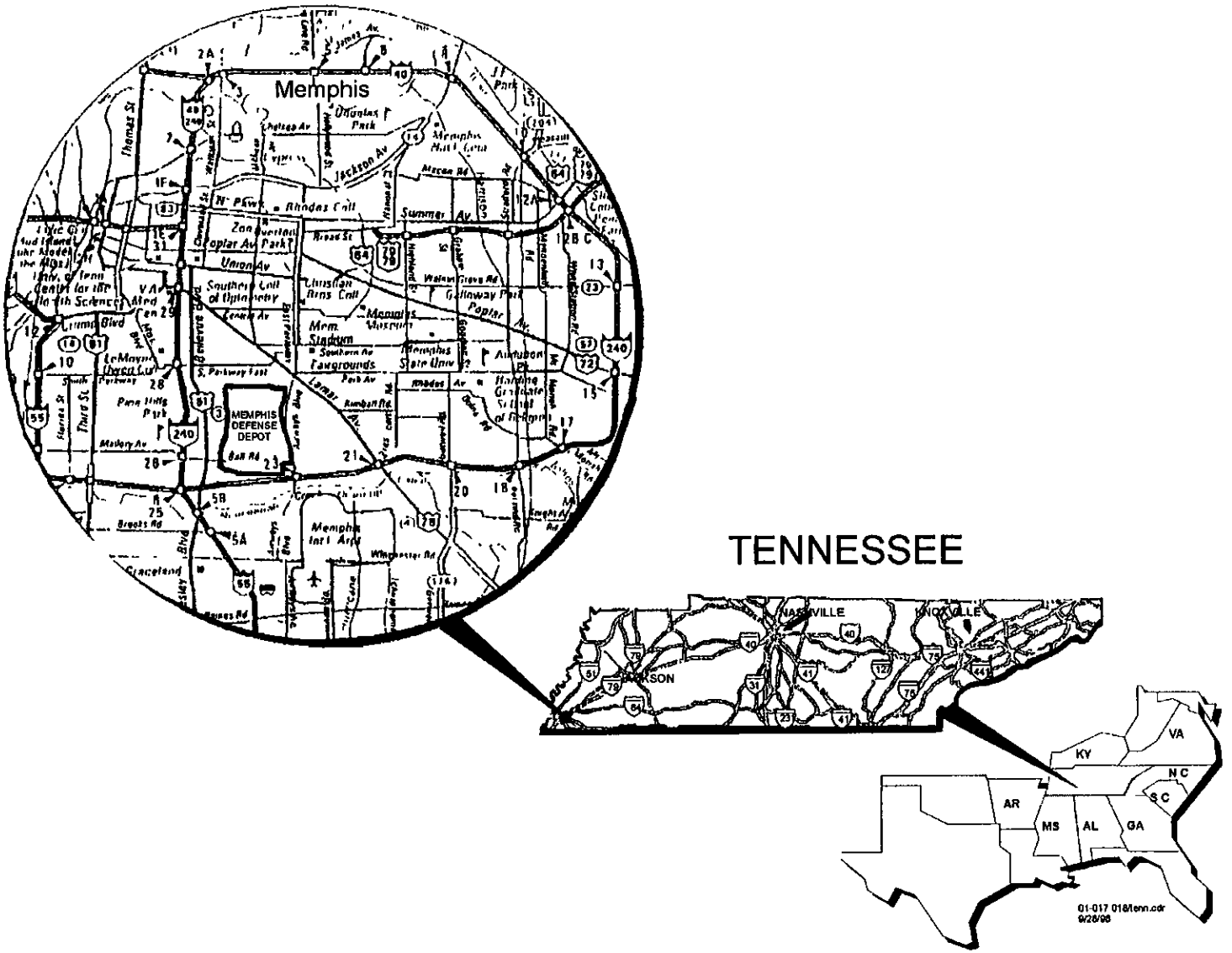

Figure 1-2. Location of Defense Distribution Depot Memphis, Tennessee

b. *K942, Toxic Gas Set.* Consists of 28 heat-sealed glass ampules, each containing 3.8 ounces of mustard (H, HS, or HD) for a total of 106.4 ounces per set.

c. *K955 Gas Identification Set, Instructional, M1 (Navy Set).* Contains seven glass bottles. Four of the bottles contain 3 ounces of activated charcoal on which 25 milliliters of agent or industrial chemical has been adsorbed. Of these four bottles, two have HS, one has lewisite (L), and one has chloropicrin (PS) adsorbed onto the charcoal. Of the remaining three bottles, one contains 6 grams of triphosgene (a CG simulant), another contains 15 grams of chloroacetophenone (CN), and the third contains 15 grams of adamsite (DM).

The chemical and physical properties of chemicals of concern are listed in annex B. Health and safety data may be found in the Material Safety Data Sheets (MSDSs) in annex C.

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SECTION 2
ORGANIZATION

The primary organizations that will participate in transporting recovered CWM from DDMT to PBA are presented in figure 2-1. A general description of organizational responsibilities is presented below. Specific details of the roles and responsibilities of each organization are provided in section 8.

2.1 Program Manager, Defense Distribution Depot Memphis, Tennessee

The Program Manager DDMT (DDMT) has overall responsibility for activities occurring at DDMT and exercises direct oversight of the installation operating contractor. DDMT is the generator of the CWM but will allow the TEU to take physical custody of the CWM during transportation. DDMT will provide equipment for onsite movement and loading of the CWM, and is also responsible for coordinating medical support, security, backup emergency response and supplies for activities at DDMT.

2.2 U.S. Army Project Manager for Non-Stockpile Chemical Materiel

PMNSCM is responsible for identifying, properly storing, transporting, and disposing of all recovered CWM and for coordinating activities with supporting agencies. PMNSCM has the program responsibility for ensuring that the transportation of recovered CWM is accomplished in a safe and environmentally acceptable manner.

2.3 U.S. Army Soldier and Biological Chemical Command, Technical Escort Unit

The U.S. Army Soldier and Biological Chemical Command (SBCCOM) and TEU will provide support to DDMT by taking physical custody of the CWM and transporting it from DDMT to PBA. The TEU will be the first responders for emergency situations

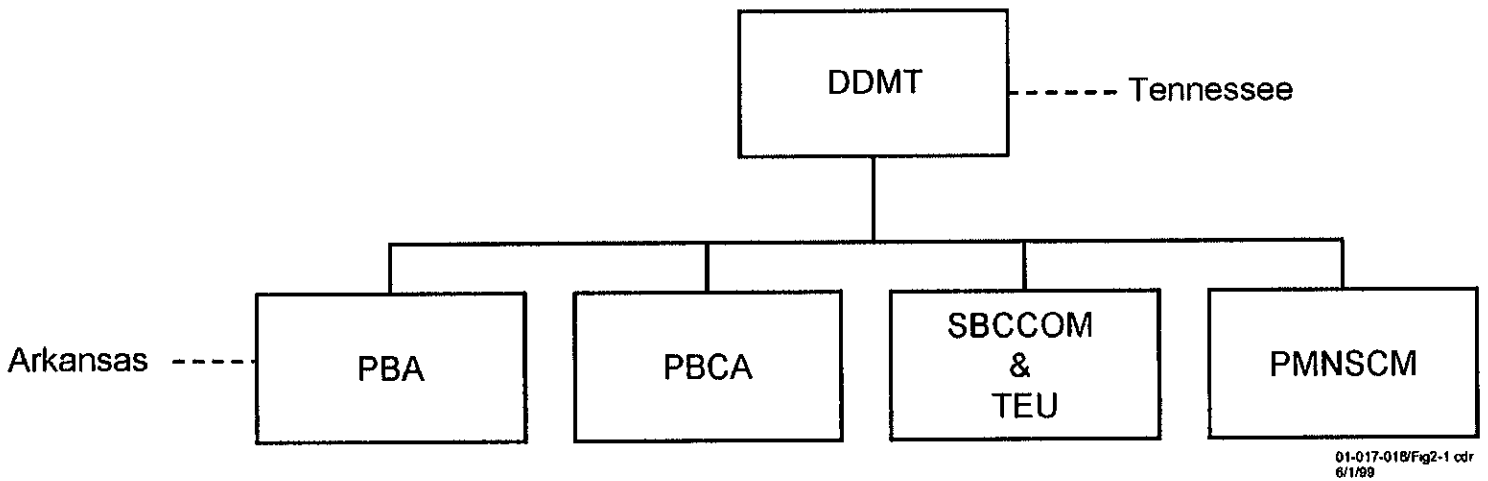

Figure 2-1. Primary Organizations for DDMT Transportation Plan

during transportation. SBCCOM will arrange for aircraft, select the transportation route, and coordinate landing and flight activities with DDMT, PBA, PBCA, and federal aviation officials. TEU will provide the onsite personnel and equipment to unload the CWM from the aircraft and to move it from the PBA helicopter landing zone to the storage facility.

2.4 Pine Bluff Chemical Activity

The PBCA will receive the CWM from TEU and operate the storage facility where the materiel will be stored until final disposition. PBCA Commander will assume responsibility for the CWM at the time it is placed in storage.

2.5 Pine Bluff Arsenal

PBA will provide support to DDMT by coordinating with the State of Arkansas Department of Environmental Quality on permit issues regarding receipt of the CWM, will sign the hazardous waste manifest, and will provide security and facility support.

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SECTION 3
PRETRANSPORTATION ACTIVITIES

This section describes pretransportation activities to include packaging, hazardous waste manifesting, facility inspections, and training.

3.1 Packaging

The following paragraphs describe the packaging, blocking, and bracing requirements associated with the transportation of CWM.

3.1.1 Containers. Recovered CWM will be placed into overpacks (MRCs) based on the size of the item. The MRCs are designed to protect the CWM from damage during transportation and will contain chemical liquids and vapors should any of the containers inside the overpack leak. As a minimum, the overpacks meet the general packaging requirements of the Department of Transportation.

3.1.2 Tie-Downs and Bracing. TEU personnel will secure the overpack containers to wooden pallets prior to transport. The overpacks and the pallets will be secured to the transport vehicle using blocking and bracing specified by the vehicle operator, pilot, or crew chief.

3.2 Hazardous Waste Manifest

Recovered CWM is categorized as a hazardous waste by Army Regulation (AR) 50-6, Chemical Surety. Therefore, transfer of responsibility for the CWM must be conducted in accordance with RCRA packaging, labeling, and manifest regulations [40 Code of Federal Regulations (CFR) 262.20 through 262.23]. As generator of the waste, DDMT will prepare a hazardous waste manifest prior to CWM transport and will retain accountability for the waste until it is placed into storage at PBA. The DDMT

waste generator identification number, TN4210020570, and the PBA interim status storage facility identification number, AR0213820707, will be used on the waste manifest. This manifest must accompany the shipment and be verified during each transfer operation.

While DDMT retains accountability for the CWM during transport, TEU will take physical custody of the CWM and be responsible for its safe handling during transportation from DDMT to PBA. TEU will obtain all necessary permits to transport hazardous waste through all jurisdictions on the route. The TEU will transfer accountability for the CWM to the storage facility manager by conducting and documenting a joint inventory. This will also serve as a chain-of-custody inventory and will ensure that manifested hazardous waste has been accounted for as required. The Commander, PBCA will accept responsibility for the CWM at the time it is placed in storage at PBA.

A sample hazardous waste manifest form is provided in annex D.

3.3 Facility Inspection Requirements

TEU will ensure that an inspection has been conducted of the storage facility at DDMT prior to removal of the CWM and at PBA prior to placing the CWM into storage. For each facility, storage structures, equipment, and operational procedures will be evaluated to ensure that each storage activity is operating in a manner that is protective of public health and safety and the environment. The facility inspections will evaluate the condition and status of the following:

a. Equipment that is integral to:

- Safety
- Emergency response
- Security
- Operations.

b. Procedures and records that provide an inventory of the number, type, and characteristics of the CWM in storage

c. Records of inspections and documentation of repairs and remedial actions that were performed to prevent health or environmental hazards.

Facility inspections will be performed in accordance with a facility inspection checklist that will be provided at the DDMT IHF and the PBCA storage facility. Loading and unloading areas will be inspected daily when in use.

3.4 Safety Equipment

Each vehicle and aircraft used to transport CWM will be equipped with the following safety equipment.

a. *Radio or Cellular Telephone.* For communication between participating organizations and with emergency response agencies

b. *Fire Extinguisher.* Suitable for use on a class A-, B-, or C-fire

c. *First Aid Supplies.* Easily accessible and clearly displayed and marked

d. *Spill Kit.* For quick access in case of a material spill

e. *Personal Protective Clothing.* The following personal protective equipment (PPE) will be available in each vehicle:

- OSHA Level B PPE
- Gloves
- Eye Protection
- Respirators.

3.5 Training and Certification Procedures

Each agency will provide an employee training program that complies with requirements specified in 49 CFR 172.700 through 172.704 and DA Pamphlet (Pam) 385-61. Training will be provided on hazardous waste operations, use of PPE, and, if needed, heavy equipment operation.

3.5.1 Site-Specific Training. Site-specific training will be provided for all employees, contractors, and subcontractors who have met the requirements of 49 CFR 172.700 through 172.704 and DA Pam 385-61. Operational training will be conducted prior to transportation of the CWM. Topics addressed will include:

- Packaging
- Loading
- Blocking and bracing
- Emergency procedures during transportation.

Training will be conducted prior to the job startup to ensure that personnel have a thorough understanding of the Emergency Response and Contingency Plan for DDMT, PBA Disaster Control Plan, standing operating procedures (SOPs), and physical and chemical hazards of the site. The following topics will be addressed in the health and safety training:

- Names and titles of employees and their duties
- Persons responsible for safety and health
- Acute and chronic effects of exposure to hazardous substances that may be present, potential routes of exposure of these substances, exposure limits, and the level of personal exposure that can be anticipated

- Monitoring procedures and functions, limitations, and maintenance of monitoring equipment
- SOPs
- Site control measures
- PPE
- Emergency procedures.

By the time this Transportation Plan is implemented, all personnel involved in the transport of the CWM will have completed at least 40 hours of training in health and safety issues associated with work at a hazardous substance site.

3.5.2 Safety Meetings. All personnel involved in the transport of CWM must attend a safety meeting at the beginning of the transportation action. This meeting, conducted by the TEU, will cover items such as specific health and safety issues, planned transportation activities, changes in plans, PPE, personnel and equipment decontamination, potential chemical and physical hazards, and contingency actions.

3.5.3 Training Documentation. Documentation of personnel training is the responsibility of each organization. Written documentation verifying compliance with DA Pam 385-61 and 29 CFR 1910.120 (e)(3), (e)(4) (as applicable), and (e)(8) must be submitted to the health and safety officer before CWM is transported or emergency response duties are assigned. Documentation of workers' current training credentials will be maintained by DDMT, PBA, PBCA, or TEU, as applicable.

3.5.4 Hazard Communication Training. Hazard communication training will be conducted in accordance with the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200 and 1926.59). Copies of MSDSs for hazardous materials that are to be transported will be available to all

personnel taking part in activities described in this Plan. The hazard communication training will be conducted in accordance with 29 CFR 1910.1200 and 1926.59. Training will include all hazards or potential hazards associated with transportation activities, and a description of any hazardous chemicals to be transported.

3.5.5 Chemical Warfare Materiel Training. All personnel involved in the transportation of CWM will undergo training concerning the CWM, although site activity involving CWM or contamination resulting from these agents will only involve the TEU. The intent of this training is to inform personnel of the hazards associated with CWM. The TEU personnel have undergone U.S. Army training required to qualify and maintain proficiency in their military or civilian occupational specialties.

SECTION 4
TRANSPORTATION ACTIVITIES

This section describes the transportation activities associated with moving recovered CWM from DDMT to PBA. Based on the HA performed to evaluate the plans and procedures presented in this Transportation Plan, this Plan can provide for the onsite and offsite transportation of recovered CWM in a safe, secure, and environmentally sound manner. Details of the HA are presented in annex A.

4.1 Description of Transportation Vehicles

4.1.1 Ground Transportation Vehicles. Local materiel handling equipment will be used to move the MRCs from the IHF to the helicopter landing zone at DDMT. The DDMT landing zone is located on the south side of the paved area where the IHF is located (see figure 4-1). A suitable truck capable of hauling at least 1,000 pounds of cargo will transport the CWM from the PBA helicopter landing zone to the storage facility at PBA. Transfer equipment to load and unload CWM may be required at DDMT and PBA.

4.1.2 Aircraft. The Army intends to use a U.S. Army UH-1N helicopter to transport the CWM from the DDMT helipad to the PBA helicopter landing zone.

4.2 Transportation Routes

Specific transportation routes must be verified before the Plan is implemented. All drivers and pilots as well as assistant drivers, copilots, operators, and navigators will have clear instructions and maps to identify the route that will be taken. Any required stops for fuel or maintenance will be at pre-selected locations indicated on the route map. All routes will be as direct as possible.

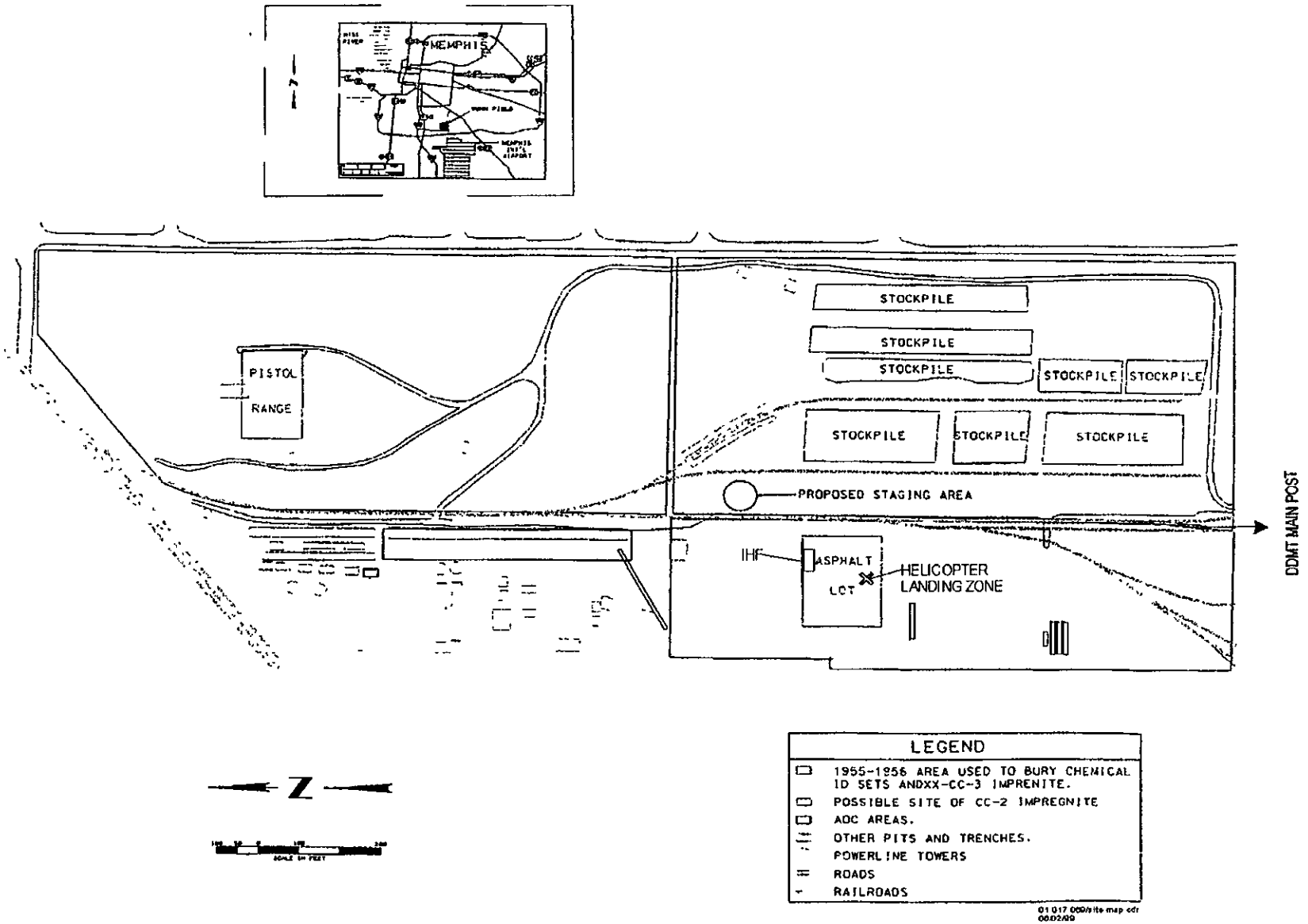

Figure 4-1. Dunn Field Site Map, Defense Distribution Depot, Memphis

4.2.1 Air Transportation Route. The CWM will be transported by military aircraft from DDMT to PBA by the most direct route that avoids densely populated areas and minimizes disruption of normal traffic activities. The distance from the DDMT to PBA is estimated to be 135 nautical miles. A generalized air transportation route is shown in figure 4-2.

4.2.2 Truck Transportation Routes. A suitable truck will be used to transport the CWM approximately 6 miles from the helicopter landing zone to the interim status RCRA-permitted hazardous waste storage facility. The route is shown in figure 4-3. The helicopter landing zone is located on Doolittle Road. The transport vehicle will travel north on Doolittle Road to Webster Road, and west on Webster to Rideout Road. The truck will turn left onto Rideout Road and travel to Avenue 55 where it will turn right. From Avenue 55, it will turn right onto 504 Street and travel to Roemer Road. At Roemer Road it will turn left and travel to Hanlon Road, where it will turn left. From Hanlon Road, it will turn left onto Avenue 6251 and travel to the Site Security Control Center for entry into the Bond Road Exclusion Area, site of the storage facility.

4.3 Transportation Procedures

The transportation procedures described in the following paragraphs include predeparture, en route, prearrival, and arrival activities. These procedures apply to each configuration of cargo, each site, and each mode of transport throughout the transfer of CWM from DDMT to PBA.

The transportation activities described in these paragraphs will be performed at each CWM transfer site. Transfer sites are where CWM is transferred from a storage facility to a transportation vehicle, transloaded from one transportation vehicle to another, or transferred from a transportation vehicle to a storage facility. The transfer sites in this plan include the DDMT IHF, the DDMT helipad, the PBA helicopter landing zone, and the PBCA storage facility.

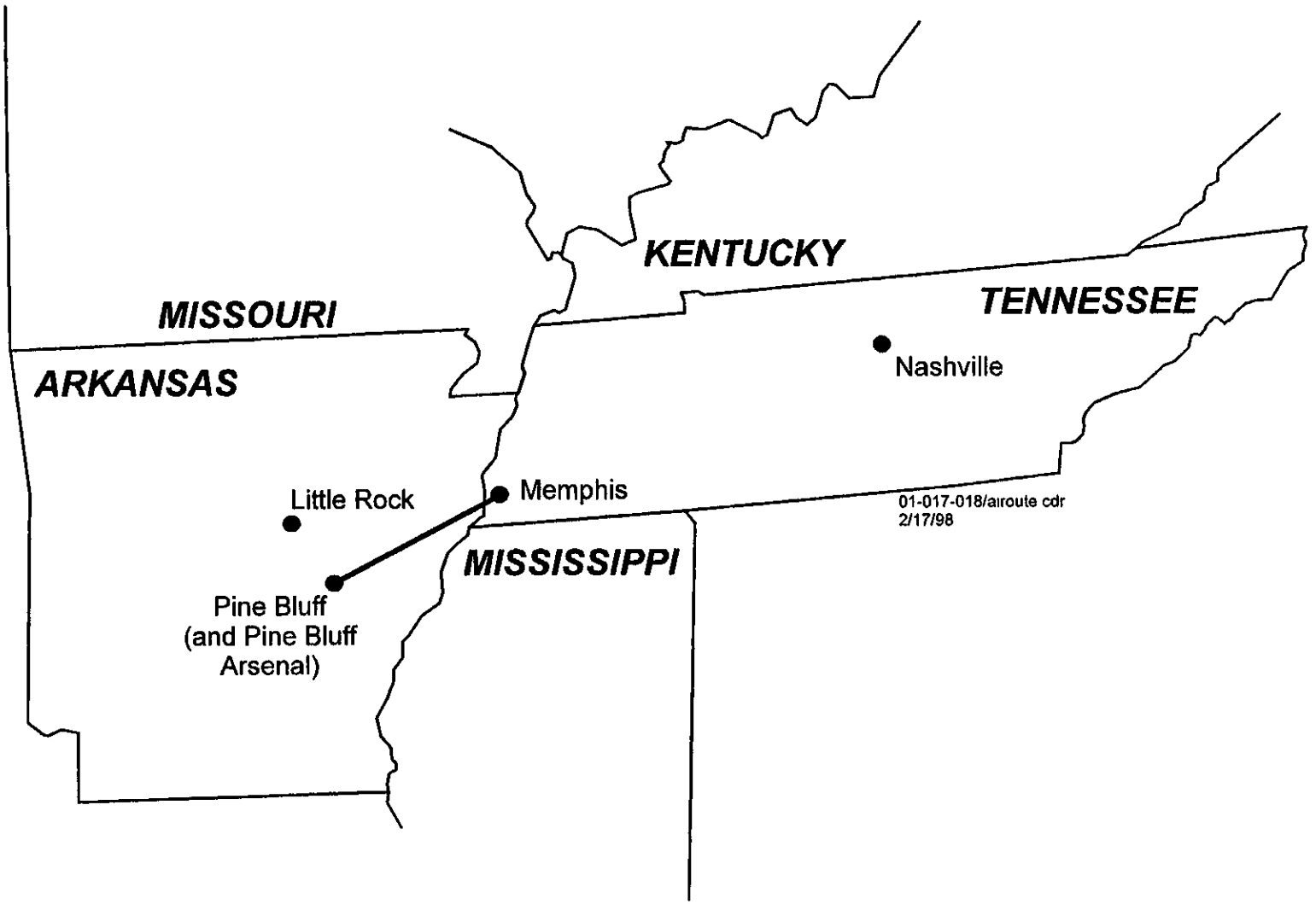

Figure 4-2. Generalized Air Route Between Defense Depot Memphis and Pine Bluff Arsenal

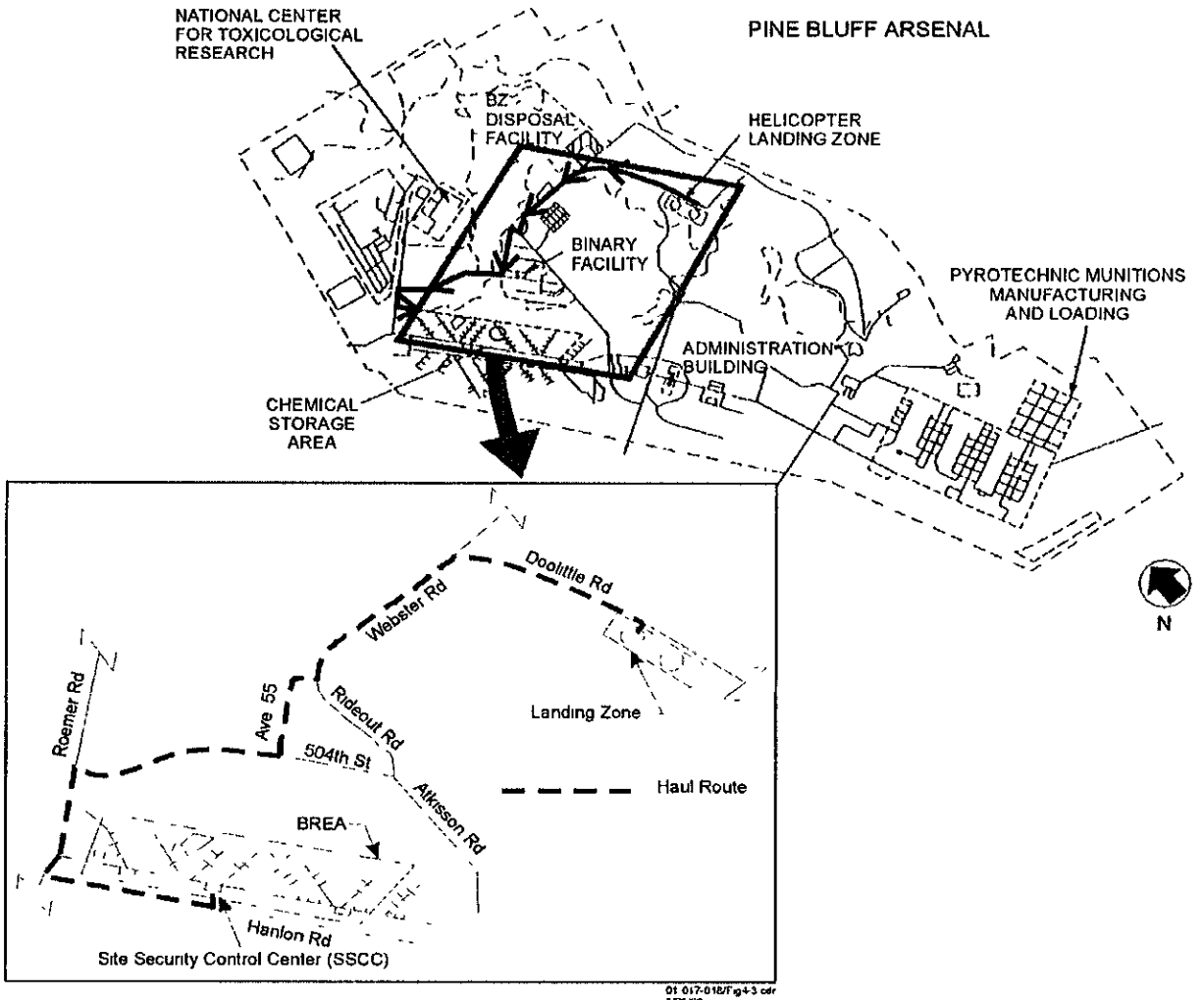

Figure 4-3. Pine Bluff Arsenal Transportation Route

4.3.1 Predeparture Activities. Predeparture activities will occur prior to transporting CWM from the DDMT storage facility, prior to moving CWM at each transfer site, and prior to resuming transportation after any intermediate stops.

a. *Determine Number of Vehicles and Order of Movement.* The TEU, after consultation with the pilot, will determine cargo configuration based on quantity of items to be moved and type of vehicle(s) that will be used. The TEU operations officer will also specify where any escort vehicles will be in relation to the cargo vehicle(s).

b. *Plan Route.* The ground and air routes proposed in this Plan may not be available at the time of transport; for example, a road may be closed for repairs. Therefore, the TEU will consult with the appropriate authorities to determine the best available routes for ground and air transport. All vehicle operators, assistant operators, and navigators will have clear instructions and maps to identify the route and any preselected stops for fuel (not planned), maintenance, and so forth. In the case of air transport, the route map will also indicate the location of airports where emergency landings can be made.

c. *Inspect Vehicles and Material Handling Equipment.* Prior to loading, preoperational checks will be performed on the cargo, vehicles, and material handling equipment according to the operator's manual for each vehicle. All ground transportation vehicles will be inspected using DD Form 626, Motor Vehicle Inspection.

d. *Verify Contingency Personnel and Systems in Place.* Emergency response teams, communication equipment, spill response kits, and detection equipment will be checked and verified as operational prior to execution of loading procedures.

e. *Inspect and Monitor IHF.* In accordance with the DDMT IHF Plan, TEU will visually inspect the IHF to verify its integrity prior to entering the structure. They will verify that the IHF door has not been tampered with and is closed and locked. Prior to entering the IHF, first entry monitoring (paragraph 6.1.1) will be conducted remotely using low-level, near real-time (NRT) air monitoring equipment to ensure that airborne chemical concentrations are below the time-weighted average (TWA) levels.

f. *Execute Loading Procedures.* Preapproved loading procedures will be executed to move the shipping containers from the storage area to the staging area, and from the staging area onto the transportation vehicles.

g. *Inspect and Monitor Containers.* Each shipping container will be inspected and monitored to verify its integrity prior to completion of loading procedures. Tie-downs will be inspected to ensure containers are correctly secured. Packing requirements are described in paragraph 3.1. Monitoring requirements are described in section 6.

h. *Verify Hazardous Waste Manifest.* The TEU will inspect each shipping container with the DDMT Accountable Officer to verify information on the hazardous waste manifest. TEU and the DDMT representatives will each sign the manifest to certify its accuracy. Additional verifications of the manifest will occur during loading, transfer, and unloading of CWM.

i. *Conduct Safety Briefing.* A safety briefing from the TEU will be given to all personnel in the transport vehicles prior to transportation in accordance with the TEU operations plan.

j. *Perform Communications Check.* A communications check will be made with each piece of communications equipment on each vehicle or aircraft prior to departure, in accordance with the TEU operations plan.

k. *Notify PBCA.* Inform PBCA of exact quantity and configuration of material being transported.

l. *Give Notification of Departure.* DDMT, PMNSCM, and PBCA will be notified immediately upon departure of the transport vehicle.

4.3.2 En Route Activities. En route activities will occur during transport from the DDMT helipad to the PBA helicopter landing zone and from the PBA helicopter landing zone to the PBCA storage facility.

a. *Location, Status, and Communications Check Procedures.* At predetermined checkpoints along the route, each vehicle will verify its location in accordance with SOPs for the move. (For example, operators may use the radio to communicate when they have reached a specific checkpoint.) The aircraft will be in constant communication with the SBCCOM Emergency Operation Center (EOC) throughout the air transport. Any transport problems will be reported to the SBCCOM EOC first. The SBCCOM EOC will initiate further calls for assistance.

b. *Halting Procedures.* Halting procedures will be established and used when the transport vehicle is required to stop for the following circumstances:

(1) *Major Mechanical Failure.* In this situation, the vehicle or aircraft cannot continue or be repaired with resources available within the transport vehicle. If the failure occurs during air transport, the procedures will involve emergency landing at the pilot's discretion. Selecting approved runways in less populated areas will be a part of the approved contingency plans. If the mechanical failure occurs during road transport, escort and operating personnel will attempt to move the vehicle so as not to impede other traffic. The cargo will be secured until suitable replacement vehicles have been provided.

(2) *Minor Mechanical Failure.* In this situation, the driver or operator experiences mechanical difficulty with the vehicle, but the vehicle can be repaired with resources available within the transport vehicle. Procedures will be in place to stop the vehicle or aircraft as safely and as quickly as possible (emergency runways, etc.). Communication procedures will be in place to inform SBCCOM, PBCA, and DDMT of the transporter status. Prior to restarting transportation operations, procedures will be implemented to account for all personnel and cargo.

(3) *Accident with Damage to Cargo.* An accident that results in damage to the CWM cargo will be addressed by the emergency response procedures in section 7.

(4) *Accident without Damage to Cargo.* Procedures will be in place for the transport vehicle to stop as safely and quickly as possible and for TEU personnel to inspect cargo for leaks, secure loose cargo, and administer first aid. PMNSCM, SBCCOM, PBCA, and the DDMT will be notified of the problem.

(5) *Public Disturbance and Traffic Obstruction.* In the event of an unexpected block of the transportation route, procedures will be developed to allow the transportation team to stop (if necessary), communicate status to the SBCCOM EOC, choose an alternate route, and react according to the situation.

4.3.3 Prearrival Activities. Prearrival activities will occur prior to arrival of the CWM at the PBA helicopter landing zone and the PBCA storage facility. To prepare for arrival of the cargo, the following tasks must be completed:

a. *Equipment Inspection.* All equipment required to unload the cargo and transfer it from one vehicle to another or from a vehicle to the storage

facility will be inspected to ensure that the equipment is on hand and operable. All PPE and safety equipment will also be checked.

b. *Contingency Personnel and Systems.* Emergency response personnel will be notified of the pending arrival of the CWM and will be standing by as required by the contingency plans. Contingency personnel supervisors will inspect all necessary equipment to verify its presence and to ensure that it is operable. Duty and equipment assignments can be verified at this time.

c. *Storage Facility Inspection.* Prior to implementation of this Transportation Plan, PBCA Material Management Personnel will ensure that sufficient space is available for storage. Prior to arrival of the CWM, facility personnel will ensure that all storage facilities and equipment are inspected and are operating in accordance with RCRA hazardous waste interim status storage requirements.

d. *Control of Site Access.* Access to the storage and transfer sites will be controlled to ensure that no personnel, beyond the minimum necessary, are exposed to hazards from CWM transfer and storage operations. Prior to arrival of the CWM, transfer and storage areas will be checked and controlled to prevent access by unnecessary personnel.

4.3.4 Arrival Activities. The following arrival activities will be required at the PBCA storage facility and at transfer points. The following actions will be taken once the cargo arrives at the transfer site or storage facility.

a. *Inspect CWM Overpack Containers.* Upon arrival at a transloading site, the TEU will inspect and monitor the CWM in accordance with TEU regulations, and procedures in section 6 of this Transportation Plan.

b. *Custody Transfer.* Upon arrival at the PBCA storage facility, the TEU and PBCA will conduct a joint inventory of the cargo and transfer accountability of the CWM to PBCA.

c. *Unloading and Transfer Operations.* Unloading and transfer operations will be conducted by TEU and PBCA personnel in accordance with TEU, PBCA, and PBA regulations, plans, and procedures.

d. *Verify that the Transportation Vehicle is Uncontaminated.* The transport vehicle will be certified as clean before being released from the storage facility or transfer point. This can be accomplished by verifying the following:

- No unusual activity occurred during transport (strong turbulence, cargo shifting, etc.).
- CWM overpacks are intact (not leaking), based on visual inspection.
- The cargo bay has no visible signs of contamination.
- At PBA only, results of low-level NRT air monitoring will demonstrate that vapor levels are below 1 TWA.

If any of the above are not true, contingency plans involving decontamination will be implemented before the vehicle will be released.

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SECTION 5
SUPPORT ACTIVITIES

This section describes support activities associated with the transportation of CWM. Support activities include communications, medical, and security.

5.1 Communications

Tracking of the cargo movement and notification of local authorities may involve use of electronic communication media. Some communication may rely on visual signals in addition to electronic methods.

5.1.1 Internal Communication. Personnel in cargo vehicles and any escort vehicles will communicate using radios or cellular phones. Communication equipment will be checked for proper operation at commencement of transport. TEU personnel accompanying the movement or on standby for emergency response may also use radios or cellular phones.

5.1.2 External Communication. The following external communication will be maintained throughout the transportation operation:

a. *Command Personnel.* To ensure safe passage and to maintain command and control, CWM movement will be tracked throughout the mission. Tracking may be accomplished by using predetermined checkpoints and by radio or telephone contact. Mobile radios and phones may be used to advise of changes in routes, unplanned stops, or need for repair personnel.

b. *Emergency Response Personnel.* In the event of an accident, TEU will notify the SBCCOM EOC (section 7) and local authorities for coordination of response efforts in accordance with the emergency response

contingency plan. Prior to beginning transport, movement personnel will be briefed on how to contact emergency response agencies along the route.

c. *Public.* In the unlikely event of an accident requiring notification or evacuation of the public, the SBCCOM EOC will coordinate with the local government officials to inform the public in accordance with existing emergency response plans and procedures.

d. *Communication Checks.* Communication checks will be performed when the shipment enters a new organization's area of responsibility. SBCCOM will monitor the status of the movement.

5.1.3 Notifications. Prior to actual transport, the Tennessee and Arkansas emergency management offices will be notified.

Tennessee Emergency Management Agency
P.O. Box 41502
3041 Sidco Drive
Nashville, Tennessee 37204-1502
605-741-6528
FAX 605-242-9635

Arkansas Office of Emergency Services
P.O. Box 758
Conway, Arkansas 70233
501-329-5601
FAX 501-329-8047.

5.2 Medical

To respond to chemical accidents or incidents that may affect workers or the public, medical support will be required. Procedures described in the PBA Chemical Accident/Incident Response and Assistance Plan address any situation that could occur during the transportation of CWM from DDMT to PBA.

5.3 Security

DDMT will provide security during the movement from the IHF to the DDMT helipad across the street. TEU will be responsible for security during air transport. PBA will provide security after the shipment arrives at the PBA.

5.4 Monitoring

The TEU will provide or arrange for agent monitoring equipment for the transportation operation. PMNSCM will have responsibility for oversight of monitoring activities and for equipment selection to support the transportation effort. Monitoring procedures and equipment are discussed in section 6.

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SECTION 6
MONITORING

Chemical agents and industrial chemicals of concern will be monitored using the sampling devices at the concentration levels specified in table 6-1. The frequency and location of air sampling are based on the type of monitoring required by DA Pamphlet (Pam) 385-61. Monitoring recovered CWM during transportation will be performed using the methods described in this Plan for each chemical agent that will be transported.

6.1 Types of Monitoring

Four types of monitoring are discussed in this section: first entry, transloading, confirmation, and contingency. First entry monitoring will be conducted at the DDMT IHF in accordance with the IHF Plan. Transloading monitoring will include visual inspection, and if a leak is suspected, gross-level monitoring. Contingency monitoring will be done when an emergency arises, such as a leaking MRC. Confirmation monitoring will verify an alarm activated during transloading procedures or during contingency monitoring.

6.1.1 First Entry Monitoring. First entry monitoring of the IHF will be performed with low-level NRT monitors to ensure that the interior airborne concentrations are below the workplace exposure level and to ensure that the CWM, overpacked in MRCs, is contained.

6.1.2 Transloading Monitoring. Transloading is removal of CWM from one conveyance and loading it onto another. En route aircraft transport is also considered transloading for purposes of monitoring. Monitoring during transloading will include periodic visual inspection to ensure that the MRCs are not leaking. The recovered

Table 6-1. Monitoring Equipment and Levels

Chemical of Concern	Type of Monitoring: Instrument	Workplace Exposure Level[a] TWA	Workplace Exposure Level[a] mg/m^3	Lowest Monitor Detection Level[b] TWA	Lowest Monitor Detection Level[b] mg/m^3
Chemical Agent:					
Mustard (H, HS, HD)	First Entry NRT: MINICAMS®	1.0	0.003	0.2	0.0006
	First Entry Confirmation: DAAMS	1.0	0.003	0.2	0.0006
	Transloading Movement NRT: CAM	Gross Level		10.0	0.03
	Transloading Movement Confirmation: Colorimetric Tube	Gross Level		36.7	0.11
	Transloading Movement Destination NRT: MINICAMS®	1.0	0.003	0.2	0.0006
	Transloading Movement Destination Confirmation: DAAMS	1.0	0.003	0.2	0.0006
	Contingency NRT: MINICAMS®	1.0	0.003	0.2	0.0006
	Contingency Confirmation: DAAMS	1.0	0.003	0.2	0.0006
Lewisite (L)	First Entry NRT: MINICAMS®	1.0	0.003	0.2	0 0006
	First Entry Confirmation: DAAMS	1.0	0.003	0 2	0.0006
	Transloading Movement NRT Detection/Confirmation: Colorimetric Tube	Gross Level		16.7	0.05
	Transloading Movement Destination NRT: MINICAMS®	1.0	0 003	0.2	0 0006
	Transloading Movement Destination Confirmation: DAAMS	1 0	0 003	0.2	0.0006
	Contingency NRT. MINICAMS®	1.0	0.003	0.2	0.0006
	Contingency Confirmation. DAAMS	1.0	0.003	0.2	0.0006

Notes:

[a] Workplace exposure level is an umbrella term encompassing all such levels, including the 8-hour TWA, the permissible exposure limit (for industrial chemicals only), the threshold limit value (for industrial chemicals only), and other limits developed for personnel protection.

[b] The lowest level that can be reliably quantified based on sampling and analytical procedures and calibration of the monitor.

CAM = chemical agent monitor
DAAMS = Depot Area Air Monitoring System
mg/m^3 = milligram per cubic meter
NA = not available
NRT = near real-time
TWA = time-weighted average

CWM, overpacked in an MRC, will be considered under engineering control and will not require additional monitoring (other than visual) until it is unloaded at the PBCA storage facility.

Upon arrival at a destination, and prior to unloading the cargo, transport vehicles will be inspected visually for evidence of contamination. If visual inspection indicates that the integrity of a container is suspect, gross-level monitoring will be performed as described in paragraph 6.1.3.1. If contamination is detected with gross-level monitors, the vehicle and any other affected material will be decontaminated in accordance with approved decontamination procedures.

Upon arrival at PBA, if visual inspection indicates that all MRCs are intact, low-level monitoring will be performed before the MRCs are transloaded for delivery to the PBCA storage facility. The purpose of low-level monitoring at the final destination is to document that the MRCs are not leaking when they are placed into storage.

6.1.3 Contingency Monitoring. Contingency monitoring is done when an emergency arises such as when a leaking MRC is identified. TEU will implement emergency response contingency actions (section 7) as a result of detecting a release during transloading operations or as a result of a credible event (accident during transport) indicating a potential release.

6.1.3.1 Release During Transloading. Upon visually detecting a release, the TEU, dressed in the appropriate level of PPE, will conduct monitoring using the appropriate monitoring instrument to confirm the release. TEU will monitor where the chemical materiel was released, identify the source of the release, and contain the leaking item in accordance with TEU operating procedures. Once the leakage has been contained, the area will be decontaminated by the TEU in accordance with DA Pam 50-6 or Technical Manual (TM) 60A-1-1-11. TEU personnel will continuously monitor the area until readings fall below the TWA for a minimum of three consecutive sampling periods.

6.1.3.2 Potential Release After a Catastrophic Event. Downwind monitoring will be initiated if a release is suspected as the result of a catastrophic event or at the scene of an accident during onsite transportation. The TEU will follow the response actions outlined in section 7. Plans for monitoring during contingencies will include a first-level contingency array based on the cargo inventory and the prevailing weather conditions. The appropriate monitors (table 6-1) will be used at each monitoring station in the monitoring array. Example monitoring arrays for situations involving transport of CWM are shown in figures 6-1 through 6-3. Specific distances will be determined based on the MCE (see annex A, paragraph 4).

6.1.4 Confirmation Monitoring. Confirmation monitoring will verify a gross-level or a low-level alarm when monitoring during loading procedures or during an emergency response. Confirmation monitoring will be conducted using monitors specified in table 6-1. Colorimetric techniques will be used to confirm a gross-level alarm and Depot Area Air Monitoring System (DAAMS) will be used to confirm a low-level alarm.

6.2 Offsite Transportation

When the recovered CWM is to be transported offsite, the CWM (overpacked in an MRC) will be loaded onto the aircraft and transported to the PBA helicopter landing zone. At the PBA helicopter landing zone, the CWM will be transloaded onto a truck for delivery to the storage facility.

6.3 Roles and Responsibilities

The TEU, acting as an agent of PMNSCM, will provide qualified personnel to perform chemical agent monitoring. The TEU will provide a monitoring team to perform the following:

a. Configure monitoring equipment for operations that use a MINICAMS® and DAAMS to detect chemical agents.

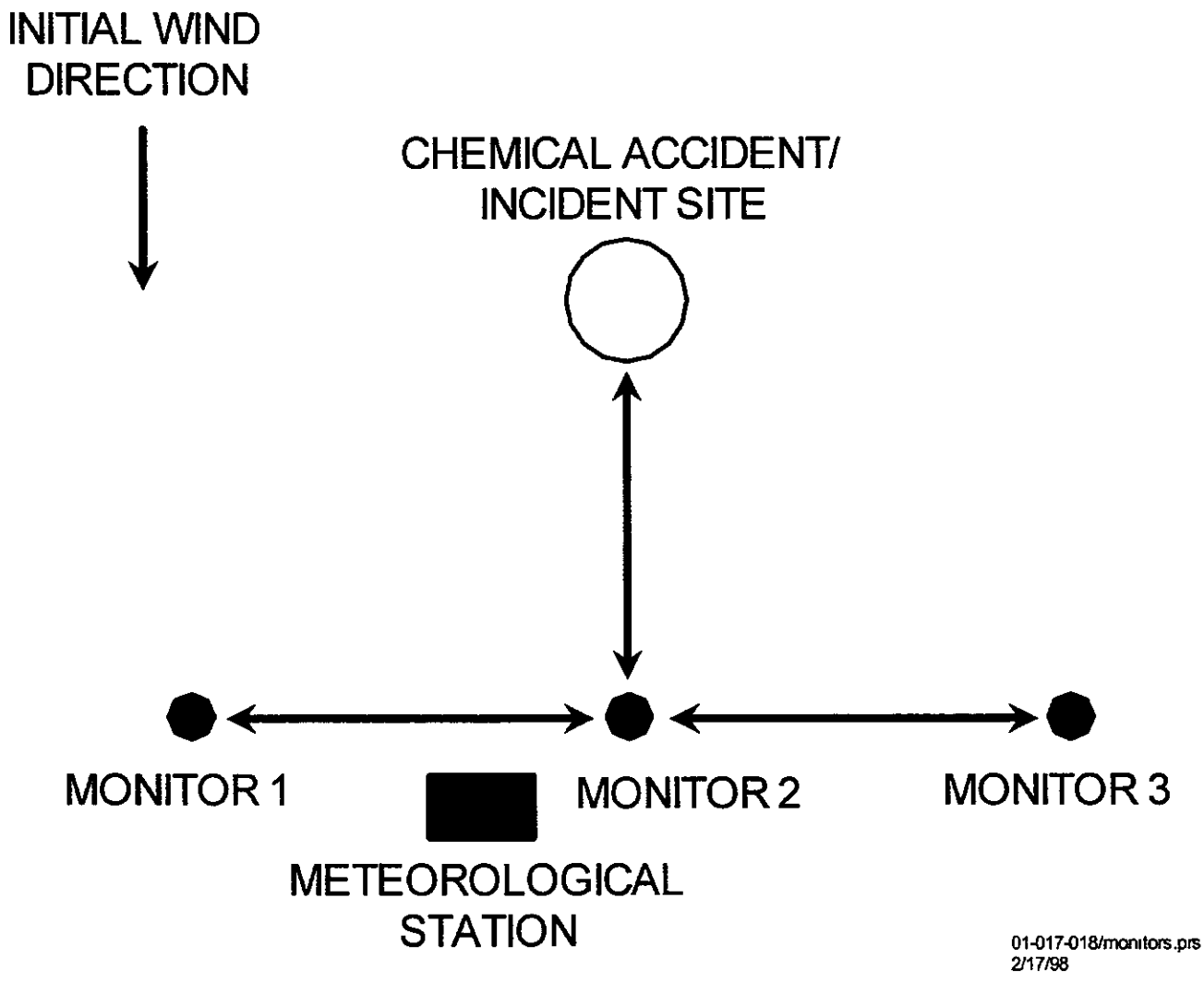

Figure 6-1. Initial Monitoring During Offsite Emergency Response

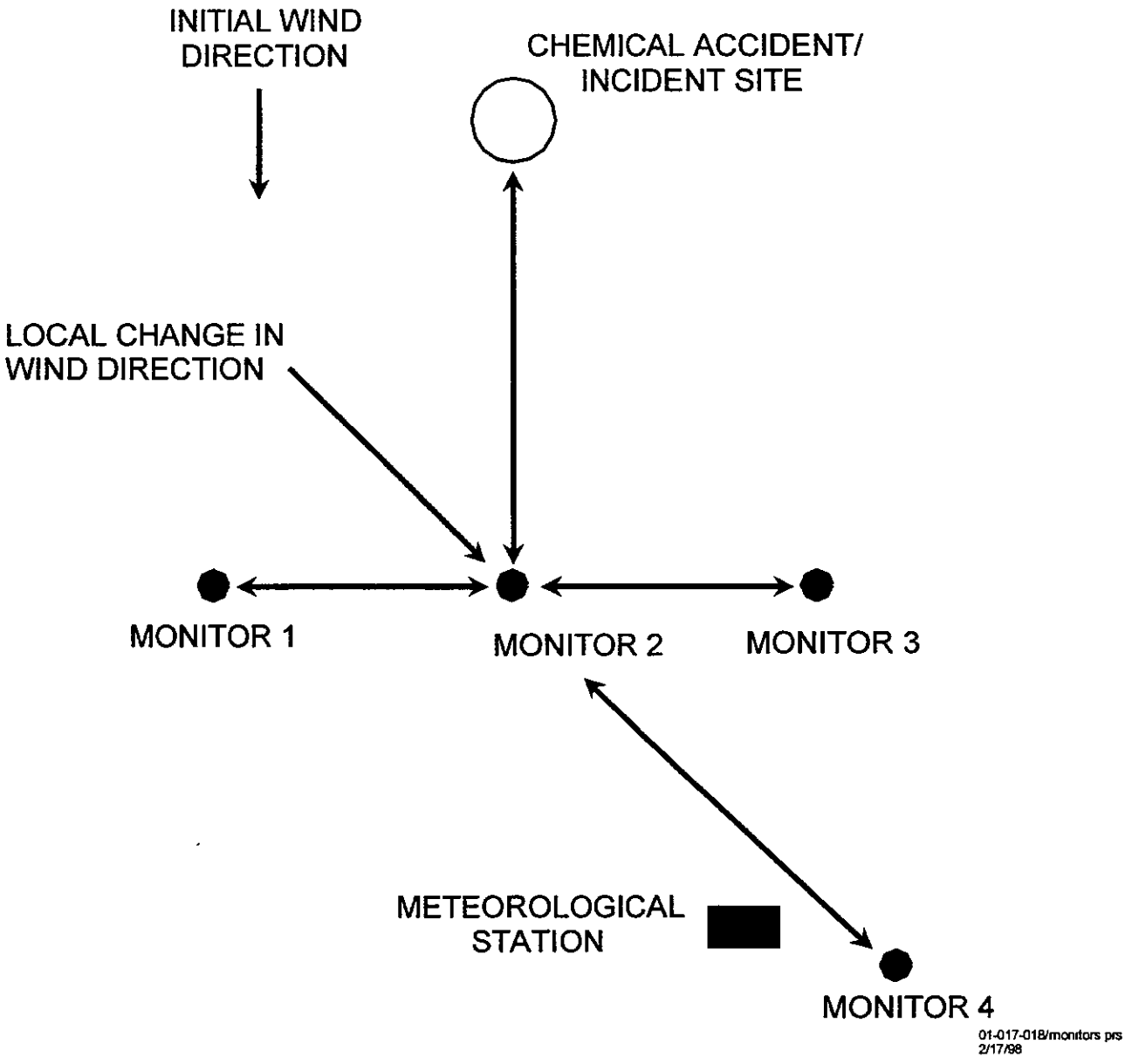

Figure 6-2. Second Array Monitoring During Offsite Emergency Response

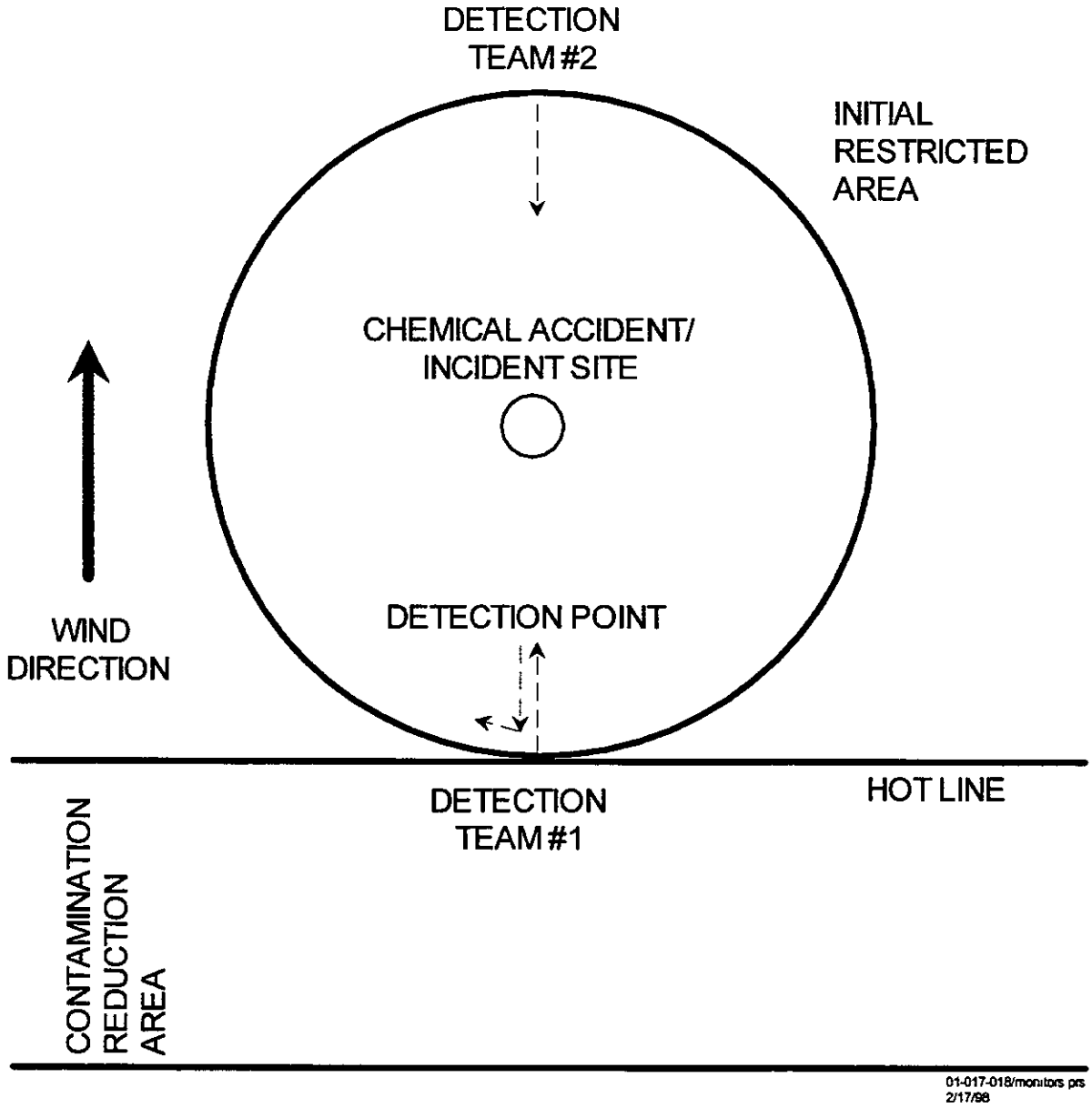

Figure 6-3. Surveillance Monitoring of the Restriction Area

b. Obtain agent standards for HD and L.

c. Record calibration data, instrument parameters, and agent standards (when used) in instrument logbooks.

Other TEU responsibilities associated with monitoring include the following:

a. Provide the required personnel, equipment, and support vehicles to conduct the operation.

b. Provide logistical support and resupply assets to sustain continuous operation throughout the duration of the project.

c. Ensure that a health and safety (air monitoring) log is maintained.

d. Coordinate with DDMT and other onsite organizations to ensure that the monitoring plan is understood and that actions to be taken in the event agent is detected are known.

e. Ensure monitoring equipment is tested and serviceable prior to commencing operations.

f. Perform D2PC hazard prediction modeling, prior to commencing monitoring, after a catastrophic event.

6.4 Chemicals of Concern

The following paragraphs provide a brief description of the monitoring strategies for the chemicals of concern. The workplace exposure levels for each chemical are identified in table 6-1.

6.4.1 Mustard (H, HS, and HD). The TEU will monitor for H, HS, and HD using MINICAMS® (see paragraph 6.5.1 for description) during first entry and contingency monitoring. The MINICAMS® will be configured with a flame photometric detector in the sulfur mode to detect H, HS, and HD. The workplace exposure level for mustard is 1.0 TWA [0.003 milligram per cubic meter (mg/m^3)]. The MINICAMS® detection limit for H, HS, and HD is 0.2 TWA. An HD standard will be used for instrument calibration per Army requirements. DAAMS tube samples (see paragraph 6.5.2) will be collected to confirm a MINICAMS® alarm.

In the event that a release is suspected during transloading, gross-level NRT monitoring will be conducted using a chemical agent monitor (CAM) (see paragraph 6.5.3) while Draeger colorimetric tubes (CH25803, as thioether) will be used for gross-level confirmation.

6.4.2 Lewisite (L). The TEU will monitor for L using MINICAMS® (see paragraph 6.5.1 for description) during first entry and contingency monitoring. The MINICAMS® will be modified for the detection of L by adding a 1,2-ethanedithiol (EDT) derivative module on the intake end of the sample line and will be configured with a halogen selective detector (XSD). The workplace exposure level for L is 1.0 TWA (0.003 mg/m^3). The MINICAMS® detection limit for L is 0.2 TWA. An L standard will be used for instrument calibration per Army requirements. DAAMS tube samples (see paragraph 6.5.2) will be collected to confirm a MINICAMS® alarm.

In the event that a release is suspected during transloading, gross-level NRT detection and confirmation will be conducted using Draeger colorimetric tubes (CH25001, as arsine).

6.5 Required Monitoring Equipment

The following paragraphs provide a brief description of the types of monitors to be used in accordance with this Transportation Plan. Monitoring equipment detection levels are provided in table 6-1.

6.5.1 MINICAMS® NRT Low-Level. Air samples for first entry and contingency monitoring of H, HS, HD, and L will be collected and analyzed with MINICAMS®. The MINICAMS® is a low-level, NRT vapor monitor that has been designed to detect chemical agents. The MINICAMS® detectors are configured for each chemical that is to be monitored (see each individual chemical for appropriate detector, paragraph 6.4).

The MINICAMS® uses a preconcentration sampler that passes air through a solid sorbent, such as a course mesh Tenax®, to collect the sample over a timed sampling cycle. The sample is desorbed and carried through a gas chromatograph (GC) temperature-programmed capillary column to the detector (see each individual chemical for appropriate detector, paragraph 6.4).

6.5.2 Depot Area Air Monitoring System. The DAAMS is not an instrument but an air sampling and analysis method that provides sampling data by using sorbent tubes. The system consists of small, glass, sorbent-packed tubes, a vacuum pump, and flow control hardware. Tenax® tubes will be used to sample all chemical agents. In the DAAMS method, a contaminant is collected by absorption onto the tube packing while air passes through the tube. After sample collection, the sample is thermally desorbed from the tube into the carrier stream of a GC and subsequently detected by a flame photometric detector. DAAMS has been certified for H, HD, and L and will be used to confirm a MINICAMS® alarm.

6.5.3 Chemical Agent Monitor. The CAM is a gross-level qualitative NRT monitor to detect HD. The CAM is a hand-held battery powered ion mobility spectrometer capable

of a response time of 60 seconds. The CAM is the best device available for en route aircraft NRT air monitoring. If required, the CAM will be used for en route monitoring.

6.5.4 Colorimetric Techniques. Colorimetric techniques are based on specific chemical reactions that produce of colored reaction products when contaminants are present above threshold concentrations. The colorimetric tubes listed below are available for qualitative detection of the chemical agents and quantitative detection of the industrial chemicals of concern.

a. HD (Draeger tube CH25803)
b. L (Draeger tube CH25303).

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SECTION 7
EMERGENCY RESPONSE CONTINGENCY PLAN

7.1 Introduction

This section outlines procedures to be taken in the unlikely event of an accident, emergency, or unintentional release of chemical agent during any phase of the transportation operation. The following procedures deal specifically with CWM transport. However, they rely heavily on emergency response procedures already prepared by the Army. Applicable references include:

a. DA Pamphlet 50-6, Chemical Accident or Incident Response and Assistance (CAIRA) Operations

b. Chemical Weapons and Materiel Escorts (TEU SOP 50-1)

c. Explosive Ordnance Disposal Procedures Chemical/Biological (C/B) Agents and Related Materiels; Characteristics, Leak Sealing, Disposal, and Decontamination (Army TM 60A-1-1-11)

d. PBA, Disaster Control Plan, Annex C, CAIRA Plan

e. DA Final Emergency Response and Contingency Plan for Solid Waste Management Sites (DDMT).

In developing emergency response procedures, consideration was also given to requirements in the Emergency Response Guidebook developed by the Research and Special Programs Identification of the Department of Transportation, and DA Contingency Plans and Procedures, including Oil and Hazardous Substance Spill Contingency Planning Control and Emergency Response set out in chapter 8 of AR 200-1, Environmental Protection and Enhancement.

7.2 Background

CWM is to be transported from DDMT to PBA. Specific operational phases are the following:

a. Transferring the CWM from the IHF onto a helicopter and flying the CWM from the DDMT helipad to the PBA helicopter landing zone

b. Transloading the CWM from the IHF onto a truck and driving it to the PBCA storage facility

c. Unloading the truck at the storage facility and placing the CWM into storage.

7.3 Objective

The primary concern of emergency response to a chemical accident/incident (CAI) is to protect human health and the environment by controlling chemical agent release. Transportation personnel will be prepared in the event of an emergency. All emergency response operations will be performed in the fastest manner compatible with safety and in accordance with preapproved contingency plans. The major types of emergencies that can be encountered are: (1) spills that may include exposure to potentially hazardous materials; (2) incidents requiring medical help; and (3) fire.

This emergency response contingency plan complies with 29 CFR 1910.120 (q) (1) and addresses the following elements:

a. Planning
b. Emergency recognition
c. Personnel, authority, and communications
d. Emergency alerting and reporting

e. Evacuation routes
f. PPE and emergency equipment
g. Procedures for decontamination and medical treatment.

As recommended by the Environmental Protection Agency, this emergency response contingency plan also includes paragraphs that address procedures to protect the local affected population in case of an accident or emergency. They are as follows:

a. First responders
b. First aid and medical information
c. Air monitoring plan
d. Spill control and countermeasures.

7.4 Command and Control

The recovered CWM being moved is not designated as chemical surety materiel and is not considered vital to national defense. Therefore, the DoD does not have inherent authority over civil authorities during contingency operations involving this Plan. CWM transportation will be the responsibility of the TEU, while PMNSCM has overall responsibility for the transportation of the CWM. DDMT retains the accountability for the CWM as generator of the waste. While the Army is responsible for safe transport and may be liable for the effects of any release of toxic material, it does not necessarily have the authority to direct response actions. In case of a CAI, the TEU traveling with the cargo will be the first responder and will take those actions necessary to save lives, protect property, and notify local and regional authorities. Authority for directing response actions beyond first response depends on where the emergency occurs. If a CAI occurs at DDMT, the DDMT has authority for emergency response. If a CAI occurs at PBA, then the Commander, PBA has authority. If a CAI occurs outside of these installations, then the local civilian authorities will direct the response actions. If a CAI occurs on a military installation but the effects extend off the installation, response actions would be conducted by both military and civilian authorities based on preapproved agreements between the federal and local governments.

In case of an emergency, the TEU will assume initial control of the CAI scene and will notify local authorities and the SBCCOM EOC. Once local authorities arrive at the scene, the TEU will assume an advisory role and will cooperate with the local authorities (for example, provide advice on the need for evacuation, size of hazard area, or need for PPE). Render-safe and leak-sealing procedures should be approved by local authorities; otherwise, only those actions needed to save lives will be performed.

TEU personnel accompanying the shipment are trained first responders for a CAI. Minor accidents or leaks could be handled by TEU on board the transport vehicle. EOC will notify the hazardous material response teams whose facilities are located along the route of the transport activities.

7.5 Emergency Response Resources

An accident during transport creates different problems than would an accident at a fixed site. Since a potential CAI can occur anywhere on the transportation route, the personnel associated with CWM transportation will be the most effective resource to respond to a chemical accident and shall be trained and prepared to handle any situation that may arise. The following paragraphs outline the personnel, equipment, and local, state, and federal resources that should be or are available in the event of an emergency.

7.5.1 Personnel. CWM escort will be the responsibility of the TEU, which is under direction from SBCCOM. The TEU will be the first responder in the event of a CAI. PMNSCM has overall responsibility for the transportation of the CWM.

The TEU is responsible for the custody of the recovered CWM and for handling emergencies during transportation phases. The TEU personnel will be trained and equipped to respond to any type of CAI that may occur. The TEU will be capable of implementing the same primary public safety measures as those performed by

community officials in fixed-site emergency response programs. The TEU will have the proper tools to handle an unpredicted situation requiring monitoring, first aid, decontamination, and fire protection.

a. *Driver Requirements.* Each vehicle and aircraft will have a licensed driver and assistant driver. Drivers will be alert and will have passed a physical exam as prescribed by the Interstate Commerce Commission Motor Carrier Safety Regulations, Federal Aviation Administration Regulations, or military equivalent.

b. *Training and Certification.* All personnel who participate in the emergency response to a chemical accident during the movement of CWM should (and all TEU personnel will) be trained and certified in emergency procedures, use of PPE, first aid, cardiopulmonary resuscitation (CPR), and should possess basic knowledge of agent exposure symptoms (again, TEU personnel will have this knowledge). This will include, as a minimum, 49 CFR 172.700 through 172.704 and DA Pam 385-61 training. Team leaders will have familiarized themselves with the PBA CAIRA Plan, the DDMT Emergency Response and Contingency Plan, and the TEU operations procedures and SOPs applicable to CWM transportation, decontamination, spill cleanup, and the emergency response procedures in this plan.

c. *Team Coordination and Support Personnel.* The TEU will have the capability to coordinate responses with local emergency response personnel, who should provide response management expertise in areas such as public alert, notification, traffic and access control, assistance to affected populations, initial medical intervention and care, and fire fighting.

d. *Backup Personnel.* If any person required for safe accomplishment of the mission cannot perform his or her function, the mission must have replacement personnel on board or must stop until replacement personnel arrive.

7.5.2 Equipment. The TEU, whether part of the road or air transport, will be equipped to handle emergencies. The same types of equipment, operations, PPE, decontamination and spill containment equipment, and communication and medical supplies will be used for each transportation mode. During ground transport, a vehicle will be available to transport injured personnel to the identified emergency medical facilities. TEU will perform its escort mission in accordance with TEU Regulation 50-1.

7.5.3 Local and State Emergency Response Resources.

a. *Local.* The DDMT Emergency Response and Contingency Plan and the PBA CAIRA will be reviewed prior to recovered CWM transport. These Plans specify the onsite emergency coordinators, local emergency response agencies, and safety and environmental officials. County-based response forces and resources adjacent to the transportation corridor will be identified by the SBCCOM EOC prior to conducting the air transportation. These resources will be available for use in the event of a CAI. The local officials at PBA must be notified about the initiation of air transport.

b. *State.* State emergency response resources may be needed to provide secondary support such as medical and evacuee care and security. The DDMT Emergency Response and Contingency Plan and the PBA CAIRA Plan can be referred to for the authorities who should be contacted.

7.6 Emergency Response Procedures

These procedures outline operational tasks to be completed before CWM transportation and in the event an accident or incident occurs involving the cargo.

Before starting transportation operations, the TEU will review the emergency procedures and will ensure that all necessary emergency equipment is ready for use. All personnel training will have been accomplished prior to operations. TEU personnel will be briefed on their roles in emergencies such as firefighting, cleanup, or first aid.

In the case of an accident during the transportation of CWM, immediate emergency response actions are required. An emergency would begin upon detection of agent by a monitor or an alarm, the presence of smoke, or the suspicion of CWM contamination. These hazards may include (but are not limited to) the following:

a. Hazards associated with CWM
b. Fire
c. Medical emergencies
d. Hazardous material handling.

These hazards and associated mitigating actions are addressed in the following paragraphs.

7.6.1 Hazards Associated with Chemical Warfare Materiel. Handling of CWM will be addressed in the TEU operations plan. Some of the essential procedures used to handle a CAI are as follows:

a. *Isolation.*

(1) Upon observing a spill, leak, or discharge of the contents of a container of any size, TEU will immediately don their masks,

proceed to a safe distance upwind, direct other personnel away from the site, and initiate appropriate emergency response actions.

(2) Ignition sources, including motor vehicles, will be extinguished immediately within 50 feet of the CWM.

(3) Persons who may have had contact with the spilled materials will undergo decontamination consistent with the extent and nature of the contact.

(4) The TEU will take action to identify the contamination and mitigate leaking CWM.

b. *Notification.*

(1) TEU will notify the SBCCOM EOC who will in turn contact DDMT if the emergency occurs in Tennessee or PBA if the emergency occurs in Arkansas. DDMT or the PBA Operations Center will contact the state emergency management as specified in the DDMT Emergency Response and Contingency Plan and the PBA CAIRA Plan.

(2) As conditions dictate and in accordance with their operating procedures, the authorities will declare an emergency, initiate remediation, request assistance, and make offsite notifications.

c. *First Aid.*

(1) If workers are unable to evacuate themselves, their rescue will be the responders' first priority.

(2) Responders will wear the PPE appropriate to the circumstances to conduct the rescue.

d. *Characterization.*

(1) The TEU will investigate the CAI site to determine the condition of the involved cargo and areas of possible contamination. Material will be presumed to be hazardous until determined otherwise. Reentry to the area will be conducted in a level of PPE appropriate to the conditions.

(2) At the discretion of the TEU, samples will be collected for field or laboratory testing.

(3) The area of the spill will be determined and documented. The quantity of spilled material will be estimated. The area will be marked with stakes and barrier tape. The TEU will assist in appropriate traffic control around the area until responders arrive.

(4) The spread of materiel will be contained as soon as circumstances permit. Loose sorbent or sorbent pads may be used to prevent the spread of spilled materiel.

e. *Cleanup and Disposal.* Damaged containers will be placed in larger MRCs or in drums of compatible construction that contain suitable loose sorbent. Contaminated tools and equipment for decontamination or disposal will be collected. Disposal will depend on the identity of the spilled material.

7.6.2 Fire. In the unlikely event that fire occurs during CWM transport, procedures for responding to fire events are as follows:

a. *Notification.* The local fire department will be notified as soon as possible of the location, size, and nature of the fire. As conditions dictate, fire department personnel will declare an emergency, initiate remedial procedures, request assistance, and make necessary notifications.

b. *Rescue.* Rescue of persons unable to evacuate themselves shall be the first priority of responders.

c. *Firefighting Procedures.*

(1) Stop the vehicle.

(2) Sound the alarm.

(3) Evacuate – If human life appears to be in danger or the spread of fire appears to be rapidly progressing, personnel will be moved further upwind, away from the fire.

(4) Use fire extinguisher – No attempt should be made to extinguish large fires. These should be handled by the fire department.

(5) Request assistance from the fire department.

d. *Fire Extinguishing.* There are three classes of fire. Examples of extinguishers acceptable for extinguishing each class of fire are listed below.

(1) Class A – Burning wood, cloth, paper, rubber, many plastics, and other ordinary combustibles can be extinguished with:

- Water
- Water with 1-percent aqueous film forming foam (AFFF)
- Water with 5-percent AFFF or fluoroprotein foam
- ABC dry chemical
- Halon 1211.

(2) Class B – Flammable liquid, gas, and grease fires can be extinguished with:

- ABC dry chemical
- Purple K
- Halon 1211
- Carbon dioxide
- Water with 6-percent AFFF.

(3) Class C – Energized electrical equipment fires can be extinguished with:

- ABC dry chemical
- Halon 1211
- Carbon dioxide.

e. *Protective Clothing.* Based on the conditions, the TEU and the fire department will determine appropriate safe distances and PPE. Firefighting turn-out gear may be required. Other protective gear may be worn, depending on the potential for chemical agent release.

f. *Decontamination.* At the conclusion of firefighting activities, the TEU or other response personnel will determine, to the extent practicable, the

nature of the contaminants encountered during the incident and will arrange for equipment to be decontaminated or labeled and isolated for further action.

7.6.3 Material Handling. The onsite emergency response will be performed by the TEU and DDMT or PBA/PBCA personnel as appropriate. When a leak or spill occurs, immediate containment and preventive measures must be taken. Procedures for material handling are specified in TEU SOPs. Upon completion of cleanup efforts for the accident, responsible personnel should notify the local authorities, collapse the exclusion area, and give the order to resume the transportation operation.

7.7 Medical Emergencies

Seriously injured or ill persons should not be moved, unless their lives are endangered, until an assessment has been made by a person trained in first aid and CPR. If the injury or illness is minor, full decontamination should be completed and first aid should be administered before transport. First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must be reported to local authorities. Any person transporting an injured or exposed person to a clinic or hospital should have directions to the hospital and information concerning the nature of the injury or illness.

Coordination with facilities is outlined in the PBA CAIRA and the DDMT Emergency Response and Contingency Plan. The following medical facilities may be contacted for emergency care:

a. In the vicinity of Memphis, Tennessee

Baptist Central
899 Madison Ave.
Memphis, TN 38146
901-227-2727

Methodist Central
1265 Union St.
Memphis, TN 38104
901-726-7000.

b. In the vicinity of Pine Bluff, Arkansas

Jefferson Regional Medical Center
1515 West 42nd St.
Pine Bluff, AR 71603
870-541-7100

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SECTION 8
ROLES AND RESPONSIBILITIES

Many of the participating organizations involved with performing offsite transportation of recovered DDMT CWM have both shared and individual roles and areas of responsibilities. The primary participating organizations include PMNSCM, DDMT, PBA, PBCA, and SBCCOM/TEU. The organization is shown in figure 2-1.

Common responsibilities among the participants include:

a. Coordinating with other participants

b. Performing duties in accordance with accepted health and safety procedures

c. Using established supply procedures and providing the supplies necessary to support their operations

d. Providing emergency response support

e. Developing training plans for use by emergency response teams.

Specific responsibilities for each key organization are presented in the following paragraphs.

8.1 U.S. Army Program Manager for Chemical Demilitarization

PMCD is responsible to ensure that the CWM is handled in a safe and environmentally acceptable manner. A PMNSCM coordinator will be identified for the DDMT

transportation effort to ensure all required coordination is conducted and responsibilities are fulfilled. Other PMNSCM responsibilities are to:

a. Develop an HA that addresses the relative risk associated with this plan. This assessment should identify variables that impact selection of landing areas and air corridors. It should assess transportation activities along selected truck and air routes, and risks associated with the vehicles or aircraft selected for the mission. The HA is provided in annex A.

b. Coordinate to ensure that all transportation operations are conducted in a safe and environmentally acceptable manner.

c. Coordinate to ensure that the recovered CWM is properly packaged and repackaged, if required.

d. Coordinate to ensure that standby decontamination and medical support is available during all phases of the transport operation.

e. Coordinate CWM movement with the TEU.

f. Monitor the status movement of the CWM in coordination with SBCCOM EOC.

g. Notify DDMT upon receipt of the cargo at PBA.

8.2 Defense Depot Memphis, Tennessee

As the supported organization, DDMT will:

a. Provide proper notifications and coordination to the U.S. Environmental Protection Agency (USEPA), the State of Tennessee, and local authorities regarding the transportation operation.

b. Provide physical security and emergency response capabilities for movement from the DDMT IHF to the DDMT helipad based on the route and mode of transportation presented in this plan.

c. Prepare the hazardous waste manifest. DDMT retains accountability until the recovered CWM is transferred to PBCA.

d. Notify the National Response Center of CWM spills while transporting material from DDMT to the DDMT helipad if releases exceed the reportable quantity.

e. Ensure that the TEU has all required permits to transport the cargo through each jurisdiction that will be entered.

f. Report spills of regulated substances to the TDEC.

8.3 U.S. Army Soldier and Biological Chemical Command

SBCCOM will support the transport of CWM from DDMT to PBA. SBCCOM will:

a. Arrange for all aircraft and provide trained crews required to support this Transportation Plan.

b. Coordinate air transportation with the appropriate agencies.

c. Transport recovered CWM from DDMT to PBA via UH-1N helicopter.

d Operate an operations center to monitor the complete movement of the recovered CWM to PBA.

e. Implement loading, transloading, and unloading plans for all operational activities.

f. Provide additional support as required.

g. Make required notifications to the National Response Center to achieve compliance with public law.

8.3.1 Operator, Driver, or Pilot. The operator, driver, or pilot will be responsible for the safe operation of the carrier and for compliance with regulations regarding transportation of CWM. The operator will perform preoperational checks, inspect load tie-downs in accordance with specifications, obtain document packets, verify and sign documents, and check for proper placarding. The operator will be trained in self-protection, emergency first aid, and spill abatement procedures. The flight crew will be trained and certified as required by the TEU.

8.3.2 Assistant Operator or Navigator. A copilot, navigator, or assistant operator will be used for aircraft operation to safely accomplish the mission and to comply with Federal Aviation Administration requirements. The assistant operator will be required to perform preoperational checks, to verify that communication equipment is functional, and to carry and be familiar with route maps. The assistant operator will be able to perform operator, driver, or pilot duties, and will be trained in self-protection, first aid, and spill abatement procedures. During ground transportation, the assistant driver may be provided based on the length or complexity of the route.

8.3.3 Maintenance Personnel. Maintenance will be the responsibility of the owner or operator of the aircraft or ground vehicle. Maintenance personnel who are capable of responding to locations that may be used for unscheduled stops and that do not have repair services will be identified in contingency plans.

8.4 U.S. Army Technical Escort Unit

The TEU is a specialized unit of SBCCOM that has historically been the sole escort of CWM as required by AR 50-6.

The TEU will follow established lines of authority. TEU has responsibility for the cargo and escort personnel. During air transportation, the pilots will have command of the aircraft. The TEU will maintain accountability for the cargo and command of escort personnel.

During a CAI, the TEU will act as the onsite safety coordinator and first responder until relieved by local authorities. Once relieved, TEU will serve as safety advisors regarding the cargo. TEU personnel may be used to assist during emergencies, but they will remain under command and control of the senior military representative. This is to ensure that DoD members do not violate aspects of the Posse Comitatus Act, prohibiting military enforcement of civil law.

Specific TEU responsibilities are to:

a. Provide qualified escort personnel and trained emergency response teams to travel with the recovered CWM from the DDMT IHF until it reaches its final destination. The TEU will perform emergency response duties as required en route.

b. Ensure that all personnel have completed required certification training prior to commencement of the mission.

c. Select specific equipment to load, transload, and unload cargo and prepare an SOP for its use. The TEU will be required to develop inspection criteria to ensure equipment is operable.

d. Maintain radio contact with the SBCCOM EOC and provide notification, if required, to initiate emergency response actions.

e. Provide maintenance for communications equipment or provide backup communication.

f. Provide personnel and equipment for ground transportation of the recovered CWM from the PBA helicopter landing zone to the storage facility.

The TEU will travel with the recovered CWM and will perform the following:

a. *Monitoring.* The shipping containers will be inspected before they are loaded onto transport vehicles in accordance with specific monitoring instructions (section 6).

b. *Container Inspection.* The cargo will be inspected during transportation as needed to determine the integrity of the containers and cargo tie-downs.

c. *Spill Abatement.* The occurrence of a spill is highly unlikely. However, if a spill occurs, the TEU will respond as the initial entry party to preserve health and safety, contain and render safe hazardous material, and protect the environment in accordance with approved contingency plans.

d. *First Aid.* As the initial entry party, the TEU will be trained to provide first aid and to apply these skills as needed until relieved by competent medical authorities in accordance with approved contingency plans.

8.5 Pine Bluff Arsenal

PBA will be responsible for providing security and emergency response capabilities for movement from the PBA helicopter landing zone to the PBCA storage facility based on the route and mode of transportation presented in this plan. PBA will also be responsible for signing the hazardous waste manifest.

8.6 Pine Bluff Chemical Activity

PBCA will be responsible for the following:

a. Receiving the CWM at the PBA helicopter landing zone

b. Accepting accountability of the recovered CWM upon receipt of the CWM at the PBCA storage facility

c. Providing a storage facility to receive the CWM

d. Providing primary emergency response capabilities for chemical accidents/incidents.

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SECTION 9
PUBLIC OUTREACH

The PMNSCM is committed to public input and to timely and accurate information exchange with all stakeholders. As a demonstration of this commitment PMNSCM has initiated a national strategy that encompasses exchanging information with partners at the national, regional, and local levels prior to implementing chemical demilitarization options. This strategy includes a continuing, pro-active outreach program covering public safety and environmental quality. The effort also includes sensitivity training for Environmental Justice and Native American issues. These issues are being incorporated into the site-specific public outreach efforts.

Efforts are ongoing to identify interested elected officials, citizens, and groups, implement initiatives, and ensure compliance with the spirit of the laws and Presidential orders that pertain to the chemical demilitarization program. PMCD participates in a state delegate legislative working group, and an independent board of experts from the National Research Council as part of its effort to ensure public input and interaction.

Sufficient lead time and thorough coordination of public outreach activities among the agencies participating in this Transportation Plan is critical. DDMT has overall responsibility for public outreach involving recovery of CWM at DDMT and will be the focal point for public inquiries into this project. PBCA will provide input concerning receipt and storage of recovered CWM at PBCA and will be responsible for public outreach involving interests local to PBA. All participants will coordinate with the PMCD Public Outreach and Information Office prior to any public outreach activities that might impact PMCD's congressional mandate. This will allow time to share information, avoid duplication, and ensure that current national outreach activities are incorporated into site specific initiatives.

Annex G contains answers to questions that might be asked about this plan. Additional questions should be directed to the following individuals:

PMNSCM
Public Outreach and Information Office
Mr. Bob Jones
1-800-488-0648 or 410-436-7439
FAX 410-436-8738
rjones@cdra.apgea.army.mil

DDMT
Public Affairs Office
Mr. George Dunn
901-775-6753

PBCA
Public Information Officer
Mr. Jeff Lindblad
870-540-2429
FAX 870-540-3886
jeffery_lindblad@pba.emh1.army.mil

SECTION 10
CONCLUSIONS

This Transportation Plan provides a scope of effort that is intended to support the removal action at DDMT. For the CWM recovered at DDMT, this Plan describes procedures and resources to safely transport recovered CWM to PBA. The recovered CWM will be managed, packaged, and transported as hazardous waste.

As part of the effort to determine whether the proposed transportation operation could be performed in a safe manner, an HA was conducted to identify and evaluate the hazards associated with the proposed activities. The assessment developed a comprehensive list of hazards associated with operations.

The analysis of the potential hazards for transporting recovered CWM from DDMT to PBA yields a carrier accident probability of 6.7×10^{-5}. According to the NSCM System Safety Management Plan, this accident probability is improbable, but could have catastrophic results, resulting in a risk assessment code of 3 for the CWM transportation.

The MCE considered for this transportation plan is judged to be no more hazardous than the conditions resulting from an aircraft crash and an evaporative release of 1.34 liters HD. For this event, the MCE "no deaths" distance is 6 meters and the "no effects" distance is 84 meters.

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ANNEX A
DEFENSE DEPOT MEMPHIS, TENNESSEE
TRANSPORTATION HAZARD ANALYSIS

ANNEX A
DEFENSE DEPOT MEMPHIS, TENNESSEE
TRANSPORTATION HAZARD ANALYSIS

1. INTRODUCTION

This hazard analysis (HA) was developed to support plans for the transportation of recovered chemical warfare materiel (CWM) at Defense Depot Memphis, Tennessee (DDMT) to Pine Bluff Arsenal, Arkansas (PBA). DDMT is located on 642 acres in the central portion of Memphis, Tennessee. The Depot is operated by the Defense Logistics Agency (DLA). The initial mission of the DDMT was to provide stock control, storage, and maintenance services for the Army Engineer, Chemical, and Quartermaster Corps. During World War II, the Depot served as an internment center for 800 prisoners of war and performed supply missions for the Signal Corps and Ordnance Corps. Since 1963, DDMT has been a principal DLA distribution center for hazardous materials; textile products; food products; electronic equipment; construction materials; and industrial, medical, and general supplies.

Chemical Agent Identification Sets (CAIS) were used by the military from the 1920s to the 1960s to train service members how to identify chemical agents in the field. At DDMT, the remains of CAIS have been identified in Dunn Field. Items from the following types of CAIS may have been disposed of in the landfill: K941, K942, K951/K952, K953/K954, and K955.

Items from these CAIS may be recovered from the landfill during remediation of the site. If CWM is recovered, it will be inspected, characterized, packaged into multiple round containers (MRCs), labeled, and manifested in accordance with applicable Tennessee Department of Environmental Conservation (TDEC) requirements, and temporarily stored in an Interim Holding Facility (IHF) until implementation of this Transportation Plan.

This transportation risk assessment was developed to support the Transportation Plan for the DDMT. It is the product of an analysis of hazards associated with the transportation of CWM, and it is performed in accordance with the System Safety Management Plan (SSMP) [U.S. Army Chemical Materiel Destruction Agency (USACMDA), 1994]. In the preparation of the HA, potential mishaps that could occur during transportation operations are discussed qualitatively. To assign quantitative values to potential risk, risk assessment codes (RACs) are identified for each hazard or hazardous condition, using tables A-1, A-2, and A-3 as a basis for assigning RACs. The quantitative risk estimates are based upon range/confidence estimates. These provide an estimated probability that the actual probability lies below the estimate with a confidence level. This risk assessment encompasses only the risk potential of transporting CWM and does not consider risks associated with locating, packaging, or storing the CWM. Descriptions of ways of eliminating or mitigating likely system failures are included.

Throughout this analysis, a distinction is made between two RAC values. First is the basic RAC assigned to a hazard without accounting for accident prevention measures. The second is the controlled RAC which takes into account efforts to mitigate either the probability that the hazard will result in an accident or the severity of the accident should one occur. A RAC 3 means that the operation should be conducted safely without implementing additional safety measures. However, even when the basic RAC is a 3, reasonable efforts to reduce accident probability or severity must be implemented even when these efforts do not change the RAC.

2. CONCEPT OF OPERATIONS

2.1 Transportation Description

2.1.1 Ground Transportation. Any CWM found at DDMT still existing in a container will be packed in an MRC. The materiel will be overpacked with vermiculite before the overpack is sealed. The MRCs have been tested for integrity and the results of these tests are included in the discussion in paragraph 2.4.1 below.

Table A-1. Hazard Severity (Consequence) Categories

Description	Category	Mishap Definition
Catastrophic	I	May cause death, system loss, or severe environmental damage.
Critical	II	May cause severe injury, severe occupational illness, or major system or environmental damage.
Marginal	III	May cause minor injury, minor occupational illness, or minor system or environmental damage.
Negligible	IV	May cause less-than-minor injury, occupational illness, or less-than-minor system or environmental damage.

Table A-2. Hazard Probability (Frequency) Categories

Frequency of Occurrence	Level	Description
Frequent	A	Will be continuously experienced.
Probable	B	Will occur frequently in the life of the system.
Occasional	C	Will occur several times in the life of the system.
Remote	D	Unlikely, but can reasonably be expected to occur in the life of the system.
Improbable	E	Unlikely, but possible to occur in the life of the system.

Table A-3. Risk Assessment Code Matrix

Hazard Probability (Frequency) Category	Hazard Severity (Consequence) Category			
	I Catastrophic	II Critical	III Marginal	IV Negligible
A - Frequent	1	1	1	3
B - Probable	1	1	2	3
C - Occasional	1	2	3	4
D - Remote	2	2	3	4
E - Improbable	3	3	3	4

Hazard Risk Index	Risk Assessment Code	Action Required
IA, IB, IC, IIA, IIB, IIIA	1	Unacceptable - immediate corrective action required; Asst. Secretary of Army decision
ID, IIC, IID, IIIB	2	Undesirable - reduced priority, corrective action required; Project Manager NSCM decision
IE, IIE, IIIC, IIID, IIIE, IVA, IVB	3	Acceptable - low priority for corrective action (may not warrant action); System Safety Program Manager decision
IVC, IVD, IVE	4	Acceptable - no corrective action required

Note:

NSCM = Non-Stockpile Chemical Materiel

Source: NSCM SSMP (U.S. Army 1994)

At PBA, the CWM will be transferred from the UH-1N helicopter to a truck for transport from the helipad to the Pine Bluff Chemical Activity (PBCA) storage facility. The ground transportation route at PBA to the Bond Road Exclusion Area (BREA) is shown in figure A-1. The route from the helipad to the Resource Conservation and Recovery Act (RCRA) interim status storage facility at PBA is entirely within PBA and about 6 miles long on paved roads rated as rural, two-lane except for Doolittle Road which is a hard-packed gravel road. The transport vehicle will travel north on Doolittle Road to Webster Road and West on Webster to Rideout Road. The truck will turn left onto Rideout Road and travel to Avenue 55 where it will turn right. From Avenue 55, it will turn right onto 504 Street and travel to Roemer Road. At Roemer Road it will turn left

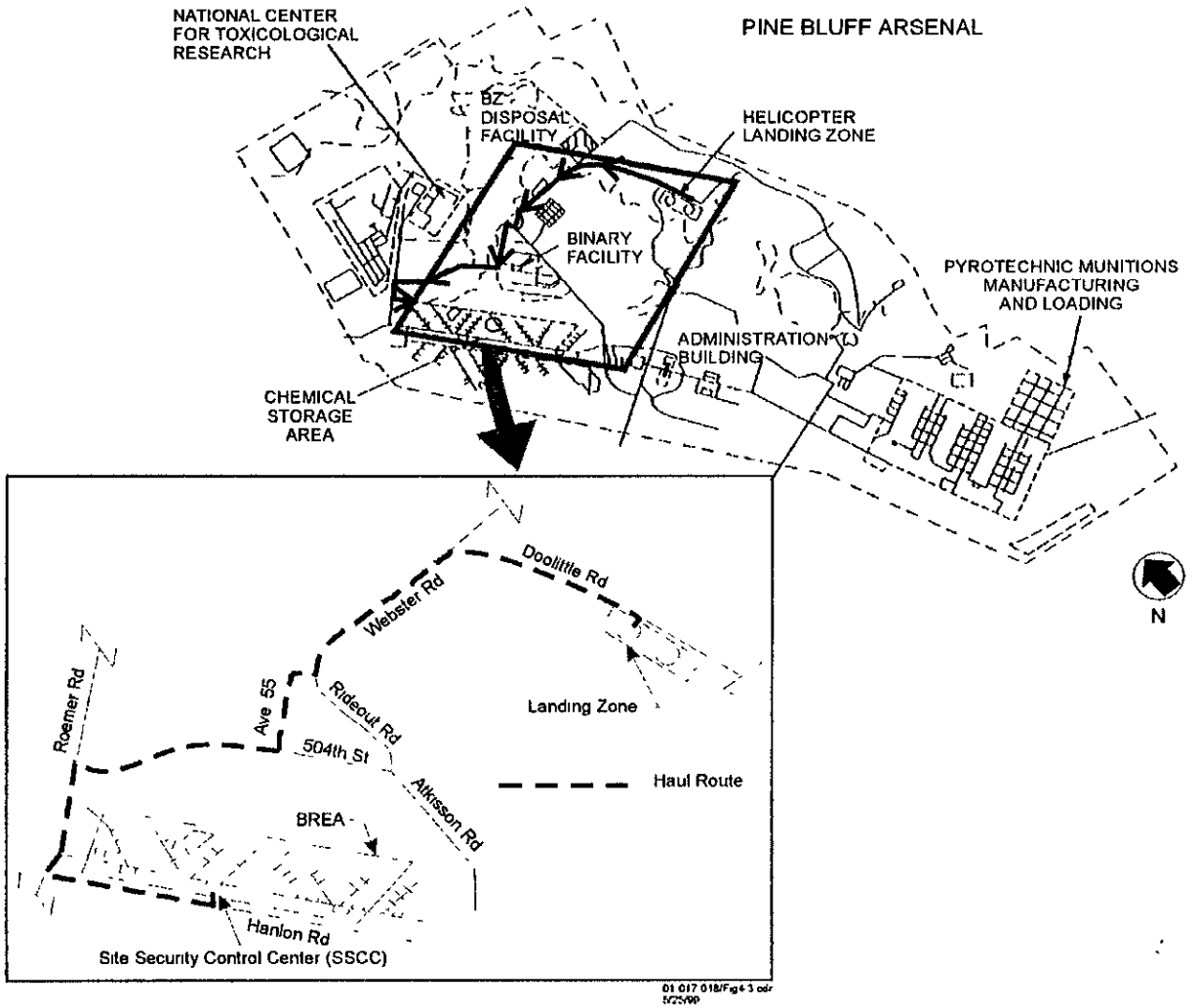


Figure A-1. Pine Bluff Arsenal Transportation Route

and travel to Hanlon Road where it will turn left. From Hanlon Road, it will turn left onto Avenue 6251 and travel to the Site Security Control Center for entry into the Bond Road Exclusion Area, site of the storage facility. The probability of an accident on this route for a single trip is 1.55×10^{-7}.

2.1.2 Air Transportation. The Army intends to use one type of aircraft during this mission. The air segment, from DDMT to the helicopter pad at PBA, will be flown by the UH-1N helicopter.

The UH-1N is a twin engine single rotor helicopter with an excellent safety record. It has a load capacity of 1,000 pounds (in addition to 3 crew, 2 passengers, and 250 pounds of equipment) and a range of 200 nautical miles at a cruising speed of 90 knots (103 miles per hour) and will be flown 135 nautical miles. Sufficient historical data involving UH-1N accidents encompassing A-type accidents, including takeoff and landing accidents, are available to estimate the accident probabilities involving this aircraft. The probability of a crash on landing is 3.8×10^{-6}, while for takeoff the probability is 3.8×10^{-6}. The probability of an in-flight accident for this trip is 6.0×10^{-5}.

The Army's D2PC program has been used in conjunction with the historic data furnished by the Army, Navy, and Air Force Safety Centers to determine the consequences of an accident caused by the hazardous material on board the aircraft.

2.2 Airfield Locations

The DDMT helipad location is a paved parking lot located at Dunn Field near the IHF. The lot will be cleared of all vehicles during transport operations. The proposed helipad location is relatively isolated from the general population with the nearest residence being approximately 300 meters away.

The PBA helipad is located on the east central portion of the Arsenal. The helipad location is relatively isolated from the general population with the nearest residence being approximately 3 miles away.

2.3 Chemical Warfare Materiel Characterization

The exact number and types of items to be transported will not be known until recovery operations are complete. Paragraph 1.4 of this Transportation Plan describes the types of items that might be recovered from the landfill. This HA is based on an example shipment consisting of 39 bottles of known or suspected chemical agent packed in two MRCs 7 x 27. In this example, one MRC contains 13 bottles of distilled mustard (HD) (a total of 1.34 liters of HD). The other MRC contains 17 bottles of sulfur mustard (HS) adsorbed onto charcoal (a total of 0.85 liters of HS) and 9 bottles of lewisite (L) adsorbed onto charcoal (a total of 0.225 liters of L).

Based on this example, the maximum credible event (MCE) was calculated for the evaporative release of 1.34 liters of HD. If the actual quantity or types of items to be transported are markedly different from this example, the MCE distances should be re-calculated using numbers for the actual items to be transported.

2.4 Containment Equipment

Recovered intact CAIS and recovered loose ampules or bottles from CAIS will be packed inside Department of Transportation (DOT)-approved containers called MRCs. Several types of MRCs are available. Figure A-2 illustrates the various MRCs. All MRC types have undergone extensive testing to demonstrate that they meet the packaging criteria set forth by DOT. The MRCs were subjected to tests in accordance with the following standards:

- American Society for Testing and Materials (ASTM) E-499-73 Method A, Helium Leak Testing
- Military Standard (MIL-STD) 453C and MIL-STD 1264B, Radiographic Testing
- Technical Provision 94-01, Transportability Testing

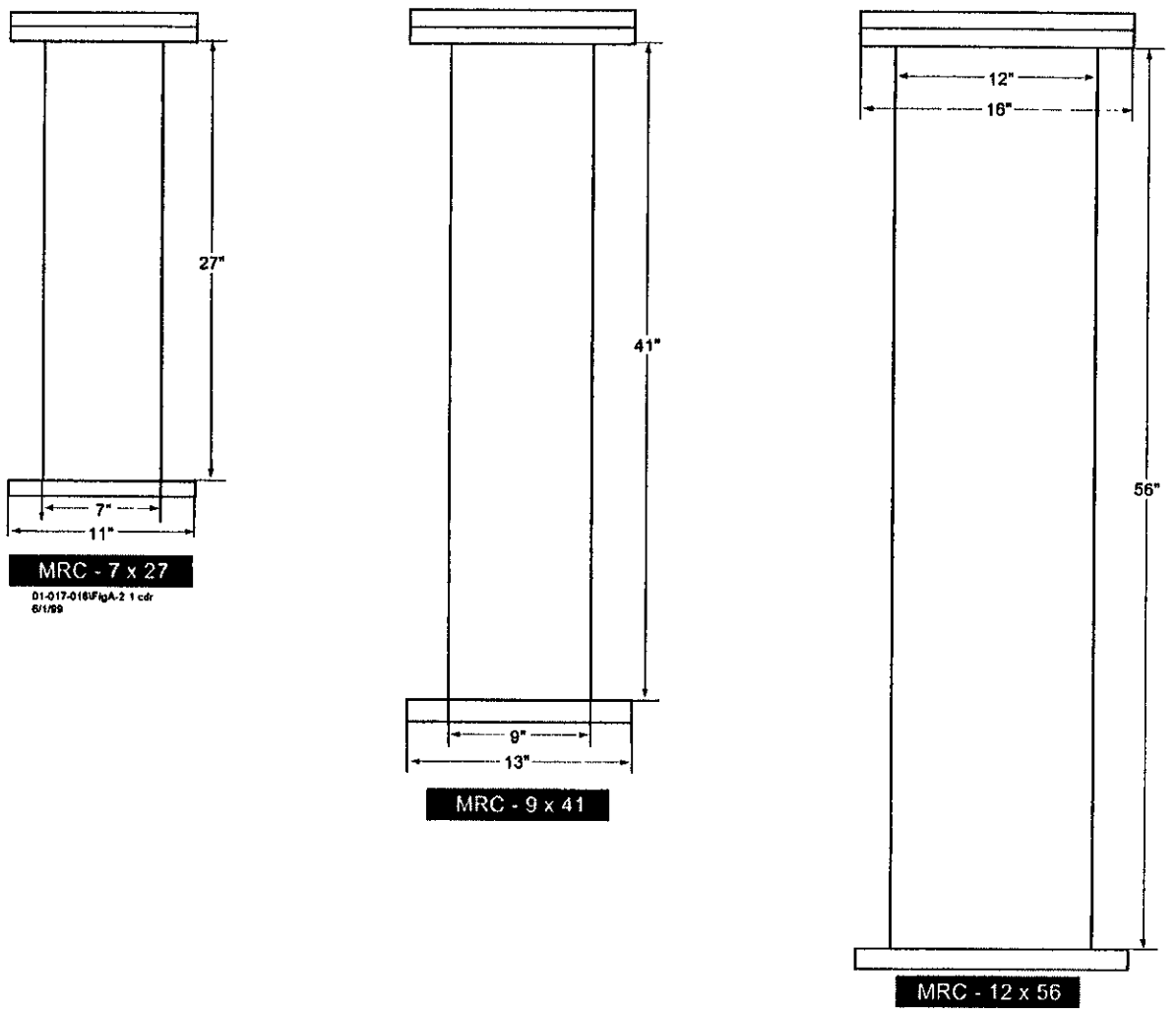
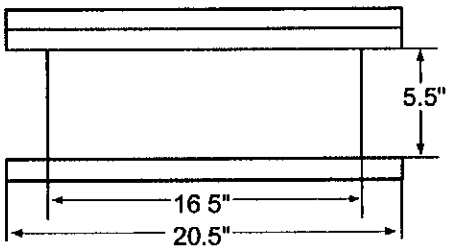
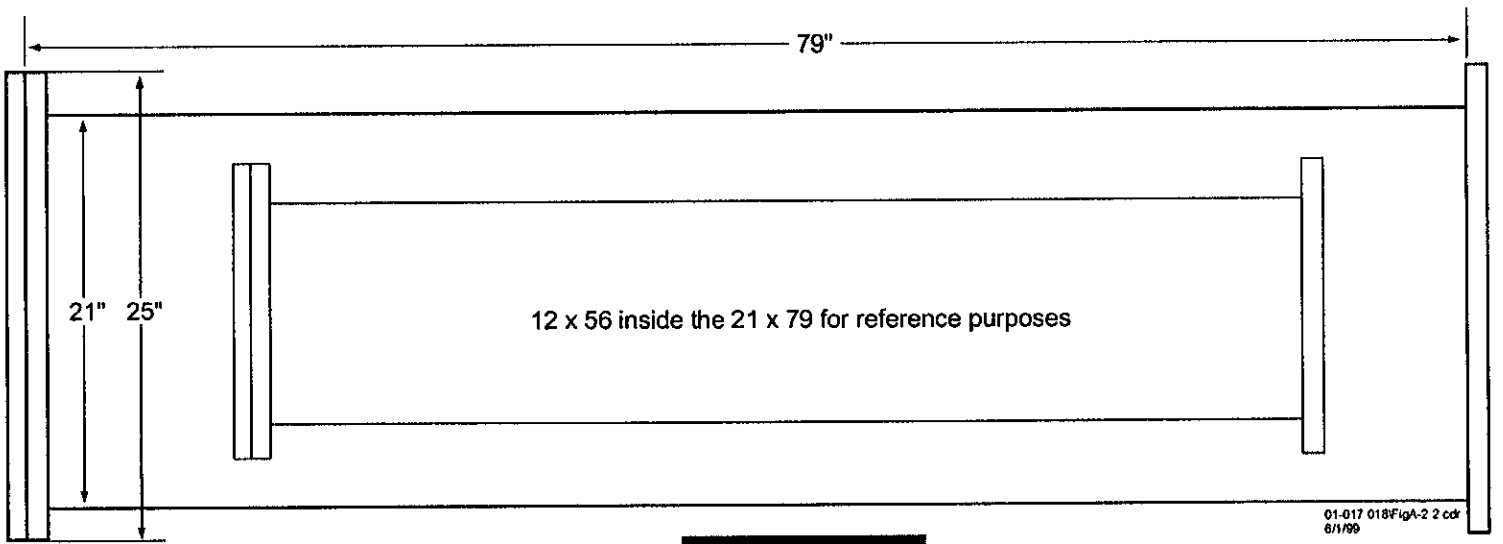


Figure A-2. Multiple Round Containers (Sheet 1 of 2)



MRC - 16.5 x 5.5



MRC - 21 x 79

Figure A-2. Multiple Round Containers (Sheet 2 of 2)

- MIL-STD-810E Method 14.4, Low and High Frequency Tests
- United Nations Performance Oriented Packaging Testing in accordance with 49 Code of Federal Regulations (CFR) Section 178.600
- MIL-STD-1660 Tests, First Article Tests (compression, vibration, drop, and incline plane).

As a result of meeting the requirements of this rigorous testing, all varieties of MRC have been approved by the DOT and the Army for transportation and storage of recovered CWM.

3. HAZARD ANALYSIS

Scenarios have been defined to aid in the evaluation of identified hazards, potential incidents, and accidents. RACs have been assigned based on the combination of the frequency and consequence of identified scenarios as illustrated in tables A-1 through A-3.

3.1 Hazards During Ground Transportation Phases

During the road portion of the transportation, several incidents could occur, such as a truck accident, an earthquake, a lightning strike, or an aircraft striking the truck. They are discussed in the following paragraphs and summarized in table A-3-1, attachment A-3.

3.1.1 Truck Accidents. Truck accident rate probabilities for the specific road types and distances associated with the transport of CWM from the helipad at PBA to the interim status RCRA-permitted hazardous waste storage facility were calculated and are presented in attachment A-1. Table A-4 lists the ground route segments by road type.

Table A-4. Ground Transportation Route Segments by Road Type

Route Segment	Length (miles)	No of trips	Type
PBA: Helipad to RCRA Interim Storage Facility Doolittle Road	1.0	1	Two-lane rural, unimproved gravel
Webster Road to BREA gate	5.0	1	Two-lane rural, paved

Notes:

BREA = Bond Road Exclusion Area
PBA = Pine Bluff Arsenal
RCRA = Resource Conservation and Recovery Act

The accident probability for a single trip for ground transportation as a result of truck accidents is 1.55×10^{-7} for the entire transport. It is assumed in this plan that one trip will be required to transport the CWM to the PBCA storage facility at PBA. The consequences of a truck accident are judged to be catastrophic (severity category I). The probability of such an accident occurring is judged to be improbable (probability category E). Thus, a RAC 3 is assigned to this event.

The cargo truck transporting the recovered CWM could have an accident. Possible mitigation to avoid an accident includes using an experienced driver, driving in clear weather, closing roads, limiting access to roads used, escorting the vehicle, and performing preventive maintenance on the truck. Vehicle speed will be limited to 25 miles per hour (20 percent less than the test speed of the MRC), and an escort vehicle will be used. These mitigators will reduce the hazard consequence to marginal (hazard severity category III) and result in a controlled RAC 3.

3.1.2 Earthquakes. There is the possibility that an earthquake could occur during a ground transportation segment, which could cause excessive bumping of the truck, resulting in damage to the overpacking and possible leakage of agent. Leakage of agent is automatically considered to be a catastrophic (severity category I) accident, but since the frequency of an earthquake during transport is considered improbable

(probability category E), the resulting RAC is a 3. Mitigation for such a contingency includes securing the overpacks in the truck using wooden braces as well as tie-down straps to minimize the probability of the overpacks moving about. The mitigations reduce the consequence to critical (severity category II) thus resulting in a controlled RAC 3.

3.1.3 Aircraft Strikes Truck. It is possible that the truck could be struck by an aircraft. If the truck were struck by an aircraft, the overpacks could be breached, resulting in agent release. The frequency of an aircraft striking the cargo truck is considered to be improbable (probability category E), with a catastrophic consequence (severity category I) giving this event a RAC 3. Trucks used to move CWM from the helipads will not approach the landing pad until after the aircraft has landed. This will result in a controlled RAC 3.

3.1.4 Lightning Strike. The possibility of lightning striking the truck was considered. This could result in a fuel fire that could breach an overpack and release agent. Lightning striking the vehicle is considered to be improbable (probability category E), with a catastrophic consequence (severity category I) giving this event a RAC 3. Transport will occur only during clear weather. In addition, the truck will have at least one functioning all-purpose fire extinguisher available. These mitigators result in a controlled RAC 3.

3.1.5 Slow Leak of Chemical Agent. Liquid leaks from the overpacks are possible but unlikely. The consequences of a slow leak are judged to be critical (hazard severity II) and are judged to be improbable (probability category E). Therefore, a RAC 3 is assigned. Overpacks have sufficient volume to contain any liquid that spills into them from leaking CWM. U.S. Army Technical Escort Unit (TEU) personnel are trained for spill response and are onsite in the event that a leak from an overpack is detected. If an overpack should leak, any significant vapor leaks would be detected by low-level, near real-time monitoring equipment. Implementation of low-level, near real-time monitoring will result in a controlled RAC 3.

3.1.6 Dropping of an Overpack. One of the most likely events to occur is the dropping of an overpack while loading or unloading the truck or aircraft. This hazard is considered to be critical (severity category II), but improbable (probability category E), and is assigned a RAC 3. Even if an overpack were dropped, the agent would be absorbed by the cushioning material. Drop testing of MRCs indicates that there is little chance of one being breached by the short drop that could occur during loading or unloading operations. Use of a forklift will minimize the lifting that the loaders must do to place overpacks in the truck. Implementation of this mitigator results in a controlled RAC 3.

3.1.7 Handling Hazards. Physical hazards that do not involve the release of agent also exist. The possibility of physical injury to workers is greatest in a situation where a worker is caught between two objects (pinch points), or for back, hand, or foot injuries.

a. *Pinching Injuries.* When loading CWM onto the truck, the area will be relatively open, so that the probability of being caught between a vehicle and a stationary object is low. Pinching injuries are judged to be critical (hazard severity category II) and remote (probability category D), resulting in a RAC 2. When loading materiel to or from an IHF or aircraft, the leader should ensure that the truck is not backed within 5 feet of the IHF, storage facility, or aircraft. Use of a ground guide and installation of a backup alarm on the truck will reduce the possibility of a worker being trapped between the truck and the IHF, storage facility, or aircraft. Implementation of these mitigators, as called for in the transportation plan, results in a hazard which is improbable (probability category E), but critical (severity category II), resulting in a controlled RAC 3.

b. *Physical Hazards.* Back, hand, and foot injuries are judged to be critical (severity category II), and remote (probability category D), resulting in a RAC 2. Workers should wear leather gloves to reduce the severity of injuries to hands caused by pinching between containers, and workers should wear safety shoes to reduce injuries in the event that an overpack

is dropped. Workers should be given refresher training in proper lifting techniques to avoid back injuries. Mechanical lifting aids should be used when necessary. Implementation of these mitigators as called for in the transportation plan results in a hazard which is improbable (probability category E), but critical (severity category II), resulting in a controlled RAC 3.

3.2 Aircraft Accidents

The Army, Navy, and Air Force Safety Centers provided a great deal of historical aircraft accident data that was used to determine the RAC of a crash in this report. Attachment A-2 is a summary of the accident data and is based on accident statistics reported by Bayley (Bayley, 1998). Aircraft hazards are summarized in table A-3-2, attachment A-3.

The air transportation consists of flying the CWM by UH-1N helicopter from DDMT to the CWM helipad at PBA. The 135-mile trip gives an in-flight accident probability point estimate of 6.0×10^{-5}. The single trip involves a takeoff and landing, which each have estimated accident probabilities of 3.8×10^{-6}. The probability of an accident for one trip from DDMT to the PBCA storage facility at PBA is 6.7×10^{-5}. The consequences of an UH-1N accident are judged to be catastrophic (severity category I). The probability of such an accident occurring is judged to be improbable (likelihood category E). Thus, a RAC 3 is assigned to this event. Flying from DDMT to PBA will occur in good weather. Also, extensive preventive maintenance checks and services will be performed before the flight. These mitigations will result in a controlled RAC 3.

3.2.1 Lightning Striking a Helicopter. The possibility of lightning striking the UH-1N helicopter was considered. This could result in an accident breaching the overpacks and resulting in agent release. Lightning striking the helicopter is considered to be improbable (probability category E), but catastrophic (severity category I), resulting in a RAC 3. It is recommended that flights be made only by veteran pilots during good weather. Implementation of this mitigation results in a controlled RAC 3.

3.2.2 Leak of Multiple Round Container Without Accident. If an overpack were to leak, but with a release that did not result in an accident, the consequence would be critical (severity category II), but the frequency is improbable (probability category E). This would result in a RAC 3. Bracing and tie-down straps will be used to secure the overpacks onboard. This mitigator will result in a controlled RAC 3.

3.2.3 Leak of Multiple Round Container With Accident. All CWM recovered from DDMT will be overpacked in an MRC. CWM that is leaking when recovered will be decontaminated and sealed prior to placement in an overpack. Although the CWM could leak or break during transportation, CWM could only be released if the overpack is improperly sealed. The possibility of an overpack leaking during air transportation should be considered; however, tests of the overpacks demonstrated their ruggedness. Agent release in an aircraft is considered to be improbable, but were the release sufficient to incapacitate the crew and result in an accident, the consequence would be catastrophic (severity category I), but improbable (probability category E). This would result in a RAC 3. Bracing and tie-down straps will be used to secure the overpacks onboard. This mitigator will result in a controlled RAC 3.

Other mishaps that can occur during the air phase of the transportation include loading and handling mishaps described earlier in the ground portion of the assessment. A summary of the above hazards is provided in table A-5.

A potential occurrence unique to the air phase involves fueling of the aircraft. The potential for a fire is greatest during fueling and refueling operations; however, no refueling should be required.

4. MAXIMUM CREDIBLE EVENT

The MCE, as defined by Army Regulation (AR) 385-61, is the "worst-case" single accident scenario that results in the release of chemical agent and has a reasonable probability of occurrence. The MCE was determined to be an aircraft accident without

Table A-5. Assigned RACs for Postulated Accident Scenarios

Item	Accident Scenario	RAC	Controlled RAC
	Ground Transportation		
1	Truck accident results in damage to overpacks and leaking of agent	3	3
2	Earthquake damages overpack causing agent release	3	3
3	Aircraft strikes truck, breaching the overpack, resulting in agent release	3	3
4	Lightning strike on truck causes fire and agent release	3	3
5	Leaking of overpacked CWM container with improper sealing	3	3
6	Dropping of overpack during loading/unloading operations	3	3
7	Pinching between containers resulting in worker being trapped	2	3
8	Physical hazards result in injuries to back, hands, and feet	2	3
	Air Transportation		
1	Crash of UH-1N helicopter	3	3
2	Lightning striking an aircraft resulting in agent release	3	3
3	Agent release from leaking overpack without an accident	3	3
4	Agent release from leaking overpack resulting in an accident	3	3
5	Physical hazards resulting in injuries to back, hands, or feet	2	3
6	Dropping container resulting in leak within the container	3	3

Notes:

CWM = chemical warfare materiel
RAC = risk assessment code

a fire, resulting in evaporative release of all the agent from an MRC containing 13 K941 CAIS bottles of HD (1.34 liters of HD).

The D2PC code (Whitacre et al., 1987) was used to evaluate the potential consequences of the MCE. Meteorological data: mixing height, windspeed and direction, and temperature conditions were obtained from the U.S. Environmental Protection Agency's SCRAM bulletin board service. The "no deaths" distance is conservatively estimated at 6 meters; the "no effects" distance is 84 meters for daylight meteorological conditions. The hazard distances are summarized in table A-6.

Table A-6. D2PC Results for Various Releases

Agent/Amount (liters)	Release Type	Location	No Deaths Distance (m)	No Effects Distance (m)
HD/1.34	EVP	DDMT	6	84
HD/1.34	Flash Fire	DDMT	MDNA	MDNA
HD/1.34	EVP	PBA	6	84
HD/1.34	Flash Fire	PBA	MDNA	MDNA

Notes:

DDMT = Defense Depot Memphis, Tennessee
EVP = evaporation
m = meter
MDNA = minimum dose not attained
PBA = Pine Bluff Arsenal

D2PC Parameters:

Evaporative release -

WND = 3 m/s
PRESS* = 760 mm Hg
HML* = 750 m
TMP = 25°C
TEV = 60 min.
SUR = CON
STB = D

Flash fire release -

HRL @ DDMT (UH-1N) = 2×10^9 cal. with full tank
HRL @ PBA (UH-1N) = 2×10^8 cal. with 10% of full tank
SEA = SUM
TMP = 25°C

* Applies to DDMT

Flash fire heat releases calculated by Science Applications International Corporation, Calc. Note SAF-452-95-0053, May 1995.

No effects are predicted for releases accompanied by fire because some of the released agent would be consumed in the fire and the extreme heat from the fire would cause the plume to rise to a high altitude, where it would disperse significantly before returning to ground level. Essentially, the agent concentration downwind of the release is zero until the plume returns to ground level. By the time the plume touches ground, it has dispersed so much that concentrations have dropped below harmful levels.

5. MITIGATION OF HAZARDS

Throughout the report, as possible events and mishaps have been described, mitigating actions have been recommended. Tables A-3-1 and A-3-2 in attachment A-3 summarize the transportation events, possible mishaps, hazards associated with the mishap, and mitigating measures that can be taken. In addition, the following paragraphs offer some general information on mitigating hazards associated with transporting CWM.

The ability to fly over relatively unpopulated areas will greatly reduce the potential hazard to personnel. Routes should be carefully picked to minimize possible population exposure. In addition, constant radio contact with the ground should be maintained so that an accident can be mitigated quickly and personnel given maximum early warning if they need to evacuate an area.

The flight should be planned to coincide with all daylight hours and for a forecast of sunny weather. This combination maximizes the possibility of the air stability being considered unstable and, in turn, minimizes the hazard associated with agent release if an accident occurs.

6. CONCLUSIONS

Historical data provide a realistic assessment of the probability of an accident involving a vehicle carrying hazardous material. When used in conjunction with a hazard predictor such as D2PC, a useful estimate of the extent of hazard can be made. This

analysis used available accident data for the UH-1N helicopter that is planned to be used in transporting the CWM. Takeoffs and landings present the greatest hazard. The use of the UH-1N and the short duration of the trip minimize the number of takeoffs and landings to one each, which minimizes overall risk.

The total carrier (truck and aircraft) accident probability is calculated as 6.7×10^{-5} (table A-7) for the transport of recovered CWM from DDMT IHF to the PBCA storage facility at PBA. This probability includes one flight of the UH-1N, and one trip for ground transportation at PBA. According to USACMDA, 1994, this probability is improbable (probability category E), but an accident could have catastrophic impact (severity category I), resulting in a RAC 3 for the transportation hazard probability.

The transportation of CWM by truck and aircraft can be safely performed given the mitigation steps outlined in this report.

For this event, the MCE was computed to be an evaporative release of 1.34 liters of HD following an aircraft crash at DDMT or PBA without a fire. The "no deaths" distance is conservatively estimated at 6 meters, the "no effects" distance is 84 meters for daylight meteorological conditions.

Table A-7. Total Accident Probability for Route from DDMT to PBA

Route Segment	Number of Trips	Accident Probability per Trip (incl landing and takeoff)	Total Probability
DDMT to PBA by UH-1N helicopter	1	6.7×10^{-5}	6.7×10^{-5}
Total Truck Transport			1.55×10^{-7}
Total Probability for transportation of CWM from the helipad at DDMT to the storage at PBA			6.7×10^{-5}

Notes:

CWM = chemical warfare materiel
DDMT = Defense Depot Memphis, Tennessee
IHF = interim holding facility
PBA = Pine Bluff Arsenal

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ATTACHMENT A-1
DERIVATION OF TRUCK ACCIDENT RATES

ATTACHMENT A-1
DERIVATION OF TRUCK ACCIDENT RATES

This attachment presents a derivation of truck accident rates for the specific road types to be used for transporting CWM from the helipad at PBA to the RCRA interim status storage facility, about 6 miles. These accident rates are derived by modifying published highway truck accident rate data to account for situation-specific factors. The modifications are made on the basis of analyst judgment and supplementary accident data. This approach is taken because no published accident rate data are available for most of the road types encountered along the chosen transport route and because the published highway truck accident rates reflect average conditions — generally better road surfaces than those encountered along the chosen routes but less-stringent controls on traffic, speed, driver training, and other factors. A similar analysis approach has previously been used for CWM transport and successfully defended (Rhyne, et al., 1985 and 1988).

The truck accident rate data used as a basis for this analysis are described in paragraph A-1.1. An analysis of the factors that affect accident rates and the development of adjusted rates for use in this HA are presented in paragraph A-1.2. In paragraph A-1.3, the adjusted accident rates are coupled with mileage estimates for the chosen transport routes to estimate the probability of a truck accident during the movement of CWM.

A-1.1 Truck Accident Rates By Highway Class

Truck accident rates have been compiled as a function of road type and surrounding population by various researchers since the early 1980s. The most widely cited values are those published by Harwood and Russell (1990). These rates are presented in table A-1-1. More recently published data were reviewed for this analysis; however, the

Table A-1-1. Truck Accident Rates by Highway Class

Highway Class		Truck Accident Rate (accidents/mile)
Area Type	Roadway Type	
Rural	Two-lane	2.19×10^{-6}
Rural	Multilane, undivided	4.49×10^{-6}
Rural	Multilane, divided	2.15×10^{-6}
Rural	Freeway	6.40×10^{-7}
Urban	Two-lane	8.66×10^{-6}
Urban	Multilane, undivided	1.39×10^{-5}
Urban	Multilane, divided	1.25×10^{-5}
Urban	One-way street	9.70×10^{-6}
Urban	Freeway	2.18×10^{-6}

Source: Harwood and Russell (1990).

Harwood and Russell data are judged to be the best available. The "base" accident rate used in this analysis is the value for two-lane, rural roads, 2.19×10^{-6} accidents per mile. Approximately 1.0 miles of the transportation route on PBA will be on a two-lane, rural gravel road known as Doolittle Road. Since the Harwood and Russell data do not include this road type, it was considered conservative to estimate the accident rate for this type of road at twice that of the paved two-lane rural road.

A-1.2 Modification of Accident Rates

A partial listing of the factors that are believed to affect truck accident rates is shown in table A-1-2 (Harwood and Russell, 1990). Data are lacking to correlate accident rate with most of these factors. In addition, some of these factors (for example, time of day and type of truck) are constant for all portions of the chosen ground transportation routes.

Table A-1-2. Partial Listing of Factors Considered to Affect Truck Accident Rates

Truck Type or Configuration	Highway
Number of trailers	Function
Number of axles on tractor/trailer(s)	Access control
Cab type	Number of lanes
Cargo area configuration	Lane width
	Shoulder width
Truck Size and Weight	Shoulder surface
Width of trailer	Median width
Length, overall	Horizontal alignment
Length, trailer(s)	Vertical alignment
Empty/loaded	Surface condition (wet/dry/etc.)
Weight, gross	Pavement condition
Weight, trailer	Pavement type
Truck Operations	Traffic
Cargo type	Volume (average daily traffic)
Operator type	Volume (day/night)
Trip type	Percent trucks
Truck Driver	Environment
Age	Visibility
Experience with rig	Weather
Hours of service	Light
Driver condition	
	Temporal Factors
Location	Month/season of year
State	Day of week
Urban/rural	Time of day

Source: Harwood and Russell (1990).

Fractional distributions of truck accidents by type are shown in table A-1-3 for the average conditions reflected in the published accident rates (column 2); modified distributions that reflect the effects of various administrative controls and physical factors are also presented in this table (columns 3 through 6). The modified fractional distributions shown in the table reflect the cumulative effect of the listed factors, moving from left to right across the table. For example, the distribution shown for operation-specific factors also includes the effects of safe drivers. The effects of these administrative controls and physical factors on the accident type distribution and on accident rate are described in the following paragraphs.

Effects of Safe Drivers. TEU personnel who will operate the pickup truck and escort vehicles are highly trained. Their training enables them to identify, handle, decontaminate, and monitor for CWM. They have security clearances and are enrolled in the Chemical Personnel Reliability Program. They have passed a physical examination as required by the Motor Carrier Safety Regulations. Their training includes en route procedures, routing to avoid heavily populated areas, accountability, load limitations, vehicle maintenance standards, and cargo-specific handling procedures. Before movement of any CWM, TEU personnel ensure that the vehicle maintenance documentation is current, inspect the transportation documentation, and inspect the loading of the CWM cargo. The vehicle will have a driver and one assistant. The commander has the responsibility of ensuring that both are alert. Each vehicle will proceed slowly along the entire course.

The TEU's safety practices are comparable to those of commercial trucking firms that emphasize a good safety culture. Trucking firms that strongly emphasize safety can achieve a factor of 10 reduction in accident rate (Anonymous, 1990; Anonymous, 1994; Wilson, 1990; U.S. Congress, Office of Technology Assessment, 1988). Truck drivers who reduce their overall accident rate do so primarily by reducing the number of accidents for which they are at fault and to a lesser extent by lowering the accident rates of other truck and car drivers by driving defensively. A driver has much more control over single-vehicle accidents than multiple-vehicle accidents; safe drivers cannot always prevent other drivers from causing multiple-vehicle accidents.

Table A-1-3. Truck Accident Type Distributions

Tractor-Trailer Accident Type	Fractional Distribution				
	Base Case	With Safe Drivers Considered	With Operation-Specific Factors Considered	With Escort Considered	With Road Closure Considered
Noncollision					
• Ran off road	0.062	0.00062	0.00012	0.00008	0 00008
• Jackknife	0.077	0.00077	0.00000	0.00000	0.00000
• Overturn	0.072	0.00072	0.00014	0.00009	0.00009
• Separation of units	0.004	0.00004	0.00000	0.00000	0.00000
• Fire	0.006	0.00006	0.00001	0.00001	0.00001
• Other	0.009	0.00009	0.00002	0.00001	0.00001
Collision					
• Fixed object	0.114	0.0014	0.00023	0.00015	0.00015
• Parked vehicle	0.093	0.00093	0.00019	0.00013	0.00013
• Train	0.005	0.00005	0.00000	0.00000	0.00000
• Nonmotorist (e.g., pedestrian)	0.015	0.00015	0.00000	0.00000	0.00000
• Other	0.034	0.00034	0.00007	0.00005	0.00005
Multiple-Vehicle Accidents					
• Head-on collision	0.015	0.00280	0.00056	0.00028	0.00002
• Rear-end collision	0.133	0.02490	0.00498	0 00249	0 00025
• Sideswipe	0.185	0.03460	0.00692	0.00346	0 00017
• Angle	0.103	0.01930	0.00386	0.00193	0.00010
• Other	0.070	0.01310	0.00262	0.00131	0.00006
TOTAL	0.997	0.09960	0.01972	0.00999	0.00102
New Reduction Factor	1	10	50	100	977

Source. Harwood and Russell (1990).

The second column of table A-1-3 shows the fractional distribution of accident types for average truck drivers, and the third column of this table shows the estimated distribution of accident types for safe drivers (that is, those who achieve a factor of 10 reduction in accident rate). Because safe driving practices are most effective in lowering the rate of single-vehicle accidents, the distribution in the third column was obtained by:
(1) lowering the fraction of single-vehicle accident types by a factor of 100 and
(2) lowering the fractions of multiple-vehicle accident types such that the overall accident rate reduction factor is 10, as reported in the literature. Mathematically, this procedure is expressed as follows:

$$\frac{A}{100}+\frac{B}{X}=\frac{0.997}{10}$$

where:

A = Fraction of single-vehicle accidents
B = Fraction of multiple-vehicle accidents
X = Reduction factor to be determined for multiple-vehicle accidents.

Values of A and B are obtained from the second column of table A-1-3. Application of this model yields an accident rate reduction factor of 5.34 for multiple-vehicle accidents.

Effects of Operation-Specific Factors. The following factors are expected to produce an additional factor of 5 reduction in accident rate for all accident types.

- Transport of CWM will only occur in good weather.
- Transport of CWM will only occur during daylight hours.
- Trips will be short, which will minimize boredom and fatigue.
- Line-of-sight conditions along the chosen route will be excellent.

- Drivers of vehicles with CWM cargo will be expected to be even more cautious than typical safe commercial truck drivers.

- The TEU's management is more effective than the management of the average trucking firm.

Train collisions are not considered to be credible along the chosen routes because the hazard frequency of railroad crossings is negligible and the only railroad tracks crossed are seldom used.

The net results of these considerations is an additional factor of 5 reduction in accident rate. The combination of safe drivers and these operation-specific factors can be expected to reduce the accident rate by a factor of 50 below the published value for two-lane, rural roads.

Effects of Escorting the Cargo Truck. An escort vehicle will precede the cargo truck during ground transportation of CWM. The escort vehicle is expected to be marked with warning signs. Oncoming traffic will not be stopped, and same-direction passing will not be prohibited. The presence of the escort vehicle will alert drivers of other vehicles, thus reducing the rate of multiple-vehicle collisions by a factor of at least 2.

The escort vehicle will also reinforce safe driving requirements on the driver of the cargo vehicle; therefore, the rate of single-vehicle collisions is expected to be reduced by an additional factor of 1.5. The overall effect of escorting on the estimated accident rate is a factor of 2 reduction above the reductions achieved by safe driving and operation-specific factors. The cumulative effect of the global factors (safe drivers, operation-specific factors, and escorting) is then a factor of 100 reduction in accident rate, leading to a modified rate of 2.19×10^{-8} accidents per mile.

Effects of Closing Roads. The rate of most multiple-vehicle accidents could be reduced by an additional factor of 20 by closing the roads along the chosen routes to all other traffic during the CWM transfers. Such accidents would not be completely eliminated

because of the possibility of persons ignoring road closure signs and barricades. The rate of rear-end collisions would only be reduced by an estimated factor of 10 by this action because the escort vehicle could be involved in a rear-end collision with the cargo truck. Single-vehicle accident rates would not be reduced by closing roads.

Road closure is not planned for transportation on PBA.

A-1.3 Route Segment-Specific Factors

PBA Ground Transportation. The ground transportation route segments by road type at PBA are described in table A-4. The route from the PBA Helicopter Landing Zone to the Chemical Storage Area is completely within the confines of PBA. The ground transportation route is as follows: Doolittle Road to Webster, Webster to Rideout Road, Rideout Road to Avenue 55, Avenue 55 to 504 Street, 504 Street to Roemer Road, Roemer Road to Hanlon Road, Hanlon Road to Avenue 6251, and from Avenue 6251 to the Site Security Control Center (SSCC). The two-lane paved portion of the route is 5.0 miles in length, and the two-lane gravel portion is 1.0 miles in length. The estimated accident rate for the paved roads to be used on PBA is 2.19×10^{-8}. Because Doolittle Road is an unimproved gravel road, an accident rate twice that calculated for the two-lane rural road was used.

A-1.4 Summary

The modified accident rates and accident probabilities for ground transportation routes are provided in table A-1-4. The product of the accident rate and the total mileage for a segment is used to compute the accident probability for a given segment. The probability for each segment is summed to give the total accident probability for the entire transport operation.

Table A-1-4. Modified Accident Rates and Accident Probabilities for Ground Transportation Routes

Route Segment	Accident Rate (per mile)	Segment Length (miles)	Accident Probability per Trip	Number of Trips	Accident Probability
Doolittle Road	4.38×10^{-8}	1.0	5.26×10^{-8}	1	5.26×10^{-8}
Webster Road to BREA Gate	2.19×10^{-8}	5.0	1.03×10^{-7}	1	1.03×10^{-7}
Total Ground Transportation Accident Probability					1.55×10^{-7}

Note:

BREA = Bond Road Exclusion Area

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ATTACHMENT A-2
AIRCRAFT ACCIDENT DATA

ATTACHMENT A-2
AIRCRAFT ACCIDENT DATA

The accident data received from the respective service safety centers are summarized in table A-2-1. Table A-2-1 is a breakout of aircraft accident data compared with total number of hours flown. Statistics for the UH-1N are summarized in this table. The resulting accident rates for the in-flight portion include A-type accidents (property damage greater than or equal to $1,000,000, or a personal injury or illness resulting in death or permanent total disability), including takeoff and landing crash probabilities for A-type flights.

None of the Safety Centers furnished information regarding the role that weather played in the accidents nor the maintenance effects. For this reason, it is expected that the actual probabilities for accidents during this operation are actually lower than reported in the tables.

Table A-2-1. Flight Statistics for Transport Aircraft

Aircraft	In-Flight Rate	Distance (miles)	Accident Probability	Landing Probability	Takeoff Probability	Total Single-Trip	No. of Trips	Total Probability
UH-1N	4.4×10^{-7}	135	6.0×10^{-5}	3.8×10^{-6}	3.8×10^{-6}	6.7×10^{-5}	1	6.7×10^{-5}

ATTACHMENT A-3
TRANSPORTATION RISK ASSESSMENT HAZARD ANALYSIS

Table A-3-1. Ground Transportation Risk Assessment Hazard Analysis

Item	Hazardous Condition	Cause	Effect	RAC	Recommendation	Resolution	Controlled RAC
1	Truck accident	Single-vehicle accident	Personal injury; damage to overpacks; release of agent	3 (IE)	Use qualified drivers	Qualified drivers will be used	3 (IIIE)
2	Truck accident	Earthquake	Damage to overpack; leakage of agent	3 (IE)	Secure overpacks.	Limit vehicle speed; secure cargo to vehicle	3 (IIIE)
3	Truck accident	Aircraft crash	Personal injury; release of agent	3 (IE)	Wait for helicopter to land before entering helipad.	Helicopter will land before CWM truck enters helipad.	3 (IIIE)
4	Truck accident	Lightning	Fuel fire; release of agent	3 (IE)	Perform operations during clear weather; equip vehicle with fire extinguisher.	Execute road movements during clear weather only.	3 (IIIE)
5	Leak of overpack	Improper seal	Release of agent	3 (IIE)	TEU trained in spill response.	Implement NRT monitoring.	3 (IIIE)
6	Dropping of overpack	Improper handling	Inner container leaks; outside container remains intact	3 (IIE)	Use proper lifting techniques.	Provide handling equipment	3 (IIIE)
7	Pinching	Caught between vehicle and a stationary object	Personal injury	2 (IID)	Truck should not be backed within 5 ft. of IHF or aircraft.	Use ground guide, install backup alarm.	3 (IIE)
8	Physical hazards	Pinching between containers	Back, hand, or foot injuries	2 (IID)	Use gloves and safety shoes.	Use proper techniques; provide mechanical lifting aids.	3 (IIE)

Notes:

CWM = chemical warfare materiel
IHF = interim holding facility
NRT = near real-time
PINS = portable isotopic neutron spectroscopy
RAC = risk assessment code
TEU = U S. Army Technical Escort Unit

Table A-3-2. Air Transportation Risk Assessment Hazard Analysis

Item	Hazardous Condition	Cause	Effect	RAC	Recommendation	Resolution	Controlled RAC
1	UH-1N accident	In-flight, takeoff, landing difficulty from DDMT to PBA	Agent release	3 (IE)	Use expert pilots; perform extensive maintenance prior to operations	Execute mission only during favorable weather conditions; use veteran pilots.	3 (IE)
2	Aircraft accident	Lightning strike	Agent release	3 (IE)	Use expert pilots; fly during good weather; use braces and tie-downs on overpacks.	Execute mission only during favorable weather conditions; use veteran pilots.	3 (IE)
3	Agent release within aircraft	Leaking overpack	Injury with no accident	3 (IIE)	Secure overpacks with tie-downs.	Secure overpacks with tie-downs.	3 (IIE)
4	Agent release within aircraft	Leaking overpack	Injury to crew resulting in accident	3 (IE)	Secure overpacks with tie-downs.	Secure overpacks with tie-downs.	3 (IE)
5	Physical hazards	Pinching between containers	Back, hand, or foot injury	2 (IID)	Use gloves and safety shoes.	Use proper handling techniques.	3 (IIE)
6	Dropping container	Improper handling	Agent leak within container	3 (IIE)	Use proper lifting techniques.	Provide handling equipment.	3 (IIIE)

Notes:

DDMT = Defense Depot Memphis, Tennessee
PBA = Pine Bluff Arsenal
RAC = risk assessment code

ANNEX B
CHEMICAL AND PHYSICAL DATA

Table Annex B-1. Chemical and Physical Properties of Chemical Agents of Concern

Chemical Name	Levinstein Mustard (H) 70% bis(2 –Chloroethyl) sulfide 30% Higher Molecular Weight Polysulfides	Distilled Mustard (HD) Diethyl, 2,2-dichloride sulfide (bis(2-Chloroethyl) sulfide)	Lewisite (L) Dichloro (2-chlorovinyl) arsine
Chemical Formula	$C_4H_8Cl_2S$	$C_4H_8Cl_2S$	$C_2H_2AsCl_3$
Molecular Weight	159.08 (pure mustard)	159.08	207.32
Physical State	Amber to brown oily liquid	Pale yellow oily liquid	Colorless to brownish liquid
Vapor Density (relative to air)	Generally exceeds 5.5	5.5	7.2
Liquid Density	1.27 g/mL @ 25°C	1.27 g/mL @ 25°C	1.89 g/mL @ 20°C
Solid Density	N/A	Crystal, 1.37 g/cm^3 @ 0°C	N/A
Normal Freezing Point	8°C	14.45°C	-18°C $\pm$ 0.1°C
Boiling Point	Decomposes at about 180°C	217°C extrapolated	190°C
Vapor Pressure	Impurities tend to lower vapor pressure below 0.11 mm Hg	0.11 mm Hg @ 25°C	0.394 mm Hg @ 20°C
Volatility	Approximately 920 mg/m^3 @ 25°C (reported for HD)	610 mg/m^3 @ 20°C 920 mg/m^3 @ 25°C	4,480 mg/m^3 @ 20°C
Viscosity	3.95 centistokes @ 25°C (HD)	3.95 centistokes @ 25°C	2.05 centipoise @ 77°F
Solubility	0.092 g/100 g H_2O @ 22°C. Completely soluble in acetone, CCL_4, CH_3Cl tetrachloroethane, ethyl benzoate, and ether. Completely soluble in 92.5% ethanol above 28.6°C.	0.092 g/100 g H_2O @ 22°C. Completely soluble in acetone, CCL_4, CH_3Cl tetrachloroethane, ethyl benzoate, and ether. Completely soluble in 92.5% ethanol above 28.6°C.	Insoluble in water and dilute mineral acids. Soluble in organic solvents and oils. Miscible with other chemical warfare agents.
Heat of Combustion	4,500 cal/g	756.03 kcal/mole	N/A

Table Annex B-1. Chemical and Physical Properties of Chemical Agents of Concern (Continued)

Chemical Name	Levinstein Mustard (H) 70% bis(2 –Chloroethyl) sulfide 30% Higher Molecular Weight Polysulfides	Distilled Mustard (HD) Diethyl, 2,2-dichloride sulfide (bis(2-Chloroethyl) sulfide)	Lewisite (L) Dichloro (2-chlorovinyl) arsine
Latent Heat of Vaporization	94 cal/g	94 cal/g	58 cal/g
Latent Heat of Fusion	26.5 cal/g	26.5 cal/g	Unknown
Special Properties			
Flash Point	105°C	105°C (Can be ignited by large explosive charges)	Does not flash
DOT Classification	Poison A	Poison A	Poison A
Corrosivity	Brass rapidly corroded. Cast iron poor.	Brass rapidly corroded @ 65°C; 0.0001 inch/month @ 65°C on steel	None if dry
Decontaminants	Bleaching powder, sodium hypochlorite	Bleaching powder, sodium hypochlorite, fire	Bleach powder, sodium hypochlorite, fire, caustic soda
Stabilizers Commonly Used	Can be stabilized with acridine or naphthoquinoline	Can be stabilized with acridine or naphthoquinoline	

Notes:

cal/g = calorie per gram
DOT = Department of Transportation
g = gram
g/cm^3 = gram per cubic centimeter
g/mL = gram per milliliter
kcal = kilocalorie
mg/m^3 = milligram per cubic meter
mm Hg = millimeters of mercury
N/A = not available

ANNEX C
MATERIAL SAFETY DATA SHEETS

ANNEX C
MATERIAL SAFETY DATA SHEETS

The following pages provide examples of Material Safety Data Sheets (MSDS) for the chemical agents discussed in this document. Preference was given to Department of Army data sheets prepared by the Edgewood Research, Development and Engineering Center; in the absence of such data, other information, such as the manufacturer's MSDS, Occupational Health Services MSDS, and printouts from the Hazardous Substances Database are provided. For chemicals with little available MSDS data, namely Levinstein mustard (H), portions of the Department of the Army Special Report EO-SR-7400, Chemical Agent Data Sheets, are provided.

H (Levinstein Mustard)

Department of the Army, Special Report EO-SR-74001, Chemical Agent Data Sheets, Volume 1, pp 29-31, December 1974.

HD (Distilled Sulfur Mustard)

Edgewood Research, Development and Engineering Center Material Safety Data Sheet, 28 February 1996.

L (Lewisite)

Edgewood Research, Development and Engineering Center Material Safety Data Sheet, 27 March 1996.

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1. Chemical Code or EA Number: H

2. Chemical Name: Levinstein Mustard. Composed of about 70% Bis (2-chloroethyl) sulfide and 30% of usually higher MW polysulfides.

3. Chemical Formulae:

   a. Empirical.

   b. Structural.

4 - 17. Most Levinstein H consists of about 70% pure H with about 30% of polysulfides. The percent of pure H in Levinstein H varies from sample to sample and therefore no specific data can be given on its colligative properties.

The biological properties of H are similar to those given for HD (q.v.).

18. Molecular Weight: Average MW varies with purity, but is generally higher than that of pure mustard (159.08).

19. Purity Range (average):

   a. Laboratory Samole.

   b. Plant Sample. 64 to 69 wt%.

20. Physical Appearance: Amber to dark brown liquid.

21. Vapor Density, Relative to Air: Varies with MW, generally exceeds value for HD of 5.5.

22. Liquid Density: 1.27 g/ml @ 25° C; fairly constant, independent of product purity.

23. Solid Density:

   a. Bulk Density. Not applicable.

   b. Crystal Density. Not applicable.

Levinstein Mustard

24. Normal Freezing Point or Melting Point: approx. 8° C.

25. Boiling Point: Varies with product composition; decomposes around 130° C.

26. Vapor Pressure :

No general value since vapor pressure varies with purity of sample. High molecular weight impurities of H tend to lower vapor pressure below 0.11 torr reported for HD.

27. Volatility: approx. 920 mg/m^3 @ 25° C (reported for HD).

28. Viscosity: See HD.

29. Flash Point: 105° C.

30. Autoignition Temperature: Unknown.

31. Latent Heat of Vaporization: In the range of 94 cal/g reported for HD.

32. Latent Heat of Fusion: See HD.

33. Vapor-Air-Explosive Hazard Range: Not available.

34. Relative Persistency:

a. Soil. Persistent.

b. Surface (Wood, Methal, Masonry, Rubber, Paint).

c. Water. Persistent due to low solubility.

35. Solubility: Similar to HD.

36. Thermal Decomposition Rate (half-life): See HD.

37. Heat of Combustion: 4500 cal/g (calculated from bomb calorimetry for products given in Item 38).

38. Products of Combustion: CO_2, Cl_2, H_2O, H_2SO_4, HCl (bomb calorimetry).

39. Rate of Hydrolysis: See HD.

40. Hydrolysis Products: See HD.

41. Corrosive Properties: Brass rapidly corroded; cast iron poor.

42. Detection Methods and Equipment:

Spotted Disk (SD) Test, Dragendorff Test.

For Liquid: ABCM8 detector paper; M6A1 detector paper.
For Vapor: M15A2, M18A2, M19 kits
(DB-3 Test, blue band detector tube)

43. Decontaminants:

a. Personnel. Flush eyes with H_2O. Protective ointment M1, M5 ointment; M13 kit (liquid on skin). M13 Kit - outer clothing. Shower with soap and water.

b. Equipment. Bleaching powder, DANC, DS2, sodium hypochlorite, fire.

c. Areas. Terrain: Aeration. STB slurry applied by M9 or M12A1 decontaminating apparatus.

44. DOT Classification: Poison A.

45. Stabilizer Utilized:

a. Laboratory Sample. See HD.

b. Production Sample.

46. Types of Containers Required for Storage:

a. RDT&E Quantities. Glass.

b. Stockpile Quantities. One-ton containers, 55-gallon steel drums, steel cylinders.

47. O-D Classification: 3
Compatability Group: A
Chemical Group: A

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MATERIAL SAFETY DATA SHEET

DISTILLED MUSTARD (HD)

SECTION I - GENERAL INFORMATION

DATE: 22 September 1988
REVISED: 28 February 1996

MANUFACTURER'S ADDRESS:

U.S. ARMY CHEMICAL BIOLOGICAL DEFENSE COMMAND
EDGEWOOD RESEARCH DEVELOPMENT, AND ENGINEERING CENTER (ERDEC)
ATTN: SCBRD-ODR-S
ABERDEEN PROVING GROUND, MD 20101-5423

Emergency telephone #' s: 0700-1630 EST: 410-671-4411/4414
After: 1630 EST: 410- 278-5201, Ask for Staff Duty Officer

CAS REGISTRY NUMBERS: 505-60-2, 39472-40-7, 68157-62-0

CHEMICAL NAME:

Bis-(2-chloroethyl)sulfide

TRADE NAMES AND SYNONYMS:

Sulfide, bis (2-chloroethyl)
Bis(beta-chloroethyl)sulfide
1,1'-thiobis(2-chloroethane)
1-chloro-2(beta-chloroethylthio)ethane
Beta, beta'-dichlorodiethyl sulfide
2,2'dichlorodiethyl sulfide
Di-2-chloroethyl sulfide
Beta, beta'-dichloroethyl sulfide
2,2'-dichloroethyl sulfide
H; HD; HS
Iprit
Kampstoff "Lost"; Lost
Mustard Gas

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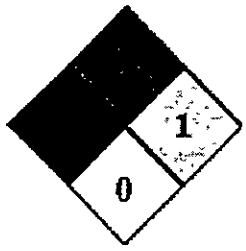
S-Lost; S-yperite; Schewefel-lost
Senfgas
Sulfur mustard; Sulphur mustard gas
Yellow Cross Liquid
Yperite
Y

CHEMICAL FAMILY: Chlorinated sulfur compound

FORMULA/CHEMICAL STRUCTURE:
C4H8Cl2S

$$ClCH_2CH_2-S-CH_2CH_2Cl$$

NFPA 704 HAZARD SIGNAL:



Health - 4
Flammability - 1
Reactivity - 1
Special - 0

SECTION II - HAZARDOUS INGREDIENTS

INGREDIENTS NAME	FORMULA	PERCENTAGE BY WEIGHT	AIRBORNE EXPOSURE LIMIT (AEL)
Sulfur Mustard	C4H8Cl2S	100	0.003 mg/m3

SECTION III - PHYSICAL DATA

BOILING POINT: 422 F 217 C

VAPOR PRESSURE (mm Hg):

0.072 mm Hg @ 20 C
0.11 mm Hg @ 25 C

VAPOR DENSITY (AIR=1): 5.5

SOLUBILITY IN WATER: Negligible. Soluble in fats and oils, gasoline, kerosene, acetone, carbon tetrachloride, alcohol, tetrachloroethane, ethylbenzoate, and ether. Miscible with the organophosphorus nerve agents.

SPECIFIC GRAVITY (H2O=1): 1.27 @ 20 C

FREEZING POINT: 14.45 C

LIQUID DENSITY (g/cc):

1.268 @ 25 C
1.27 @ 20 C

PERCENTAGE VOLATILE BY VOLUME:

610 mg/m3 @ 20 C
920 mg/m3 @ 25 C

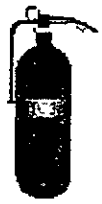
APPEARANCE AND ODOR: Normally amber to black colored liquid with garlic or a horseradish odor. Water clear if pure. The odor threshold for HD is 0.6 mg/m3 (.0006 mg/L).

SECTION IV - FIRE AND EXPLOSION DATA

FLASHPOINT : 105 C (Can be ignited by large explosive charges)

FLAMMABILITY LIMITS (% by volume): Unknown

EXTINGUISHING MEDIA: Water, fog, foam, CO2. Avoid use of extinguishing methods that will cause splashing or spreading of HD.



SPECIAL FIRE FIGHTING PROCEDURES: All persons not engaged in extinguishing the fire should be immediately evacuated from the area. Fires involving HD should be contained to prevent contamination to uncontrolled areas. When responding to a fire alarm in buildings or areas containing agents, firefighting personnel should wear full firefighter protective clothing (without TAP clothing) during chemical agent firefighting and fire rescue operations. Respiratory protection is required. Positive pressure, full face piece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. In cases where firefighters are responding to a chemical accident/incident for rescue/reconnaissance purposes they will wear appropriate levels of protective clothing (See Section VIII).

Do not breathe fumes. Skin contact with agents must be avoided at all times. Although the fire may destroy most of the agent, care must still be taken to assure the agent or contaminated liquids do not further contaminate other areas or sewers. Contact with the agent liquid or vapor can be fatal.

SECTION V - HEALTH HAZARD DATA

AIRBORNE EXPOSURE LIMIT (AEL): The AEL for HD is 0.003 mg/m3 as found in "AR 40-173, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, HT." To date, the Occupational Safety and Health Administration (OSHA) has not promulgated a permissible exposure concentration for HD.

EFFECTS OF OVEREXPOSURE: HD is a vesicant (causing blisters) and alkylating agent producing cytotoxic action on the hematopoietic (blood-forming) tissues which are especially sensitive. The rate of detoxification of HD in the body is very slow and repeated exposures produce a cumulative effect. HD has been found to be a human carcinogen by the International Agency for Research on Cancer (IARC).

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Median doses of HD in man are:
LD50 (skin) = 100 mg/kg ICt50 (skin) = 2000 mg-min/m3 at 70 - 80 F (humid environment)
= 1000 mg-min/m3 at 90 F (dry environment)

ICt50 (eyes) = 200 mg-min/m3

ICt50 (inhalation) = 1500 mg-min/m3 (Ct unchanged with time)

LD50 (oral) = 0.7 mg/kg

Maximum safe Ct for skin and eyes are 5 and 2 mg-min/m3, respectively.

ACUTE PHYSIOLOGICAL ACTION OF HD IS CLASSIFIED AS LOCAL AND SYSTEMIC.

LOCAL ACTIONS: HD effects both the eyes and the skin. SKIN damage occurs after percutaneous absorption. Being lipid soluble, HD can be absorbed into all organs. Skin penetration is rapid without skin irritation. Swelling (blisters) and reddening (erythema) of the skin occurs after a latency period of 4-24 hours following the exposure, depending on degree of exposure and individual sensitivity. The skin healing process is very slow. Tender skin, mucous membrane and perspiration-covered skin are more sensitive to the effects of HD. HD's effect on the skin, however, is less than on the eyes. Local action on the eyes produces severe necrotic damage and loss of eyesight Exposure of eyes to HD vapor or aerosol produces lacrimation, photophobia, and inflammation of the conjunctiva and cornea.

SYSTEMIC ACTIONS: Occurs primarily through inhalation and ingestion. The HD vapor or aerosol is less toxic to the skin or eyes than the liquid form. When inhaled, the upper respiratory tract (nose, throat, tracheae) is inflamed after a few hours latency period, accompanied by sneezing, coughing, and bronchitis, loss of appetite, diarrhea, fever, and apathy. Exposure to nearly lethal doses of HD can produce injury to bone marrow, lymph nodes, and spleen as showed by a drop in white blood cell count, thus resulting in increased susceptibility to local and systemic infections. Ingestion of HD will produce severe stomach pains, vomiting, and bloody stools after a 15-20 minute latency period.

CHRONIC EXPOSURE : HD can cause sensitization, chronic lung impairment, (cough, shortness of breath, chest pain), cancer of the mouth, throat, respiratory tract and skin, and leukemia. It may also cause birth defects.

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Hold breath until respiratory protective mask is donned. Remove from the source IMMEDIATELY. If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination exits. Seek medical attention IMMEDIATELY.

EYE CONTACT: Speed in decontaminating the eyes is absolutely essential. Remove the person from the liquid source, flush the eyes immediately with water for at least 15 minutes by tilting the head to the side, pulling the eyelids apart with the fingers and pouring water slowly into the eyes. Do not

cover eyes with bandages but, if necessary, protect eyes by means of dark or opaque goggles. Transfer the patient to a medical facility **IMMEDIATELY.**

SKIN CONTACT: Don respiratory protective mask. Remove the victim from agent sources immediately. Immediately wash skin and clothes with 5% solution of sodium hypochlorite or liquid household bleach within one minute. Cut and remove contaminated clothing, flush contaminated skin area again with 5% sodium hypochlorite solution, then wash contaminated skin area with soap and water. Seek medical attention **IMMEDIATELY.**

INGESTION: Do not induce vomiting. Give victim milk to drink. Seek medical attention **IMMEDIATELY.**

SECTION VI - REACTIVITY DATA

STABILITY: Stable at ambient temperatures. Decomposition temperature is 149 C to 177 C. Mustard is a persistent agent depending on pH and moisture, and has been known to remain active for up to three years in soil.

INCOMPATIBILITY: Rapidly corrosive to brass @ 65 C. Will corrode steel at a rate of .0001 in. of steel per month @ 65 C.

HAZARDOUS DECOMPOSITION: Mustard will hydrolyze to form HCl and thiodiglycol.

HAZARDOUS POLYMERIZATION: Does not occur.

SECTION VII - SPILL, LEAK, AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: If spills or leaks occur, only personnel in full protective clothing will remain in the area (**See Section VIII**). In case of personnel contamination **See Section V** for emergency and first aid instructions.

RECOMMENDED FIELD PROCEDURES: The HD should be contained using vermiculite, diatomaceous earth, clay or fine sand and neutralized as soon as possible using copious amounts of 5.25% sodium hypochlorite solution. Scoop up all material and clothing and place in a approved DOT container. Cover the contents of the container with decontaminating solution as above. The exterior of the container will be decontaminated and labeled according with EPA and DOT regulations. All leaking containers will be over packed with vermiculite placed between the interior and exterior containers. Decontaminate and label in accordance with EPA and DOT regulations. Dispose of the material in accordance with waste disposal methods provided below. Dispose of the decontaminate according to Federal, state and local regulations. Conduct general area monitoring with an approved monitor to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (**See Sections II and VIII**).

If 5.25 % sodium hypochlorite solution is not available then the following decontaminants may be used instead and are listed in the order of preference: Calcium Hypochlorite, contamination Solution No. 2 (DS2), and Super Tropical Bleach Slurry (STB).

WARNING: Pure, undiluted calcium hypochlorite will burn on contact with liquid HD.

RECOMMENDED LABORATORY PROCEDURES: A minimum of 65 grams of decon solution

per gram of HD is allowed to agitate for a minimum of one hour. Agitation is not necessary following the first hour if a single phase is obtained. At the end of 24 hours, the resulting solution will be adjusted to a pH between 10 and 11. Test for presence of active chlorine by use of acidic potassium iodide solution to give free iodine color. Place 3 ml of the decontaminate in a test tube. Add several crystals of potassium iodine and swirl to dissolve. Add 3 ml of 50 wt.% sulfuric acid:water and swirl. IMMEDIATE iodine color shows the presence of active chlorine. If negative, add additional 5.25% sodium hypochlorite solution to the decontamination solution, wait two hours, then test again for active chlorine. Continue procedure until positive chlorine is given by solution. A 10 wt.% calcium hypochlorite (HTH) mixture may be substituted for sodium hypochlorite. Use 65 grams of decon per gram of HD and continue the test as described for sodium hypochlorite. Scoop up all material and clothing and place in a approved DOT container. Cover the contents of the container with decontaminating solution as above. The exterior of the container will be decontaminated and labeled according with EPA and DOT regulations. All leaking containers will be over packed with vermiculite placed between the interior and exterior containers. Decontaminate and label in accordance with EPA and DOT regulations. Dispose of the material in accordance with waste disposal methods provided below. Dispose of the decontaminate according to Federal, state and local regulations. Conduct general area monitoring with an approved monitor to confirm that the atmospheric concentrations do not exceed the airborne exposure limits **(See Section VIII).**

NOTE: Surfaces contaminated with HD, then rinse and decontaminated may evolve sufficient HD vapor to produce a physiological response. HD on laboratory glassware may be oxidized by its vigorous reaction with concentrated nitric acid.

WASTE DISPOSAL METHOD: Open pit burning or burying of HD or items containing or

contaminated with HD in any quantity is prohibited. Decontamination of waste or excess material will be accomplished according to the procedures outlined above can be destroyed by incineration in EPA approved incinerators according to appropriate provisions of Federal, State and local Resource Conservation Recovery Act (RCRA) regulations.

NOTE: Some states define decontaminated surety material as a RCRA hazardous waste.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

CONCENTRATION	RESPIRATORY PROTECTIVE EQUIPMENT.
< 0.003 mg/m3	A full face piece, chemical canister, air purifying protective mask will be on hand for escape. (The M9-, M17-, or M40-series masks are acceptable for this purpose. Other masks certified as equivalent may be used)
> 0.003 mg/m3	A NIOSH/MSHA approved pressure demand full face piece SCBA suitable for use in high agent concentrations with protective ensemble. (See DA PAM 385-61 for examples).

VENTILATION:

Local Exhaust: Mandatory. Must be filtered or scrubbed. Air emissions will meet local, state and federal regulations.

Special: Chemical laboratory hoods will have an average inward face velocity of 100 linear feet per minute (lfpm) +/- 10% with the velocity at any point not deviating from the average face velocity by more than 20%. Existing laboratory hoods will have an inward face velocity of 150 lfpm +/- 20%. Laboratory hoods will be located such that cross drafts do not exceed 20% of the inward face velocity. A visual performance test using smoke producing devices will be performed in assessing the ability of the hood to contain agent HD.

Other: Recirculation of exhaust air from agent areas is prohibited. No connection between agent area and other areas through the ventilation system are permitted. Emergency backup power is necessary. Hoods should be tested semiannually or after modification or maintenance operations. Operations should be performed 20 centimeters inside hoods.

PROTECTIVE GLOVES: Butyl Rubber Gloves M3 and M4 Norton, Chemical Protective Glove Set

EYE PROTECTION: As a minimum, chemical goggles will be worn. For splash hazards use goggles and face shield.

OTHER PROTECTIVE EQUIPMENT: For laboratory operations, wear lab coats, gloves and have mask readily accessible. In addition, daily clean smocks, foot covers, and head covers will be required when handling contaminated lab animals.

MONITORING: Available monitoring equipment for agent HD is the M8/M9 detector paper, blue band tube, M256/M256A1 kits, bubbler, Depot Area Air Monitoring System (DAMMS), Automated Continuous Air Monitoring System (ACAMS),CAM-M1, Hydrogen Flame Photometric Emission Detector (HYFED), the Miniature Chemical Agent Monitor (MINICAM), and Real Time Analytical Platform (RTAP).

Real-time, low-level monitors (with alarm) are required for HD operations. In their absence, an Immediately Dangerous to Life and Health (IDLH) atmosphere must be presumed. Laboratory operations conducted in appropriately maintained and alarmed engineering controls require only periodic low-level monitoring.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: When handling agents, the buddy system will be incorporated. No smoking, eating, or drinking in areas containing agents is permitted. Containers should be periodically inspected for leaks, (either visually or using a detector kit). Stringent control over all personnel practices must be exercised. Decontaminating equipment will be conveniently placed. Exits must be designed to permit rapid evacuation. Chemical showers, eyewash stations, and personal cleanliness facilities must be provided. Wash hands before meals and shower thoroughly with special attention given to hair, face, neck, and hands using plenty of soap and

water before leaving at the end of the work day .

OTHER PRECAUTIONS: HD should be stored in containers made of glass for Research, Development, Test and Evaluation (RDTE) quantities or one-ton steel containers for large quantities. Agent will be double-contained in liquid and vapor tight containers when in storage.

For additional information see "AR 385-61, The Army Toxic Chemical Agent Safety Program," "DA PAM 385-61, Toxic Chemical Agent Safety Standards," and "AR 40-173, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to HD Agents H, HD, and HT."

SECTION X - TRANSPORTATION DATA

FORBIDDEN FOR TRANSPORT OTHER THAN VIA MILITARY (TECHNICAL ESCORT UNIT) TRANSPORT ACCORDING TO 49 CFR 172

PROPER SHIPPING NAME: Poisonous liquids, n.o.s.

DOT HAZARD CLASS: 6.1, Packing Group I, Hazard Zone B

DOT LABEL: Poison

DOT MARKING: Poisonous liquids, n.o.s. Bis-(2-chloroethyl) sulfide UN 2810, Inhalation Hazard

DOT PLACARD: POISON

EMERGENCY ACCIDENT PRECAUTIONS AND PROCEDURES: **See Sections IV, VII and VIII.**

PRECAUTIONS TO BE TAKEN IN TRANSPORTATION: Motor vehicles will be placarded regardless of quantity. Drivers shall be given full information regarding shipment and conditions in case of an emergency. AR 50-6 deals specifically with the shipment of chemical agents. Shipment of agents will be escorted in accordance with AR 740-32.

ADDENDUM A
ADDITIONAL INFORMATION FOR THICKENED HD

384 139

TRADE NAME AND SYNONYMS: Thickened HD, THD

HAZARDOUS INGREDIENTS: K125 (acryloid copolymer, 5%) is used to thicken HD. K125 is not known to be hazardous except in a finely-divided, powder form.

PHYSICAL DATA: Essentially the same as HD except for viscosity. The viscosity of HD is between 1000 and 1200 centistoke @ 25 C.

FIRE AND EXPLOSION DATA: Same as HD.

HEALTH HAZARD DATA: Same as HD except for skin contact. For skin contact, don respiratory protective mask and remove contaminated clothing IMMEDIATELY. IMMEDIATELY scrape the HD from the skin surface, then wash the contaminated surface with acetone. Seek medical attention IMMEDIATELY.

SPILL, LEAK, AND DISPOSAL PROCEDURES: If spills or leaks of HD occur, follow the same procedures as those for HD, but dissolve THD in acetone before introducing any decontaminating solution. Containment of THD is generally not necessary. Spilled THD can be carefully scraped off the contaminated surface and placed in a fully removable head drum with a high density, polyethylene lining. THD can then be decontaminated, after it has been dissolved in acetone, using the same procedures used for HD. Contaminated surfaces should be treated with acetone, then decontaminated using the same procedures as those used for HD.

NOTE: Surfaces contaminated with THD or HD and then rinse-decontaminated may evolve sufficient HD vapor to produce a physiological response.

SPECIAL PROTECTION INFORMATION: Same as HD.

SPECIAL PRECAUTIONS: Same as HD with the following addition. Handling THD requires careful observation of the "stringers" (elastic, threadlike attachments) formed when the agents are transferred or dispensed. These stringers must be broken cleanly before moving the contaminating device or dispensing device to another location, or unwanted contamination of a working surface will result.

TRANSPORTATION DATA: Same as HD.

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MATERIAL SAFETY DATA

LEWISITE

SECTION I - GENERAL INFORMATION

DATE: 16 April 1988
REVISED: 27 March 1996

MANUFACTURER'S ADDRESS.

U S. ARMY CHEMICAL BIOLOGICAL DEFENSE COMMAND EDGEWOOD
RESEARCH DEVELOPMENT. ANDENGINEERING CENTER (ERDEC)
ATTN: SCBRD-ODR-S
ABERDEEN PROVING GROUND, MD 20101-5423

Emergency telephone #' s: 0700-1630 EST. 410-671-4411/4
After: 1630 EST: 410- 278-5201, Ask for Staff Duty Officer

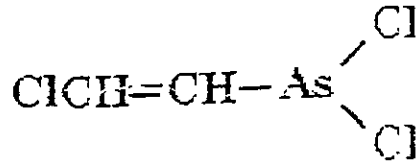
CAS REGISTRY NUMBER: 541-25-3

CHEMICAL NAME:
Dichloro-(2-chlorovinyl) arsine

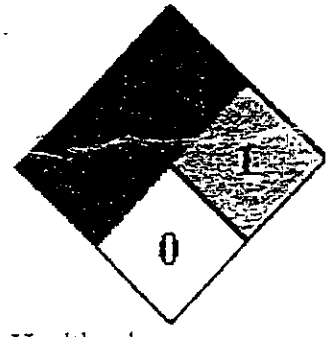
TRADE NAME AND SYNONYMS.
Arsine, (2-chlorovinyl) dichloro-
Arsonous dichloride, (2-chloroethenyl)
Chlorovinylarsine dichloride
2-Chlorovinyldichloroarsine
beta-Chlorovinyldichloroarsine
Lewisite

L
EA 1034
CHEMICAL FAMILY. Arsenical (vesicant)

FORMULA/CHEMICAL STRUCTURE. C2H2AsC13



NFPA 704 HAZARD SIGNAL:



Health - 4
Flammability - 1
Reactivity - 1
Special - 0

SECTION II - HAZARDOUS INGREDIENTS

INGREDIENTS NAME FORMULA PERCENTAGE BY WEIGHT AIRBORNE EXPOSURE LIMIT (AEL)LewisiteC2H2AsCl3100* 0.003 mg/m3 * This is a ceiling value

SECTION III - PHYSICAL DATA

BOILING POINT: 374 F 190 C

VAPOR PRESSURE (mm Hg):
0.35 @ 25 C
0 394 @ 20 C
VAPOR DENSITY (AIR=1): 7.1

SOLUBILITY: Insoluble in water and dilute mineral acids. Soluble in organic solvents, oils. and alcohol.

SPECIFIC GRAVITY (H2O=1): 1.88 @ 25 C

FREEZING POINT 18 C to 0.1 C depending on purity

VOLATILITY 4,480 mg/m3 @ 20 C

MOLECULAR WEIGHT 207.32

LIQUID DENSITY 1 89 at 20 C (Much heavier than Mustard)

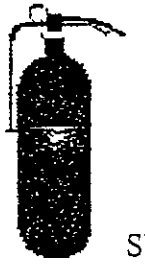
APPEARANCE AND ODOR: Pure L is a colorless oily liquid. "War gas" is an amber to dark brown liquid. A characteristic odor is usually geranium-like; very little odor when pure.

SECTION IV - FIRE AND EXPLOSION DATA

FLASHPOINT (Method Used): Does not flash

FLAMMABILITY LIMITS N/A.

EXTINGUISHING MEDIA: Water, fog, foam. CO2. Avoid use of extinguishing methods that will cause splashing or spreading of L.



SPECIAL FIRE FIGHTING PROCEDURES: All persons not engaged in extinguishing the fire should be evacuated immediately. Fires involving L should be contained to prevent contamination of uncontrolled areas. When responding to a fire alarm in buildings or areas containing agents, firefighting personnel should wear full firefighter protective clothing during chemical agent firefighting and fire rescue operations. Respiratory protection is required. Positive pressure. full face piece, NIOSH approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI)operations officer. In cases where firefighters are responding to a chemical accident/incident for rescue/reconnaissance purposes, they will wear appropriate levels of protective clothing (See **Section VIII**).

Do not breathe fumes. Skin contact with nerve agents must be avoided always. Although the

fire may destroy most of the agent. care must still be taken to assure the agent or contaminated liquids do not further contaminate other areas or sewers Contact with the agent liquid or vapor can be fatal.

SECTION V - HEALTH HAZARD DATA

AIRBORNE EXPOSURE LIMITS (AEL): The permissible airborne exposure concentration of L for an 8-hour workday or a 40-hour work week is an 8-hour time weighted average (TWA) of 0.003 mg/m3 as a ceiling value. A ceiling value may not be exceeded anytime. The ceiling value for Lewisite is based upon the present technologically feasible detection limits of 0.003 mg/m3. This value can be found in "DA Pam 40-173, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard H. HD, HT. and L." To date, however. the Occupational Safety and Health Administration (OSHA) has not promulgated permissible exposure concentration for L.

EFFECTS OF OVEREXPOSURE. L is a vesicant (blister agent), also, it acts as a systemic poison, causing pulmonary edema. diarrhea, restlessness, weakness, subnormal temperature, and low blood pressure. In order of severity and appearance of symptoms, it is: a blister agent, a toxic lung irritant, and absorbed in tissues, a systemic poison. When inhaled in high concentrations, may be fatal in as short a time as 10 minutes. L is not detoxified by the body. Common routes of entry into the body include ocular, percutaneous, and inhalation.

TOXICOLOGICAL DATA.

Man:

LCt50 (inhalation, man) = 1200 - 1500 mg min/m3
LCt50 (skin vapor exposure, man) = 100,000 mg min/m3 LDLO (skin, human) = 20 mg/kg
LCt50 (skin, man): >1500 mg/min3. L irritates eyes and skin and gives warning of its presence. Minimum effective dose (ED min) = 200 mg/m3 (30 min).
ICt50 (eyes, man): <300 mg min/m3.

Animal:

LD50 (oral, rat) = 50 mg/kg
LD50 (subcutaneous, rat) = 1 mg/kg
LCtLO (inhalation, mouse) = 150 mg/m3 10m
LD50 (skin, dog = 15 mg/kg RTECS) or 38 mg/kg (CRDEC chemical agent data sheets)
LD50 (skin, rabbit) = 6 mg/kg
LD50 (subcutaneous, rabbit) = 2 mg/kg
LD50 (intravenous, rabbit) = 500 mg/kg
LD50 (skin, guineapig) = 12 mg/kg
LD50 (subcutaneous, guinea pig) = 1 mg/kg
LD50 (skin, domestic farm animals) = 15 mg/kg
LCt50 (inhalation, rat) = 1500 mg min/m3 (9 min)
LCt50 (vapor skin, rat) = 20,000 mg min m 25 min)

LCD50 (skin, rat) = 15 - 24 mg/kg
LD50 (ip, dog) = 2 mg/kg
EDmin (skin, dog) = 50 mg/m3 (30 min)
EDmin (eye, dog) = 20 mg/m3 (30 min)
EDmin (skin, rabbit) = 25 mg/m3 (30 min)
EDmin (eye, rabbit) = 1 mg/m3 (30 min)

ACUTE EXPOSURE:

EYES: Severe damage. Instant pain, conjunctivitis and blepharospasm leading to closure of eyelids, followed by corneal scarring and iritis. Mild exposure produces reversible eye damage if decontaminated instantly. Otherwise, more permanent injury or blindness is possible within one minute of exposure.

SKIN: Immediate stinging pain increasing in severity with time. Erythema (skin reddening) appears within 30 minutes after exposure accompanied by pain with itching and irritation for 24 hours. Blisters appear within 12 hours after exposure with more pain that diminished after 2-3 days. Skin burns are much deeper than with HD. Tender and moist skin (mucous membrane; perspiration covered; ..), absorbs more L, therefore is more sensitive than the skin. This, however, is counteracted by L's hydrolysis by moisture, producing less vesicant. higher vapor pressure product.

RESPIRATORY TRACT: Irritating to nasal passages and produces a burning sensation followed by a profuse nasal secretion and violent sneezing. Prolonged exposure causes coughing and production of large quantities of froth mucus. In experimental animals, injury to respiratory tracts, due to vapor exposure is similar to mustard's; however, edema of the lung is more marked and frequently accompanied by pleural fluid.

SYSTEMIC EFFECTS: L on the skin, and inhaled vapor, is absorbed and may cause systemic poisoning. A manifestation of this is a change in capillary permeability, which permit's loss of sufficient fluid from the bloodstream to cause hemoconcentration, shock and death. In nonfatal cases, hemolysis of erythrocytes has occurred with a resultant hemolytic anemia. The excretion of oxidized products into the bile by the liver produces focal necrosis of that organ, necrosis of the mucosa of the biliary passages with periobiliary hemorrhages, and some injury to the intestinal mucosa. Acute systematic poisoning from large skin burns cause's pulmonary edema, diarrhea, restlessness weakness, subnormal temperature, and low blood pressure in animals.

CHRONIC EXPOSURE: L can cause sensitization and chronic lung impairment. Also, by comparison to agent mustard and arsenical compounds, it can be considered as a suspected human carcinogen.

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Hold breath until respiratory protective mask id donned. Remove from the source IMMEDIATELY. Ifbreathing has stopped give artificial respiration. If breathing is difficult, administer oxygen. Seek medical attention IMMEDIATELY.

EYE CONTACT. Speed in decontaminating the eyes is essential. Remove the person from

the liquid source, flush the eyes immediately with water for at least 15 minutes by tilting the head to the side, pulling eyelids apart with fingers and pouring water slowly into the eyes. Do not cover eyes with bandages but, if necessary, protect eyes by means of dark or opaque goggles. See medical attention IMMEDIATELY.

SKIN CONTACT: Remove the victim from the source immediately and remove contaminated clothing. Immediately decon affected areas by flushing with 10% sodium carbonate solution. After 3-4 minutes, wash off with soap and water to protect against erythema. Seek medical attention IMMEDIATELY

INGESTION. Do not induce vomiting. Give victim milk to drink. Seek medical attention IMMEDIATELY.

SECTION VI - REACTIVITY DATA

STABILITY: Stable in steel or glass containers.

INCOMPATIBILITY: Corrosive to steel at a rate of 1 x 10 -5 to 5 x 10-5 in/month at 65 C.

HAZARDOUS DECOMPOSITION PRODUCTS. Reasonably stable; however, in presence of moisture, it hydrolyses rapidly, losing its vesicant property. It also hydrolyses in acidic medium to form HC1 and non-volatile (solid) chlorovinylarsenious oxide, which is less vesicant than Lewisite. Hydrolysis in alkaline medium, as in decontamination with alcoholic caustic or carbonate solution or DS2, produces acetylene and trisodium arsenate (Na3AS04). Therefore, decontaminated solution would contain toxic arsenic.

SECTION VII - SPILL, LEAK, AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Only personnel in full protective clothing (See Section VIII) will be allowed in area where L is spilled. See Section V for emergency and first aid procedures.

RECOMMENDED FIELD PROCEDURES. The L should be contained using vermiculite, diatomaceous earth, clay, or fine sand and neutralized as soon as possible using copious amounts of alcoholic caustic, carbonate, or DS2. Caution must be exercised when using these decontaminates since acetylene will be given off. Household bleach can also be used if accompanied by stirring to allow contact. Scoop up all contaminated material and place in approved DOT containers. Cover with additional decontaminant. Decontaminate the outside of the container, label according to DOT and EPA requirements, and dispose of as specified below. Conduct general area monitoring with an approved monitor to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (See Sections II and

VIII).

RECOMMENDED LABORATORY PROCEDURES. A 10 wt. % alcoholic sodium hydroxide solution is prepared by adding 100 grams of denatured ethanol to 900 grams of 10 wt.% NaOH in water. A minimum of 200 grams of decon isrequired for each gram of L. The decon/agent solution is agitated for a minimum of one hour At the end of one hour the resulting pH should be checked and adjusted to above 11 5 using additional NaOH. if required. It is permitted to substitute 10 wt.% alcoholic sodium carbonate made and used in the same ratio as the NaOH listed above. Reaction time should be increased to 3-hours with agitation for the first hour. Final pH should be adjusted to above 10. It is permitted to substitute 5.25% sodium hypochlorite for the 10% alcoholic sodium hydroxide solution above. Allow one hour with agitation for the reaction. Adjustment of the pH is not required. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (See Section VIII). WASTE DISPOSAL METHOD· All neutralized material should be collected and contained for disposal according to land ban RCRA regulations or thermally decomposed in an EPA permitted incinerator equipped with a scrubber that will scrub out the chlorides and equipped with an electrostatic precipitator or other filter device to remove arsenic. Collect all the arsenic dust from the electrostatic precipitator or other filter device and containerize and label according to DOT and EPA regulations. The arsenic will be disposed of according to land ban RCRA regulations. Any contaminated materials or protective clothing should be decontaminated using alcoholic caustic, carbonates, or bleach analyzed to assure it is free of detectable contamination (3X) level. The clothing should then be sealed in plastic bags inside properly labeled drums and held for shipment back to the DA issue point.

NOTE: Some states define decontaminated surety material as an RCRA hazardous waste.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION·

CONCENTRATIONRESPIRATORY PROTECTIVE EQUIPMENT <0.003 mg/m3A full face piece, chemical canister, air purifying
protective mask will be on hand for escape.
(The M9-, M17-, or M40-series masks are
acceptable for this purpose. Other masks
certified as equivalent may be used) > 0.003 mg/m3 or unknownA NIOSH/MSHA approved, full face piece SCBA
suitable for use in high agent concentrations with
a protective ensemble. (See DA Pam 385-61) VENTILATION
Local exhaust: Mandatory. Must be filtered or scrubbed to limit exit concentration to non-detectable level. Air emissions will meet local, state and federal regulations

Special: Chemical laboratory hoods will have an average inward face velocity of 100 linear

feet per minute (1fpm)ñ 10% with the velocity at any point not deviating from the average face velocity by more than 20%. Existing laboratory hoods will have an inward face velocity of 150 lfpm ñ20%. Laboratory hoods will be located such that cross drafts do not exceed 20% of the inward face velocity A visual performance test utilizing smoke producing devices will be performed in the assessment of the inclosure's ability to contain Lewisite.

Other: Recirculation of exhaust air from agent areas is prohibited. No connection between agent area and other areas through the ventilation system is permitted. Emergency backup power is necessary. Hoods should be tested semiannually or after modification or maintenance operations. Operations should be performed 20 centimeters inside hoods. Procedures should be developed for disposal of contaminated filters.

PROTECTIVE GLOVES. Norton. Chemical Protective Glove Set. M3 Butyl Rubber

EYE PROTECTION: As a minimum, protective eye glasses will be worn. For splash hazard use goggles and face-shield.

OTHER PROTECTIVE EQUIPMENT: For laboratory operations. wear lab coats, gloves and have a mask readily accessible. In addition, daily clean smocks, foot covers, and head covers will be required when handling contaminated lab animals.

MONITORING: Available monitoring equipment for agent L is the M18A2 (yellow band), bubblers (arsenic and GC method). and M256 & A1 Kits.

Real-time, low-level monitors (with alarm) are required for L operations. In their absence. an IDLH atmosphere must be presumed. Laboratory operations conducted in appropriately maintained and alarmed engineering controls require only periodic low-level monitoring.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: When handling agents, the buddy system will be incorporated. No smoking, eating, or drinking in areas containing agents is permitted. Containers should be periodically inspected for leaks, either visually or using a detector kit. Stringent control over all personnel handling L must be exercised. Decontaminating equipment will be conveniently located. Exits must be designed to permit rapid evacuation. Chemical showers, eye wash stations, and personal cleanliness facilities must be provided. Wash hands before meals and shower thoroughly with special attention given to hair, face, neck, and hands, using plenty of soap before leaving at the end of the workday.

OTHER PRECAUTIONS: L should be stored in containers made of glass for Research, DevelopmentTest and Evaluation (RDTE) quantities or one-ton steel containers for large

quantities. Agent will be double contained in liquid tight containers when in storage or during transportation.

For additional information see "AR 385-61, The Army Toxic Chemical Agent Safety Program," "DA Pam 385-61, Toxic Chemical Agent Safety Standards," and "DA Pam 40-173, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard H, HD, HT, and L."

SECTION X - TRANSPORTATION DATA

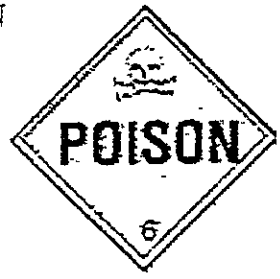
PROPER SHIPPING NAME. Poisonous liquids, n.o.s.

DOT HAZARDS CLASSIFICATION: 6.1, Packing Group I

DOT LABEL: Poison

DOT MARKING. Poisonous liquids, n.o.s. Dichloro-(2-chlorovinyl)arsine UN 2810

DOT PLACARD: POISON



EMERGENCY ACCIDENT PRECAUTIONS & PROCEDURES: See Sections IV and VIII.

PRECAUTIONS TO BE TAKEN IN TRANSPORTATION: Motor vehicles will be placarded regardless of quantity. Drivers will be given full information regarding shipment and conditions in case of an emergency. AR 50-6 deals specifically with the shipment of chemical agents. Shipment of agents will be escorted according to AR 740-32.

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ANNEX D

HAZARDOUS WASTE MANIFEST FORMS AND INSTRUCTIONS AND OTHER TRANSPORTATION FORMS

ANNEX D
HAZARDOUS WASTE MANIFEST FORMS AND INSTRUCTIONS AND OTHER TRANSPORTATION FORMS

The following pages provide the following forms and instructions to support the transportation and storage of chemical warfare materiel (CWM):

- Hazardous Waste Manifest Forms and Instructions
- DD Form 1387-2 Special Handling/Data Certification
- DD Form 626 Motor Vehicle Inspection
- DDMT Site Igloo Inspection Checklist
- DD Form 1911, Materiel Courier Receipt.

STATE OF ARKANSAS
Department of Pollution Control and Ecology
P. O. Box 8913 Little Rock, Arkansas 72219-8913
Telephone 501-562-7444

1

Please print or type (Form designed for use on elite (12-pitch) typewriter)

Form Approved. OMB No. 2050-0039 EXPIRES 9-30-96

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No. | 2. Page 1 of | Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address

4. Generator's Phone ( )

5. Transporter 1 Company Name | 6. US EPA ID Number

7. Transporter 2 Company Name | 8. US EPA ID Number

9. Designated Facility Name and Site Address | 10. US EPA ID Number

A. State Manifest Document Number: AR-805033

B. State Generator's ID

C. State Transporter's ID

D. Transporter's Phone

E. State Transporter's ID

F. Transporter's Phone

G. State Facility's ID

H. Facility's Phone

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No	Type	13. Total Quantity	14. Unit Wt/Vol	I. State Waste No.
a.					
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above

K. Handling Codes for Wastes Listed Above

If no alternate TSDF, return to generator.

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations and Arkansas state regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name | Signature | Month Day Year

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 19.

Printed/Typed Name | Signature | Month Day Year

EPA Form 8700-22 (Rev. 9-88) Previous edition is obsolete.

NOTICE THE ORIGINAL AND NOT LESS THAN TWO (2) COPIES MUST MOVE WITH THE HAZARDOUS WASTE SHIPMENT ONCE DELIVERED, THE TREATMENT/STORAGE/DISPOSAL FACILITY MUST RETURN THIS ORIGINAL COPY TO THE GENERATOR.

Appendix I to Section 262 — Uniform Hazardous Waste Manifest and Instructions (Arkansas/EPA Forms 8700-22 and 8700-22A and Their Instructions)

Arkansas/EPA Form 8700-22

Read all instructions before completing this form

This form has been designed for use on a 12-pitch (elite) typewriter a firm point pen may also be used — press down hard

State and Federal regulations require generators and transporters of hazardous waste and owners or operators of hazardous waste treatment, storage, and disposal facilities to use this form (Arkansas/EPA 8700-22) and, if necessary, the continuation sheet (Form 8700-22A) for both inter- and intrastate transportation

State and Federal regulations also require generators and transporters of hazardous waste and owners or operators of hazardous waste treatment, storage and disposal facilities to complete the following information

* * * * *

The following statement must be included with each Uniform Hazardous Waste Manifest, either on the form, in the instructions to the form, or accompanying the form

"Public reporting burden for this collection of information is estimated to average: 37 minutes for generators, 15 minutes for transporters, and 10 minutes for treatment, storage and disposal facilities This includes time for reviewing instructions, gathering data, and completing and reviewing the form. Send comments regarding the burden estimate, including suggestions for reducing this burden, to Chief, Information Policy Branch, PM-223, U S Environmental Protection Agency, 401 M Street SW , Washington, DC 20460, and to the Office of Information and Regulatory Affairs, Office of Management and Budget Washington, DC 20503 "

GENERATORS

Item 1. Generator's U.S. EPA ID Number — Manifest Document Number:
Enter the generator s U.S. EPA twelve digit identification number and the unique five digit number assigned to this Manifest (e g , 00001) by the generator

Item 2. Page 1 of ——
Enter the total number of pages used to complete this Manifest. i e , the first page (Arkansas/EPA Form 8700-22) plus the number of Continuation Sheets (EPA Form 8700-22A), if any.

Item 3. Generator's Name and Mailing Address
Enter the name and mailing address of the generator The address should be the location that will manage the returned Manifest forms

Item 4. Generator's Phone Number
Enter a telephone number where an authorized agent of the generator may be reached in the event of an emergency

Item 5 Transporter 1 Company Name
Enter the company name of the first transporter who will transport the waste

Item 6. U.S. EPA ID Number
Enter the U S EPA twelve digit identification number of the first transporter identified in item 5

Item 7. Transporter 2 Company Name
If a second transporter is used during this shipment, enter the company name of the second transporter who will transport the waste If more than two transporters are used to transport the waste, use a Continuation Sheet(s) (EPA Form 8700-22A) and list the transporters in the order they will be transporting the waste

Item 8. U.S. EPA ID Number
If applicable, enter the U S EPA twelve digit identification number of the second transporter identified in item 7

Note. If more than two transporters are used, enter each additional transporter's company name and U S EPA twelve digit identification number in items 24-27 on the Continuation Sheet (EPA Form 8700-22A) Each Continuation Sheet has space to record two additional transporters Every transporter used between the generator and the designated facility must be listed

Item 9. Designated Facility Name and Site Address
Enter the company name and site address of the facility designated to receive the waste listed on this Manifest The address must be the site address, which may differ from the company mailing address.

Item 10. U.S. EPA ID Number
Enter the U.S EPA twelve digit identification number of the designated facility identified in item 9

Item 11. U.S. DOT Description [Including Proper Shipping Name, Hazard Class, and ID Number (UN/NA)]
Enter the U S DOT Proper Shipping Name, Hazard Class, and ID Number (UN/NA) for each waste as identified in 49 CFR 171 through 177

Note· If additional space is needed for waste descriptions, enter these additional descriptions in item 28 on the Continuation Sheet (EPA Form 8700-22A).

Item 12. Containers (No. and Type)
Enter the number of containers for each waste and the appropriate abbreviation from Table I (below) for the type of container

Table I — Types of Containers

DM = Metal drums, barrels, kegs	DW = Wooden drums, barrels, kegs
DF = Fiberboard or plastic drums, barrels kegs	TP = Tanks portable
TT = Cargo tanks (tank trucks)	TC = Tank cars
DT = Dump truck	CY = Cylinders
CM = Metal boxes, cartons, cases (including roll-off)	CW = Wooden boxes, cartons, cases
CF = Fiber or plastic boxes, cartons or cases	BA = Burlap, cloth, paper or plastic bags

Item 13. Total Quantity
Enter the total quantity of waste described on each line

Item 14. Unit (Wt./Vol.)
Enter the appropriate abbreviation from Table II (below) for the unit of measure.

Table II — Units of Measure

G = Gallons (liquids only)	P = Pounds
T = Tons (2000 lbs)	Y = Cubic yards
L = Liters (liquids only)	K = Kilograms
M = Metric tons (1000 kg)	N = Cubic meters

Item 15. Special Handling Instructions and Additional Information
Generators may use this space to indicate special transportation, treatment, storage, or disposal information or Bill of Lading information States may not require additional, new, or different information in this space For international shipments, generators must enter in this space the point of departure (City and State) for those shipments destined for treatment, storage, or disposal outside the jurisdiction of the United States.

Item 16. Generator's Certification
The generator must read, sign (by hand), and date the certification statement. If a mode other than highway is used, the word "highway" should be lined out and the appropriate mode (rail, water, or air) inserted in the space below. If another mode in addition to the highway mode is used, enter the appropriate additional mode (e g., and rail) in the space below

Primary exporters shipping hazardous wastes to a facility located outside of the United States must add to the end of the first sentence of the certification the following words "and conforms to the terms of the EPA Acknowledgment of Consent to the shipment."

In signing the waste minimization certification statement, those generators who have not been exempted by statute or regulation from the duty to make a waste minimization certification under section 3002(b) of RCRA are also certifying that they have complied with the waste minimization requirements.

Generators may preprint the words, "On behalf of" in the signature block or may hand write this statement in the signature block prior to signing the generator certifications.

Note All of the above information except the handwritten signature required in item 16 may be preprinted.

* * * * *

TRANSPORTERS

Item 17. Transporter 1 Acknowledgement of Receipt of Materials
Enter the name of the person accepting the waste on behalf of the first transporter That person must acknowledge acceptance of the waste described on the Manifest by signing and entering the date of receipt

Item 18. Transporter 2 Acknowledgement of Receipt of Materials
Enter, if applicable, the name of the person accepting the waste on behalf of the second transporter. That person must acknowledge acceptance of the waste described on the Manifest by signing and entering the date of receipt

Note International Shipments — Transporter Responsibilities

Exports — Transporters must sign and enter the date the waste left the United States in item 15 of Form 8700-22

Imports — Shipments of hazardous waste regulated by RCRA and transported into the United States from another country must upon entry be accompanied by the U.S EPA Uniform Hazardous Waste Manifest. Transporters who transport hazardous waste into the United States from another country are responsible for completing the Manifest (40 CFR 263 10(c)(1))

OWNERS AND OPERATORS OF TREATMENT, STORAGE, OR DISPOSAL FACILITIES

Item 19. Discrepancy Indication Space
The authorized representative of the designated (or alternate facility's owner or operator must note in this space any significant discrepancy between the waste described on the Manifest and the waste actually received at the facility.

Owners and operators of Arkansas facilities should contact the Department for information on State Discrepancy Report requirements

Item 20. Facility Owner or Operator: Certification of Receipt of Hazardous Materials Covered by This Manifest Except as Noted in Item 19
Print or type the name of the person accepting the waste on behalf of the owner or operator of the facility That person must acknowledge acceptance of the waste described on the Manifest by signing and entering the date of receipt.

Arkansas' Additional Requirements for Completing the Hazardous Waste Manifest:

(1) The following items shall be completed as State manifest reporting requirements. (the following instructions refer to items A-K on the hazardous waste manifest report form (Arkansas/EPA Form No 8700-22) and are to be completed for all inter- and intrastate shipments of hazardous waste)·

(a) ITEM B If an EPA identification number is not required, enter the PCB identification number or Arkansas provisional identification number assigned by ADPC&E.

(b) ITEMS C and E: Enter the Transportation Permit number issued by the Arkansas Highway and Transportation Department

(c) ITEMS D and F The phone number of the transporter

(d) ITEM H The phone number of the designated facility.

(e) ITEM I. The EPA Waste Code, or the letters

"PCB" for PCB shipments

(f) ITEM J· The name, address and I D number of an alternate treatment, storage or disposal facility (if any)

(g) ITEM K· Emergency response contact (individual's name and telephone number)

(2) For rail transportation, the first and last rail transporter delivering the shipment must sign and date the manifest or continuation sheet in the appropriate space on the manifest.

INSTRUCTIONS — CONTINUATION SHEET, U.S. EPA FORM 8700-22A

ADPC&E does not supply manifest continuation forms Should a continuation form be required, generators may use a uniform manifest continuation form as shown in 40 CFR 262 Appendix I, and completed in accordance with these directions ***The Continuation form is only valid when accompanied by a Manifest (AR/EPA Form 8700-22) and when the corresponding manifest serial number is clearly indicated on each page of the continuation form.***

Read all instructions before completing this form.

This form has been designed for use on a 12-pitch (elite) typewriter, a firm point pen may also be used — press down hard

This form must be used as a continuation sheet to U S EPA Form 8700-22 if:

· More than two transporters are to be used to transport the waste,

· More space is required for the U.S DOT description and related information in Item 11 of Arkansas/EPA Form 8700-22 Federal regulations require generators and transporters of hazardous waste and owners or operators of hazardous waste treatment, storage, or disposal facilities to use the uniform hazardous waste manifest (Arkansas/EPA Form 8700-22) and, if necessary, this continuation sheet (EPA Form 8700-22A) for both inter- and intrastate transportation.

GENERATORS

Item 21. Generator's U.S. EPA ID Number — Manifest Document Number
Enter the generator's U S. EPA twelve digit identification number and the unique five digit number assigned to this Manifest (e.g., 00001) as it appears in item 1 on the first page of the Manifest.

Item 22. Page ——
Enter the page number of this Continuation Sheet

Item 23. Generator's Name
Enter the generator's name as it appears in item 3 on the first page of the Manifest.

Item 24. Transporter —— Company Name
If additional transporters are used to transport the waste described on this Manifest, enter the company name of each additional transporter in the order in which they will transport the waste. Enter after the word "Transporter" the order of the transporter For example, Transporter 3 Company Name. Each Continuation Sheet will record the names of two additional transporters.

Item 25. U.S. EPA ID Number
Enter the U S EPA twelve digit identification number of the transporter described in item 24

Item 26. Transporter —— Company Name
If additional transporters are used to transport the waste described on this Manifest, enter the company name of each additional transporter in the order in which they will transport the waste. Enter after the word "Transporter" the order of the transporter. For example, Transporter 4 Company Name. Each Continuation Sheet will record the names of two additional transporters.

Item 27. U.S. EPA ID Number
Enter the U S. EPA twelve digit identification number of the transporter described in item 26

Item 28. U.S. DOT Description Including Proper Shipping Name, Hazardous Class, and ID Number (UN/NA)
Refer to item 11.

Item 29. Containers (No. and Type)
Refer to item 12.

Item 30. Total Quantity
Refer to item 13.

Item 31. Unit (Wt./Vol.)
Refer to item 14.

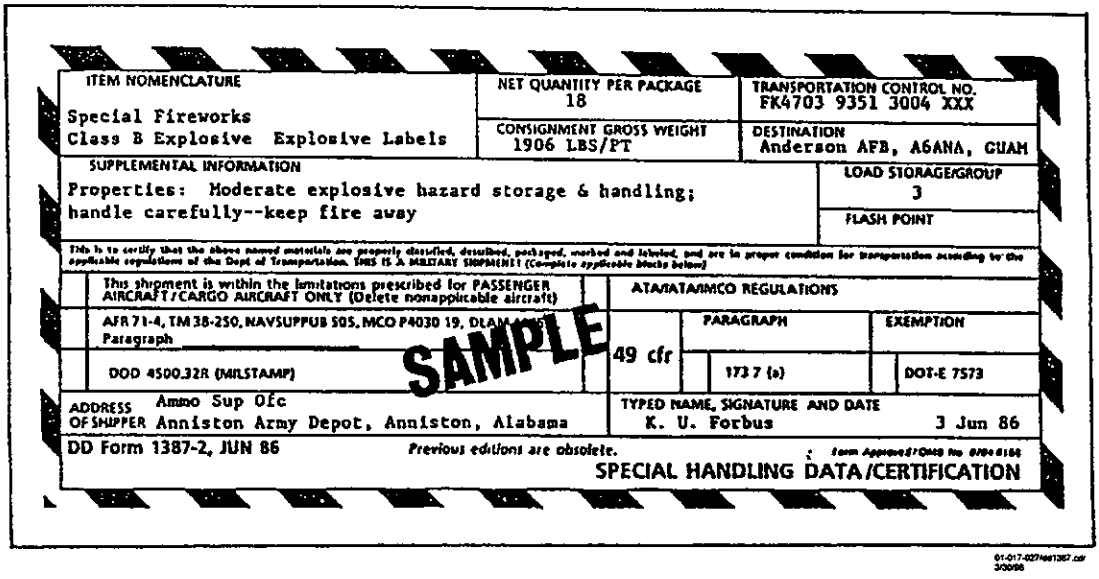
Item 32. Special Handling Instructions
Generators may use this space to indicate special transportation, treatment, storage, or disposal information or Bill of Lading information. States are not authorized to require additional, new, or different information in this space.

* * * * *

TRANSPORTERS

Item 33. Transporter —— Acknowledgement of Receipt of Materials
Enter the same number of the Transporter as identified in item 24. Enter also the name of the person accepting the waste on behalf of the Transporter (Company Name) identified in item 24. That person must acknowledge acceptance of the waste described on the Manifest by signing and entering the date of receipt.

Item 34. Transporter —— Acknowledgement of Receipt of Materials
Enter the same number as identified in item 26. Enter also the name of the person accepting the waste on behalf of the Transporter (Company Name) identified in item 26. That person must acknowledge acceptance of the waste described on the Manifest by signing and entering the date of receipt.



ITEM NOMENCLATURE
Special Fireworks
Class B Explosive Explosive Labels

NET QUANTITY PER PACKAGE
18

CONSIGNMENT GROSS WEIGHT
1906 LBS/PT

TRANSPORTATION CONTROL NO.
FK4703 9351 3004 XXX

DESTINATION
Anderson AFB, A6ANA, GUAM

SUPPLEMENTAL INFORMATION
Properties: Moderate explosive hazard storage & handling; handle carefully--keep fire away

LOAD STORAGE/GROUP
3

FLASH POINT

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Dept of Transportation. THIS IS A MILITARY SHIPMENT (Complete applicable blocks below)

This shipment is within the limitations prescribed for PASSENGER AIRCRAFT/CARGO AIRCRAFT ONLY (Delete nonapplicable aircraft)

AFR 71-4, TM 38-250, NAVSUPPUB 505, MCO P4030.19, DLAM [illegible]
Paragraph

DOD 4500.32R (MILSTAMP)

SAMPLE

ATA/IATA/IMCO REGULATIONS

49 cfr

PARAGRAPH
173.7 (a)

EXEMPTION
DOT-E 7573

ADDRESS OF SHIPPER
Ammo Sup Ofc
Anniston Army Depot, Anniston, Alabama

TYPED NAME, SIGNATURE AND DATE
K. U. Forbus
3 Jun 86

DD Form 1387-2, JUN 86 *Previous editions are obsolete.* Form Approved OMB No. 0704-0188

SPECIAL HANDLING DATA/CERTIFICATION

01-017-027ee1387.cdr
3/30/88

MOTOR VEHICLE INSPECTION
(TRANSPORTING HAZARDOUS MATERIAL)

	ORIGIN	DESTINATION
CPL NO.		
NAME OF CARRIER		
NAME OF DRIVER		
DATE AND HOUR		
INSTALLATION/ACTIVITY		
DRIVER'S STATE PERMIT NO.		
MEDICAL EXAMINER'S CERTIFICATE AND DATE		

VEHICLE

TYPE OF VEHICLE	TRUCK NUMBER	TRAILER(S) NUMBER	SLEEPER CAB:
☐ TRUCK ☐ TRUCK AND FULL TRAILER	ORIGIN	ORIGIN	☐ YES ☐ NO
☐ TRACTOR AND DOUBLE TRAILERS	DESTINATION	DESTINATION	VALID LEASE
☐ TRACTOR AND CLOSED SEMITRAILER			☐ YES ☐ NO
☐ TRACTOR AND FLAT-BED TRAILER			I.C.C. NUMBER

NOTE: All of the following items shall be checked on empty equipment prior to loading. Items with an asterisk (*) shall be checked on incoming loaded equipment.

ITEM NO.	CHECK APPROPRIATE COLUMN *(See reverse side for explanatory notes)*	ORIGIN SAT	ORIGIN UNSAT	DESTINATION SAT	DESTINATION UNSAT	REMARKS *(Explain unsatisfactory items; use reverse side if necessary)*
1.	ENGINE, BODY, CAB AND CHASSIS CLEAN					
2.	STEERING MECHANISM					
3.	HORN OPERATIVE					
4.	WINDSHIELD AND WIPERS					
5.	SPARE ELECTRIC FUSES AVAILABLE					
6.	REAR VIEW MIRRORS INSTALLED					
7.	HIGHWAY WARNING EQUIPMENT					
* 8.	FULL FIRE EXTINGUISHER INSTALLED					
9.	LIGHTS AND REFLECTORS OPERATIVE					
10.	EXHAUST SYSTEM					
* 11.	LIQUID PETROLEUM GAS POWERED VEHICLES					
* 12.	FUEL TANK; LINE AND INLET					
13.	COUPLING DEVICES - KINGPIN LOCK					
* 14.	ALL BRAKES OPERATIVE					
* 15.	LANDING GEAR ASSEMBLY OPERATIVE					
16.	SPRINGS AND ASSOCIATED PARTS					
* 17.	TIRES					
18.	CARGO SPACE					
* 19.	ELECTRIC WIRING					
* 20.	TAIL GATE AND DOORS SECURED					
* 21.	FIRE AND WATER RESISTANT TARPAULIN					
22.	ANY OTHER DEFECTS *(Specify)*					

☐ APPROVED. ☐ REJECTED *(If rejected give reasons on reverse under "Remarks". Equipment shall be approved if deficiencies are corrected prior to loading.)*

SIGNATURE *(of Inspector)* ORIGIN

SIGNATURE *(of Inspector)* DESTINATION

	ITEMS TO BE CHECKED PRIOR TO RELEASE OF LOADED VEHICLE	ORIGIN	DESTINATION
23.	MIXTURES OF MATERIAL PROHIBITED BY DOT REGS. ARE NOT LOADED ONTO THIS VEHICLE		
* 24.	LOAD IS SECURED TO PREVENT MOVEMENT		
25.	WEIGHT IS PROPERLY DISTRIBUTED AND VEHICLE IS NOT OVERWEIGHT		
* 26.	SEAL(S) APPLIED TO CLOSED VEHICLE, FIRE AND WATER RESISTANT TARPAULIN APPLIED ON OPEN VEHICLE*		
* 27.	SPECIAL INSTRUCTIONS *(DD Form 836)* FURNISHED DRIVER		
* 28.	COPY OF VEHICLE INSPECTION *(DD Form 626)* FURNISHED DRIVER		
* 29.	PROPER PLACARDS APPLIED		
* 30.	SHIPMENT MADE UNDER DOT EXCEPTION 868		

SIGNATURE *(of Inspector)* ORIGIN	SIGNATURE *(of Driver)* ORIGIN
SIGNATURE *(of Inspector)* DESTINATION	SIGNATURE *(of Driver)* DESTINATION

DD, FORM, APR 72 626 REPLACES EDITION OF 1 JUN 72, WHICH IS OBSOLETE.

01-017-027/dd626.cdr 3/30/98

EXPLANATORY NOTES

REFERENCES IN ITALICS BELOW ARE THE APPLICABLE PORTIONS OF THE DOT MOTOR CARRIER SAFETY REGULATIONS (M.C.S.R.) AND THE CODE OF FEDERAL REGULATIONS (C.F.R.); DOD REQUIREMENTS ARE ESTABLISHED BY THE DEPARTMENT OF DEFENSE (DOD)

THE INSPECTOR MUST BE FAMILIAR WITH THE CITED PORTIONS OF THE SAFETY AND EXPLOSIVE REGULATIONS

MEDICAL EXAMINER'S CERTIFICATE — Certificate must not be over 24 months old. (M.C.S.R.)

Item 1, ENGINE, BODY, CAB, AND CHASSIS CLEAN (i.e., no excessive oil or grease) - Inspect to see that engine and compartment are clean, check cab to see that no excessive grease is on cab and cab floor is free of debris; check under cab and chassis for excessive grease. (DOD Requirement)

Item 2, STEERING MECHANISM — Inspect to see that steering mechanism is in good condition, in proper adjustment, correctly and securely mounted, and whether the steering gear case is leaking lubricant. Pay particular attention to the pitman arm and tie rod assembly to see that they are securely mounted and not bent out of normal shape. (DOD Requirement)

Item 3, HORN OPERATIVE — Inspect to see that horn is securely mounted and of sufficient volume to serve its purpose. (M.C.S.R.).

Item 4, WINDSHIELD AND WIPERS — Inspect to see that the windshields of the tractors are free from breaks, cracks or defects which would make operation of the vehicle unsafe, that the view of the driver is not obscured by stickers, that wipers operate properly, and that wiper blades are of proper kind and in good condition. Defroster operative when conditions require it. (M.C.S.R.)

Item 5, SPARE ELECTRIC FUSES AVAILABLE — Check to see that at least one spare fuse for each kind and type of installed fuse is carried on vehicle as a spare, or it is equipped with an overload protective device (circuit breaker) (M.C.S.R.)

Item 6, REAR VIEW MIRRORS INSTALLED — Every truck and truck tractor shall have installed two rear vision mirrors, one at each side, firmly attached and so located as to reflect to the driver a view of the highway to the rear along both sides of the vehicle. Mirrors must not be cracked or dirty. (M.C.S.R.)

Item 7, HIGHWAY WARNING EQUIPMENT — This equipment must include either three red electric lanterns in operating condition and two red flags or three red emergency reflectors and two red flags with standards adequate to maintain them in an upright position, or three red emergency reflective triangles or three bidirectional emergency reflector triangles. Flame producing equipment is prohibited. (M.C.S.R.)

Item 8, FULL FIRE EXTINGUISHER INSTALLED — Inspect to see that one full fire extinguisher having an Underwriters' Laboratories rating of 10 B:C or more is securely mounted and readily accessible. (M.C.S.R.)

Item 9, LIGHTS AND REFLECTORS OPERATIVE — (Head-Stop-Tail-Front and Rear Clearance) — Inspect all lights and switches, including clearance lights and turn signals; make sure they are not obscured by dirt or grease or have broken lens; high and low beam switch must be operative. EMERGENCY flashers operating on front and rear of vehicle. (M.C.S.R.)

Item 10, EXHAUST SYSTEM — Inspect the exhaust system to see that no part is so located as would be likely to result in its burning, charring, or damaging the electrical wiring, the fuel supply, or any combustible part of the vehicle. The exhaust system shall discharge to the atmosphere at a location to the rear of the cab or, if the exhaust projects above the cab, at a location near the rear of the cab. (M.C.S.R.)

Item 11, LIQUID PETROLEUM GAS POWERED VEHICLES — Inspect LPG burning system to insure compliance with DOT standards prescribed in 49 CFR 393.69. (M.C.S.R.)

Item 12, FUEL TANK, LINE, AND INLET — Inspect tanks and fuel lines to see that they are in completely serviceable condition, free from leaks or evidence of leakage and surely mounted. Examine caps for defective gaskets or plugged vents. Inspect the filler neck to see that they are in completely serviceable condition, securely supported and not leaking at joints. (M.C.S.R.)

Item 13, COUPLING DEVICES - KINGPIN LOCK — Inspect without uncoupling to see that the fifth wheel rocker plate and bed are in good condition, properly assembled and mounted, and adequately lubricated. Kingpin lock must operate freely and properly, lock securely, and not show excessive wear. (M.C.S.R.)

Item 14, ALL BRAKES OPERATIVE — (Including hand brakes and air pressure warning devices) — Inspect for oil or grease leaks around drum flanges, pedal travel, air or vacuum line leaks, moisture in tanks, compressor build up and governor cut off. Test for proper and adequate brake application. (M.C.S.R.)

Item 15, LANDING GEAR ASSEMBLY OPERATIVE — Landing gear assembly must be in good condition, correctly assembled, adequately lubricated, and properly mounted.

Item 16, SPRINGS AND ASSOCIATED PARTS — Examine visually the springs, suspension hanger mechanisms, torsion bar assemblies, and auxiliary parts such as U-bolts, shackles, center bolts and hangers, for breakage, improper adjustment, and, as appropriate, lack of lubrication. Air suspensions should not be leaking. (DOD Requirement)

Item 17, TIRES — Examine all tires for cuts, bruises, breaks, and blisters. All tires with cuts or injuries extending into the cord body and those worn smooth in the center of the tread are not acceptable. Insure that stones are removed from between duals. Tires must be properly matched on dual-equipped tractors and trailers. (M.C.S.R.)

Item 18, CARGO SPACE — Inspect to see that cargo space is clean and in good condition to prevent damage to lading from exposed bolts, nuts, screws, nails, or other inwardly projecting parts. Check floor to make sure it is tight and free of holes. Floors shall not be permeated with oil or gasoline. (C.F.R.)

Item 19, ELECTRIC WIRING — Electric wiring must be clean and properly secured, insulation must not be frayed or otherwise in poor condition. There must be no uninsulated wires or improper splices or connections. Wires and electric fixtures inside the body must be protected from the lading. (M.C.S.R.)

Item 20, TAILGATE AND DOORS ON CLOSED EQUIPMENT SECURED — Inspect to see that all hinges are tight in body. Check for broken latches and safety chains. Doors must close securely. (M.C.S.R.)

Item 21, FIRE AND WATER RESISTANT TARPAULIN — If shipment is made on open equipment, check to make sure the lading is properly covered with a fire and water resistant tarpaulin. Explosive material packed in fire and water resistant containers and transported on flat-bed vehicles are not required to be covered with fire and water resistant tarpaulin. (C.F.R.)

Item 22, ANY OTHER DEFECTS (Specify) — Self Explanatory.
Item 23, MIXTURES OF MATERIAL PROHIBITED BY DOT REGS. ARE NOT LOADED ONTO THIS VEHICLE — Check carefully to prevent loading of incompatible explosives. (C.F.R.)
Item 24, LOAD IS SECURED TO PREVENT MOVEMENT — Self Explanatory.

Item 25, WEIGHT IS PROPERLY DISTRIBUTED AND VEHICLE IS NOT OVERLOADED — Lading shall be distributed in accordance with the approved load plan, when available, or when not available, a plan agreed upon by the shipper and the carrier. The weight of the load shall not exceed the capacity of the vehicle established by the carrier. The gross axle weights and the gross vehicle weight shall not exceed the limits imposed by the states through which the vehicle is routed. The carrier shall inform the shipper of the state(s) law requirements. (DOD Requirement)

Item 26, 27, and 28 — Self Explanatory.

Item 29, PROPER PLACARDS APPLIED — Four standard placards applicable to the load will be furnished the carrier and insure they are conspicuously displayed, one in front, rear, and each side. (C.F.R.)

Item 30, SHIPMENT MADE UNDER DOT EXCEPTION 868 — This item will be checked when a shipment is made under the provisions of DOT Exception 868. When checked, it signifies that the shipment was loaded in compliance with carrier's advice on maximum weight and that the driver is relieved from certifying to Items 23, 24, and 25. (DOD Requirement)

REMARKS

★U.S.GPO:1997-0-197-780

01-017-027/dd626.cdr
3/30/98

DDMT Site

Igloo Inspection Checklist

Period Covered: From _____ to _____

	MON		TUES		WED		THUR		FRI		SAT		SUN	
Inspector:														
Date:														
Time:														
	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
Outside														
Signs posted on igloo entrance gate	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Area Secure, gate closed and locked, igloo door closed and locked	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Storage Area														
Building structurally sound	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Area clean of debris	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Aisle space adequate for emergency response	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
All containers on pallets	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
All containers sealed	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
No leaks, spills, leaking containers, or residue	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Containers turned so that labels are visible	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Inspect container labels														
composition of waste	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
quantity of waste	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
generator	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
date of acceptance	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Inspect secondary containment sumps	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

DDMT Site
Igloo Inspection Checklist

Period Covered. From _____to _____

	MON		TUES		WED		THUR		FRI		SAT		SUN	
Inspector:														
Date:														
Time:														
	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
Equipment														
Emergency shower/eyewash operable	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Absorbent available	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Inspect fire extinguishers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Gloves available	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Eye protection available	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Respirators available	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Protective clothing available	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Spill kit available and complete	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tool kit available and complete	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Records/Reports														
Waste logs complete, accurate and up-to-date	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Manifests logged and filed	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Copies of returned manifests	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Emergency Response Contingency Plan on file	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sample records on file	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Discrepancy reports prepared and filed	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Incident reports for spills on file	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Comments:

_____

_____

DDMT Site
Igloo Inspection Checklist (Continued)

Corrective Action:

Mon:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Tue:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Wed:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Thur:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Fri:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Sat:	Item	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Sun:	Item.	_____	Action Taken:	_____
	Date:	_____	Signature:	_____

MATERIEL COURIER RECEIPT	SHIPPER'S CONTROL/DOCUMENT NO
SHIPPER	SUPPLY ACCOUNT NUMBER
DESTINATION	SUPPLY ACCOUNT NUMBER

PRIVACY ACT STATEMENT

AUTHORITY 5 U.S.C., Sec 552a (PL 93 579)

PRINCIPLE PURPOSES. To provide a receipt for transfer of controlled materiel. The use of the SSAN is required and is necessary to provide positive identification of the individuals receipting for the materiel.

ROUTINE USES. To document transfer of materiel from a shipper to a courier, courier to courier and/or receiver

DISCLOSURE IS VOLUNTARY. Since the SSAN must be used, refusal to provide SSAN may be grounds for action to

I certify by my signature that I have received the materiel listed on this form and am aware of the applicable safety and security requirements

SHIPMENT TRANSFERS			
FIRST	LOCATION OF TRANSFER		DATE(YR/MO/DAY)
RECIPIENT'S PRINTED NAME (LAST, FIRST, M I)		ORGAN OR ACCOUNT NO	
SIGNATURE		SOCIAL SECURITY NUMBER	
SECOND	LOCATION OF TRANSFER		DATE (YR/MO/DAY)
RECIPIENT'S PRINTED NAME (LAST, FIRST, M I)		ORGAN OR ACCOUNT NO.	
SIGNATURE		SOCIAL SECURITY NUMBER	
THIRD	LOCATION OF TRANSFER		DATE (YR/MO/DAY)
RECIPIENT'S PRINTED NAME (LAST, FIRST, M I)		ORGAN OR ACCOUNT NO	
SIGNATURE		SOCIAL SECURITY NUMBER	
FOURTH	LOCATION OF TRANSFER		DATE (YR/MO/DAY)
RECIPIENT'S PRINTED NAME (LAST, FIRST, M I)		ORGAN OR ACCOUNT NO	
SIGNATURE		SOCIAL SECURITY NUMBER	
FIFTH	LOCATION OF TRANSFER		DATE (YR/MO/DAY)
RECIPIENT'S PRINTED NAME (LAST, FIRST, M I)		ORGAN OR ACCOUNT NO	
SIGNATURE		SOCIAL SECURITY NUMBER	

SHIPMENT DESCRIPTION

LINE NUMBER	QUANTITY	SERIAL NUMBERS	REMARKS

DD FORM 82 MAY 1911

PREVIOUS EDITION MAY BE USED UNTIL 31 DEC 82

DD Form 1911, Materiel Courier Receipt

ANNEX E
ACRONYMS AND ABBREVIATIONS

ANNEX E
ACRONYMS AND ABBREVIATIONS

AFFF	aqueous film forming foam
AR	Army Regulation
BREA	Bond Road Exclusion Area
CAI	chemical accident/incident
CAIRA	Chemical Accident or Incident Response and Assistance
CAIS	chemical agent identification set
CAM	chemical agent monitor
cc/sec	cubic centimeter per second
CFR	Code of Federal Regulations
CG	phosgene
CK	cyanogen chloride
CN	chloroacetophenone
CPR	cardiopulmonary resuscitation
CWM	chemical warfare materiel
DA	Department of the Army
DAAMS	Depot Area Air Monitoring System
DDMT	Defense Depot Memphis, Tennessee
DLA	Defense Logistics Agency
DM	adamsite
DoD	Department of Defense
DOT	Department of Transportation

EDT	1,2-ethanedithiol
EOC	Emergency Operation Center
GA	tabun
GC	gas chromatograph
H	mustard agent
HA	hazard analysis
HD	distilled mustard
HN-1	nitrogen mustard
HS	sulfur mustard
IHF	interim holding facility
L	lewisite
MCE	maximum credible event
MIL-STD	Military Standard
mg/m^3	milligram per cubic meter
MRC	multiple round container
MSDS	material safety data sheet
NRT	near real-time
NSCM	non-stockpile chemical materiel
OSHA	Occupational Safety and Health Administration
Pam	Pamphlet
PAO	Public Affairs Office
PBA	Pine Bluff Arsenal, Arkansas
PBCA	Pine Bluff Chemical Activity

PMCD	U.S. Army Program Manager for Chemical Demilitarization
PMNSCM	Project Manager for Non-Stockpile Chemical Materiel
POIO	Public Outreach and Information Office
PPE	personal protective equipment
PS	chloropicrin
psig	pounds per square inch gauge
RAC	risk assessment code
RCRA	Resource Conservation and Recovery Act
SBCCOM	U.S. Army Soldier and Biological Chemical Command
SOP	standing operating procedure
SSCC	Site Security Control Center
SSMP	System Safety Management Plan
TDEC	Tennessee Department of Environmental Conservation
TEU	Technical Escort Unit
TM	Technical Manual
TWA	time-weighted average
USACMDA	U.S. Army Chemical Materiel Destruction Agency
USEPA	U.S. Environmental Protection Agency
XSD	halogen selective detector

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ANNEX F
REFERENCES

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ANNEX G
QUESTIONS AND ANSWERS
FOR DEFENSE DEPOT MEMPHIS TRANSPORTATION PLAN

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Q: What items at Defense Depot Memphis are being shipped?

A: *The items are bottles of material that used to belong to chemical agent identification sets.*

Q: What are chemical agent identification sets?

A: *Chemical agent identification sets were training aids used from the 1920s to the 1960s to train military personnel in the safe handling and detection of chemical agents.*

Q: What chemicals are in these bottles?

A: *The chemicals in these bottles include the chemical warfare agents mustard and lewisite. Mustard and lewisite are blister agents that can cause severe irritation to the eyes, nose, and lungs. They also can cause blisters on exposed skin.*

Q: How did the items come to be at Defense Depot Memphis?

A: *The items were discovered in an old landfill on the depot. The Defense Depot Memphis was established in 1942 as a distribution center for military equipment including chemical warfare materiel. Wastes generated on the depot were disposed of in the landfill. This was an accepted practice before the 1960s.*

Q: How were the items discovered?

A: *The Defense Depot Memphis is cleaning up areas of the depot that were contaminated by past activity. The landfill where these items were found was being cleaned up because of contamination caused by petroleum products that had been placed in the landfill. There is no contamination by chemical agents.*

Q: What threats to the public are posed by these items?

A: *The items are safe because the chemicals are inside sealed glass bottles that have been packed inside of steel containers. The steel containers are specially designed to contain leaks should any of the bottles break.*

Q: Where are the items now?

A: *When the items were discovered, they were packed inside of the steel containers and stored in a building specifically designed for the temporary storage of hazardous wastes. The items will remain inside of this building until they are shipped.*

Q: Where are the items being shipped?

A: *The items are being shipped to Pine Bluff Arsenal, Arkansas.*

Q: Why are they being shipped?

A: *In accordance with Pubic Law 103-337, recovered chemical warfare materiel will be shipped to the nearest military installation with the necessary permits for storing the materiel until it can be destroyed.*

Q: How will the items be shipped?

A: *A truck will move the items from their current holding facility to a military UH-1N helicopter that will land at the Depot. The helicopter will fly the items to Pine Bluff Arsenal. At Pine Bluff Arsenal, another truck will move the items from the helicopter to a State of Arkansas permitted hazardous waste storage facility on Pine Bluff Arsenal.*

Q: Who will ship the items?

A: *The U.S. Army Technical Escort Unit will transport the items. They are specially trained individuals skilled in all aspects of storage, handling, and transport of chemical warfare materiel.*

Q: What safeguards will be used to protect the public?

A: *The items are packed inside steel cylinders called multiple round containers. These steel containers were specially designed to withstand impact and contain leakage. A specially trained Army unit will monitor the containers before shipment begins and upon arrival at Pine Bluff Arsenal. Throughout the shipping process, medical and hazardous materiel response teams will be on standby should their assistance be needed. Personnel trained in hazardous materiel detection and spill response will accompany the items in transit.*

Q: When will the items be shipped?

A: *The items will be shipped during the week of TBD. The exact date will depend on weather and the availability of the Technical Escort personnel and aircraft.*

Q: How long will the flight take?

A: *The flight will last approximately one and one-half hours.*

Q: What laws govern the shipment of these items?

A: *These items are being handled under the environmental laws governing hazardous waste and shipped according to the transportation laws governing transport of hazardous waste.*

Q: Will local authorities and the public be informed when the transport is to take place?

A: *Yes. State environmental agencies and federal aviation officials will be informed. Local emergency response agencies along the transportation route will also be told when the shipment is going to be passing through their jurisdiction. Approval must come from the states before the items will be transported.*

Q: Has the Army shipped similar items in the past?

A: *Yes, the Army has conducted similar operations without incident. Over 200 items similar to those being shipped from the Memphis depot were safely moved from Jackson, Mississippi. Other shipments include removing 428 items from Edison, New Jersey, 12 items from Fort Ord, California, and 39 items from Ellsworth Air Force Base, South Dakota.*

Q: What will happen to the items after they arrive at the destination?

A: *The items will be stored in a permitted hazardous waste storage facility pending fielding of the Army's portable treatment system.*

Q: How will the items be destroyed?

A: *The items will be placed inside a treatment system where the steel shipping containers will be opened and the individual bottles separated according to the material they contain. The bottles will be opened and mixed with a caustic solution that will destroy the chemical agent.*

Q: When will the items be destroyed?

A: *The treatment system for destruction of these items is being tested in Utah. Approval from Utah state officials is expected soon. When that occurs, the system will be deployed to dispose of the recovered items.*

Q: What options were considered instead of transporting the items to Pine Bluff Arsenal?

A: *The Army considered leaving the items in storage at Defense Depot Memphis until the treatment system could be brought to the depot to destroy the chemical agents. However, this option posed a greater risk to depot workers and the public, and was more expensive than transporting the items. Defense Depot Memphis is in an urban area surrounded by homes and businesses. The Army chose to transport the items in order to reduce risk to the public.*

Q: Who can I call for more information?

A: *For Defense Depot Memphis specific questions, contact the Depot Public Affairs Office, Mr. George Dunn, 901-775-6753. For information about Chemical Agent Identification Sets and the transport of chemical warfare materiel, contact the Project Manager for Non-Stockpile Chemical Materiel, Public Outreach and Information Office, Ms. Louise Dyson, 800-488-0648.*

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