

APPENDIX D

EMPLOYMENT OF CHEMICAL AND BIOLOGICAL COLLECTIVE PROTECTION SHELTER SYSTEMS BY MEDICAL UNITS**D-1. Types of Collective Protection Shelter Systems**

a. The M51 CPS system is currently the only CPS system with a *litter air lock* available for HSS use. The M51 CPS system is used at the BAS and DCS. A replacement shelter system, the chemical biological protected shelter (CBPS) system, is under development. The CBPS may be attached to the rear of a high mobility multi-purpose wheeled vehicle (HMMWV); it will provide 300 square feet of working space. The CBPS will replace the M51 CPS system one-for-one at the BAS and DCS. Current basis of issue is two M51 CPS systems for the BAS and four M51 CPS systems for the DCS.

b. An Advanced Simplified Collective Protection System that provides an NBC contamination free environment for DEPMEDS-equipped hospitals is also under development. This system will provide a contamination free environment for patient care under CB conditions. It will not protect personnel or patients from the thermal, blast, and initial radiation effects of nuclear weapons; however, it will provide protection against the effects of fallout. The system will include the capabilities for CB protection in TEMPERS, ISOs, and passageways; filtered, conditioned air; ambulatory and litter air locks, and larger air locks for receipt of supplies. However, all areas of the hospital may not be protected. Areas not protected may include minimum care wards, administrative areas, food service, supply (including Class VIII), and staff quarters.

c. The M20E1 simplified collective protection system is another system available. It consists of a chemical room liner, a CB filter blower, and an ambulatory air lock. Currently this system only provides ambient temperature air. The M20E1 is best set up inside a room. It may be used inside tents; however, the available space will be limited by tent poles and other components of the tent. When space is available, the M20E1 can be complexed (two or more interconnected); see the technical manual provided with the system for details.

NOTE

The M20E1 does not have a litter air lock, only staff or ambulatory patients can enter this system.

d. When employing CPS systems, provisions for waste disposal and protected water and food supplies within the CPS are required. Additionally, Class VIII supplies must be protected from contamination. Supplies not in use or needed in treatment areas are stored in medical chest or shipping containers that are inside covered areas, such as closed MILVANS or tents. When contamination is present, only open these storage areas for emergency resupply of operational areas. Use plastic sheeting or other material to provide an additional barrier between the supplies and the contamination. Wrap supplies in plastic or other barrier material for movement from the storage area to the air lock of the CPS.

- If the hospital water supply is not hardened against NBC effects, water may be stored inside the CPS in 5-gallon water cans; 55-gallon collapsible fabric drums; 250-gallon collapsible fabric pillows; 500-gallon collapsible fabric drums; or other available water containers. Store the containers of water in any available area of the CPS such as under tables, beds, and in corners of wards. The storage area must be easily accessible to all hospital personnel in the CPS; also, it must not interfere with patient care.

- Rations, as determined by the hospital commander, should be available for personnel and patients. The rations can be stored in the same area with the water, if required. Ration control measures are established to ensure that the rations are only consumed as provided for in the hospital SOP.

- Human waste devices must also be provided. Portable potties (plastic bag lined or chemical), buckets with plastic bags and bag ties, or other improvisations will do the job. Regardless of the procedure used, the waste must be controlled to prevent odors and health hazards associated with the waste. The area used for these devices should have privacy curtains. Plastic bags can be passed to the outside for disposal through the supply air lock, or on a litter through the litter patient air lock.

- Solid waste (including medical) must be placed in plastic bags. Seal the top of the bags to prevent spillage, odors, or spread of infections/disease. NEVER overfill the bags; always leave enough room in the bag to make a good seal. Pass the sealed bags to the outside through the supply air lock, or on a litter through the litter patient air lock. Outside personnel take the bags to the designated waste disposal site for burial.

D-2. Battalion Aid Station

To establish a BAS using the M51 CPS system, one shelter is set up with medical supplies and equipment in place as designated in the TSOP. Place padding under litter stands and equipment to prevent puncturing the shelter floor. A contaminated triage, patient decontamination station, and a contaminated treatment area is established on the downwind (prevailing wind) side of the M51. An overhead cover of plastic sheeting (at least 20 x 50 feet) is set up over the contaminated triage, decontamination station, contaminated treatment area, and the clean treatment/waiting area; the cover overlaps the air lock. A second area covered with 20 x 25 feet of plastic sheeting (the evacuation holding area) is set up beside the shelter on the opposite side from the generator. The clean treatment area is separated from the decontamination area by a hot line with a shuffle pit. Only clean (decontaminated) patients or personnel are allowed to cross the hotline into the clean treatment area, or are admitted into the M51. Figure D-1 presents one layout of a BAS using the M51 system. Figure D-2 presents one interior layout of the M51 as a BAS. See TM 3-4240-264-12 for set up, operation, and maintenance of the M51 system.

NOTE

1. The overhead cover is not needed when the wind speed exceeds 10 knots per hour. The plastic will not stay in place.
2. Although the BAS has two M51 systems, only one is set up at any given time for use in the contaminated area. This is due to the lack of authorized personnel to operate both systems at one time. The second system can be used without the CB filters when the treatment squad is operating in the split team mode. The second system also provides a replacement in the event that the one in operation is damaged beyond repair. This ensures continued HSS to the command.

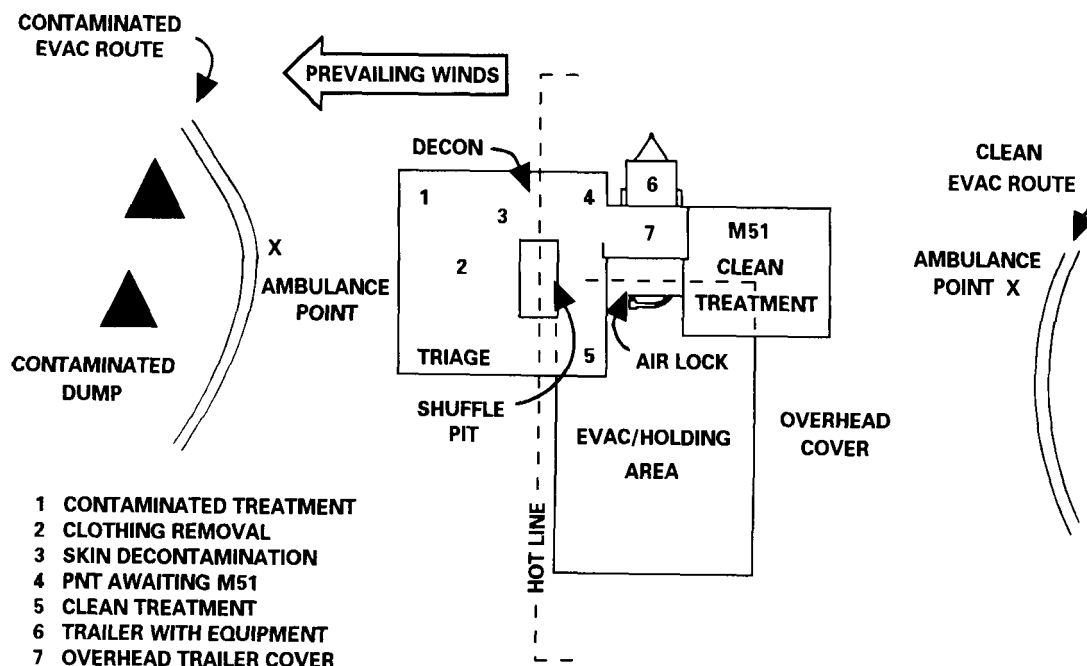


Figure D-1. Battalion aid station using the M51 shelter system.

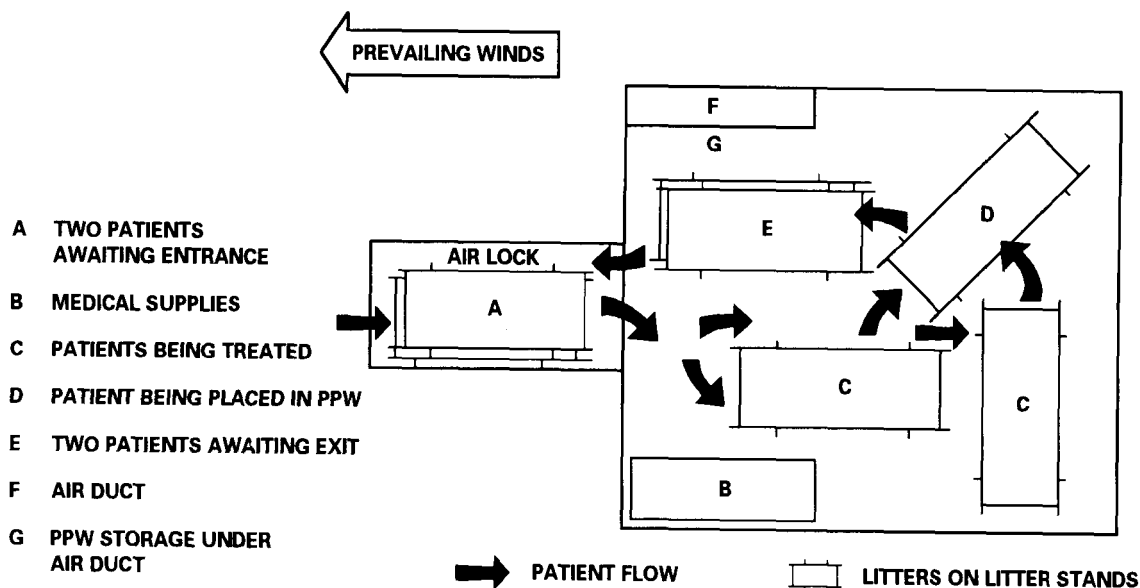


Figure D-2. Battalion aid station interior layout of M51.

D-3. Division Clearing Station

To establish a DCS using the M51 CPS system, set up four shelters with medical supplies and equipment as outlined in unit TSOP. The four shelters are complexed as shown in Figures D-3 and D-4. The pinwheel configuration (Figure D-4) requires a special transition piece. As with the BAS, the triage, decontamination, and contaminated treatment areas are separated from the clean treatment/waiting area by a hot line with a shuffle pit. Overhead covering is provided over the triage, decontamination station, contaminated treatment area, and clean waiting area as described for the BAS. The overhead covering for patients awaiting evacuation to a corps level hospital is established on the upwind end of the M51 systems as shown in Figures D-3 and D-4.

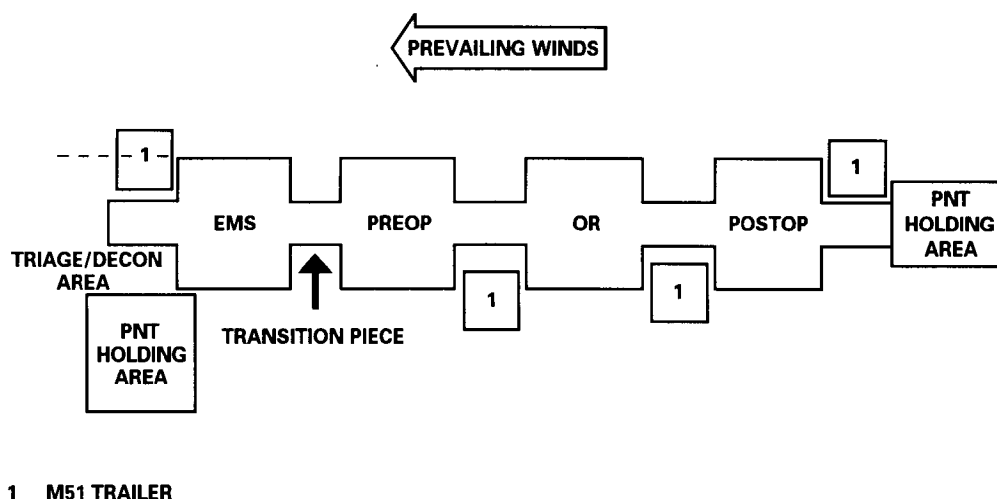


Figure D-3. M51 collective protection shelter straight line configuration as a division clearing station.

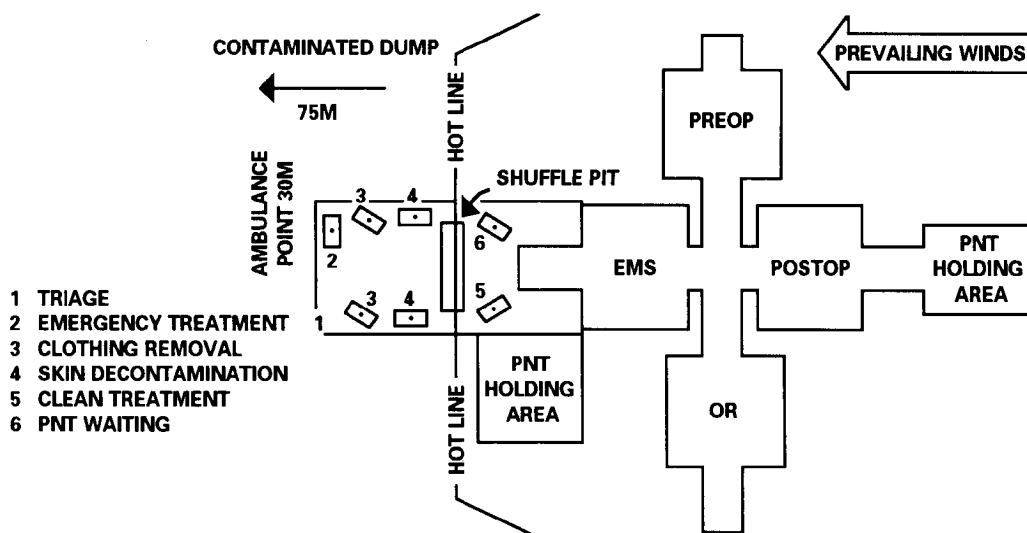


Figure D-4. M51 collective protection shelter pinwheel configuration as a division clearing station.

D-4. Battalion Aid Station in a Chemical Biological Protected Shelter

To establish a BAS using the CBPS system, set up one shelter following the instructions provided in the technical manual or manufacturer's instructions and your unit SOP. All designated medical supplies and equipment are set up as required in the unit TSOP. Provide padding under litter stands and equipment to prevent puncturing the floor. Overhead cover is provided as described for the M51 CPS. The triage, decontamination station, contaminated treatment area, and clean treatment waiting area is established as for the M51 CPS. These areas are separated by a hot line with a shuffle pit. Everyone crossing the hot line must be decontaminated.

D-5. Division Clearing Station in a Chemical Biological Protected Shelter

To establish a DCS with the CBPS, follow the procedures for the BAS except set up four CBPS systems as described in the technical manual or manufacturer's instructions provided with the system. All equipment is set up inside the CBPS as required by your unit TSOP. With four CBPS set up and operational, a total of 1200 square feet of work area is available. A triage, patient decontamination station, contaminated treatment area, and clean treatment/waiting area is established on the downwind side of the CBPS. These areas must have overhead covering as described for the M51 systems.

D-6. Collective Protection in a Deployable Medical System-Equipped Hospital

To establish CPS systems within a DEPMEDS-equipped hospital, follow the procedures as described in the manufacturer's instructions or the technical manual on the CPS system to be used. Training Circular 8-13 provides instructions on establishing a DEPMEDS-equipped hospital (without CPS).

D-7. Hardening the International Organization for Standardization Shelter

To complete the hardening effort of the DEPMEDS-equipped hospital, the ISO shelter must be hardened. The seams and openings of the ISO must be sealed to prevent the entry of CB agents. The environment control unit (ECU) must be hardened and the vestibules between the ISOs or the ISO and TEMPER tent must be hardened.

D-8. Establish Collective Protection Shelter With the M20E1 Simplified Collective Protection System

The M20E1 is used to establish a CPS within a room of opportunity, or in tentage. Two or more M20E1s may be complexed if the supporting shelter provides sufficient room. See the technical manual provided with the system for set up procedures.

D-9. Patient Decontamination

Patients admitted into the MTF must be contamination free. Therefore, a patient decontamination area must be established near the MTF. The patient decontamination area should be provided with an overhead cover as described for the M51 shelter system, except that it does not overlap the entry

to the hospital. Also, consideration must be given to the location of other operations at the hospital site when establishing the patient decontamination area. However, the area must be close enough to the entry/exit of the CPS to protect the patients from the environment and reduce their exposure to recontamination. Keep in mind that under NBC conditions personnel outside of the CPS are at MOPP Level 4 (except decontaminated patients; they have their mask on), thus increasing the stress load and reducing their overall performance capabilities. The entry/exit area must have overhead cover to protect patients awaiting access to the CPS. Figure D-5 shows one configuration of a patient decontamination area at a hospital; add more clothing removal lines setup as the mission requires. Figure D-6 shows overhead cover at the entry/exit area.

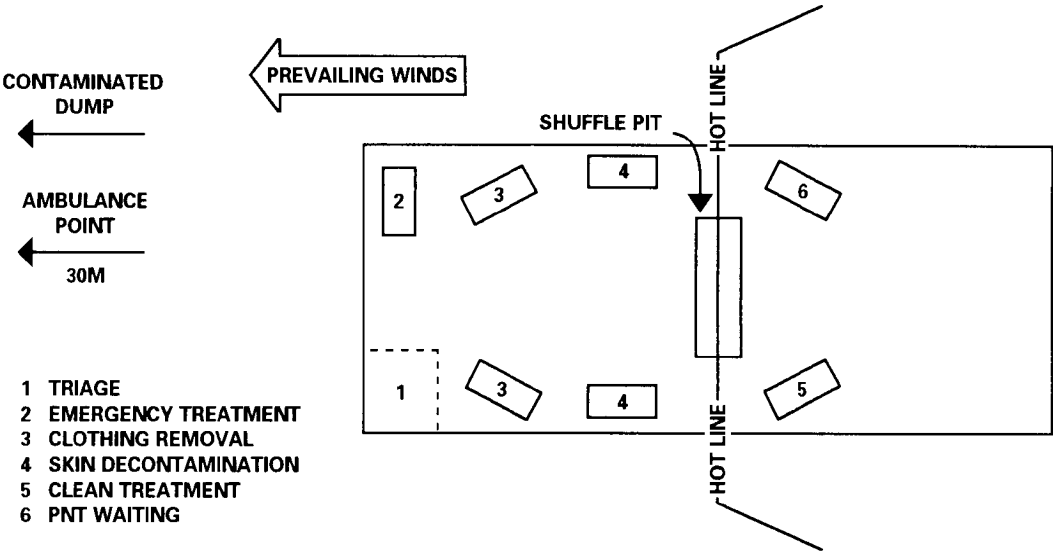


Figure D-5. Patient decontamination area.

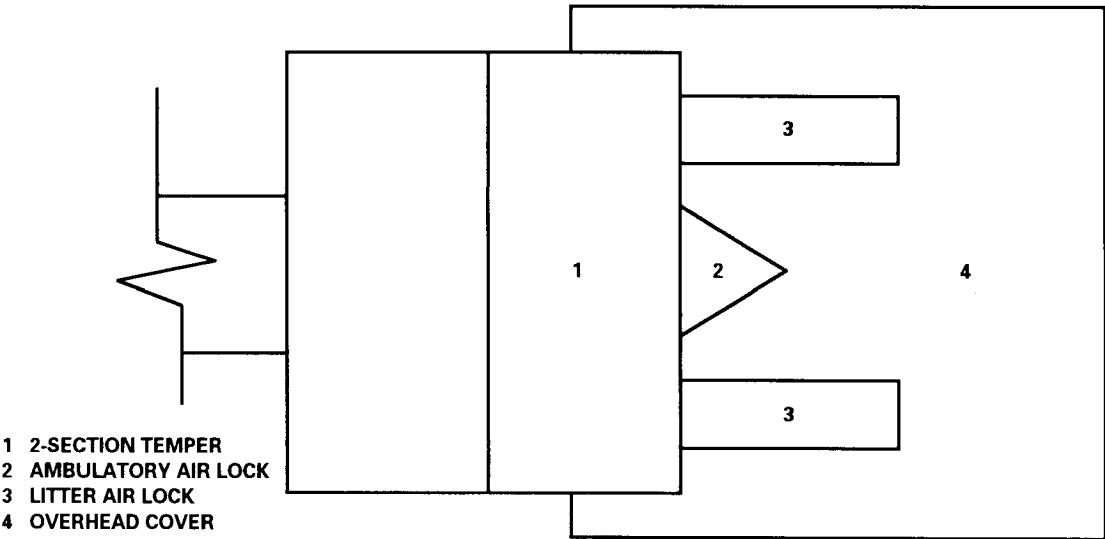


Figure D-6. Overhead cover at the entry/exit area.

D-10. Entry and Exit Guidelines

Guidelines for operation, entry, and exit of CPS may be used to prepare an SOP for the operation of CPS systems in your unit.

- a. When using these guidelines, the following should be considered:
 - Location of the shelter.
 - General climate of the AO (high and low temperature variations during operation).
- b. Information on setting up, striking, and operating the CPS is contained in equipment publications. Where applicable, special procedures are provided in these publications for setting up in both contaminated and uncontaminated areas. The commander will determine which procedures to use.
- c. During operations, periodic checks are made of the atmosphere within the shelter. These checks are made by using available chemical agent detection equipment/material (such as the CAM), the chemical agent detector kit, or an alarm to determine if there is agent penetration. Should chemical agent penetration occur, all personnel must mask until the agent has been purged from the shelter.

D-11. Decontamination of Area Around Entrance

- a. Normally, the MTF will not operate in a contaminated environment. However, if the MTF must remain in an area on a temporary basis and liquid agent contamination is present, the immediate area around the entrance must be decontaminated.
- b. To decontaminate the area around the entrance use one or more of the following methods:
 - Turn over about 4 inches (10 cm) of soil.
 - Remove the top layer of soil containing any liquid agent. Use the CAM or M8 detector paper (paper, chemical agent detector, VHG; ABC-M8 from the detector kit) to check the area after top soil removal to ensure complete removal of the agent.
 - Add several inches of clean soil or sand.
 - Mix STB into the soil to make a shuffle pit.
 - Use DS2 decontaminant on contaminated ground that is hard-surfaced or frozen.

D-12. Procedures Prior to Entry

All personnel (staff and patients) must be decontaminated before they are permitted entry into the CPS.

- Use chemical detection equipment (such as the CAM or M8 paper) to check for the presence of contamination on individuals, their equipment, or weapons. Thorough decontamination is critical in preventing contamination transfer into the CPS.

- If a chemical agent is detected, follow the procedures in Appendix C for patient decontamination and FM 3-5 for other personnel decontamination entering the CPS. All contaminated clothing and equipment is placed in the contaminated dump. Weapons should not have been evacuated with patients. However, if weapons are evacuated with the patient, they are decontaminated and held for disposition instructions.
- Decontamination must be thorough; procedures must be strictly followed. Failure to do so can contaminate the medical system and injure medical treatment personnel, reducing their mission support capabilities.

WARNING

WHEN OPERATING IN A TOXIC ENVIRONMENT, NEVER OPEN THE OUTER AND INNER DOORS OF THE AIR LOCKS AT THE SAME TIME.

D-13. Entry/Exit for the Collective Protection Shelter System

a. Ambulatory Personnel.

(1) Entry procedures.

(a) Ambulatory patients and others remove their overgarments and overboots (booties) outside the air lock. This procedure reduces the amount of contamination entering the air lock.

(b) A check is made to ensure that the ambulatory airlock is empty and the inner door is closed.

(c) The individual enters the air lock and closes the outer door.

(d) At the end of the purge cycle (5 minutes), the boots and mask are removed and placed in a plastic bag; the bag is sealed and marked. The individual checks his BDU for contamination. If contaminated, the BDU is also removed and placed in a plastic bag. The gloves are removed and placed in the plastic bag with the BDU, or in a separate plastic bag. All plastic bags containing removed items are sealed and labeled. The individual opens the inner air lock door and enters the CPS; the plastic bags are carried into the shelter with the individual.

(2) Exit procedures.

(a) A check is made to ensure that the ambulatory airlock is empty and the outer door is closed.

(b) The individual enters the air lock and closes the inner door.

(c) The individual puts on his BDU, boots protective mask, and gloves; then exits through the outer door.

(d) The individual assumes the established MOPP level before departing the immediate area of the exit door.

WARNING

DO NOT OPEN THE OUTER DOOR UNTIL THE PROTECTIVE MASK HAS BEEN PUT ON.

NOTE

Exits must be spaced at least 3 minutes apart to permit purging the air lock of contaminants that entered while the outer door is open. Only open the doors long enough to permit passage.

b. Litter Patients.

(1) Entry procedures.

(a) An outside aidman notifies an inside aidman that a litter patient is ready for admission.

(b) The inside aidmen ensure that the inner litter air lock door is closed. The outside aidmen open the outer airlock door and place the litter on the litter rails; they push the patient into the air lock head first; then they close the outer door. After a purge time of 3 minutes, an aidman inside the CPS opens the inner door; the patient is checked to ensure that he is contamination free. The patient is checked by placing the CAM nozzle near absorptive surfaces, such as the patient's hair. If no contamination is found, the aidman removes the patient's mask and places it in a plastic bag. The inside aidmen remove the patient from the air lock and position him on treatment litter stands, or move him to the treatment area as directed by supervisory personnel.

(c) Patients received at the treatment facility in the PPW are checked for contamination; if they are contamination free, they may be processed through the litter air lock in the PPW. The inside aidmen ensure that the inner litter air lock door is closed. The outside aidmen open the outer air lock door and place the litter on the litter rails and push the patient into the litter air lock head first, then close the outer door. Purge the air lock for 3 minutes. After the purge time, an aidman inside of the CPS opens the inner door and uses the CAM to check the patient to ensure that he is free of contamination. If no contamination is found, the inside aidmen remove the patient from the air lock. (If the patient is wearing a protective mask, the mask is removed and placed in a plastic bag before the patient is moved from the air lock.) As the patient is removed from the air lock, the PPW is opened and rolled inside out so that any desorbing vapors are adsorbed by the charcoal

layer. The inside aidmen remove the patient from the air lock and position him on litter stands. The patient is transferred to a clean litter; then moved to the treatment area as directed by supervisory personnel. The receiving litter and PPW is returned to the outside; dispose of the PPW in the contaminated waste dump. Decontaminate the litter and return it to the litter pool.

NOTE

Should contamination be found when monitoring the air lock in (b) or (c) above, repeat the purge cycle then retest for contamination. All vapor hazard must be eliminated before the patient is moved into the CPS. Repeating the purge cycle may NOT be possible if the patient is in need of immediate lifesaving care. The patient may have to be returned to the outside treatment area for immediate care.

(2) *Exit procedures.*

(a) The litter patient is placed in a PPW.

(b) An inside aidman notifies an outside aidman that the patient is ready to exit the shelter. An outside aidman ensures that the outer air lock door is closed. The patient is placed in the litter air lock feet first. The inner air lock door is closed. The outside aidmen open the outer door and remove the patient.

(c) Hospital staff, visitors, or ambulatory patients exit through the ambulatory air lock. Before entering the air lock, each individual must ensure that the outer air lock door is closed. The individual enters the air lock and closes the inner door; puts on his protective ensemble and exits through the outer door.

WARNING

DO NOT OPEN THE OUTER DOOR UNTIL THE INNER DOOR HAS BEEN CLOSED.

NOTE

Exits must be spaced at least 3 minutes apart to allow for a complete purge of the air lock.

D-14. Resupply of Protected Areas

Resupply of protected areas is accomplished by placing contamination-free supplies or equipment on a litter and passing it through the litter air lock, or processing it through an air lock designed for resupply.