Chapter 4.

Thorough Decontamination

Thorough decon reduces NBC contamination levels to a negligible risk. There are three thorough decon techniques: detailed troop, detailed equipment, and detailed aircraft. Detailed aircraft decon is discussed in chapter 7. This chapter discusses the planning considerations required to conduct thorough decontamination. It also discusses how the various chemical units (decon and smoke/decon) can conduct detailed equipment decon operations. The exact layout of the thorough decon site is determined by METT-T. Conducting decontamination at night is another viable alternative for the conduct of decon operations. Therefore, procedures for nighttime decon operations are also included.

Considerations

Thorough decon operations reduce contamination to negligible risk levels. They restore combat power by removing nearly all contamination from unit and individual equipment so troops can operate equipment safely for extended periods at reduced MOPP levels. A small risk remains, so periodic checks with the CAM, M8/M9 paper, or M256-series kit must be made after each operation. Thorough decon can be done as part of reconstitution or to support operations throughout the battlefield. After thorough decon, the unit moves out of the decon site into a tactical assembly area. The unit, while in this tactical assembly, may undergo reconstitution or prepare for future operations. Combat service support elements will replenish combat stocks, refit equipment, and replace personnel and equipment as required.

Planning

Thorough decon is both the most effective type of decon and is the most resource intensive. Operational decon requires less resources, but physically removes only surface contamination. Weathering causes a significant reduction of contamination over time, but the immediate reduction of contamination to negligible risk levels does not normally occur. Weather conditions; agent used, mission requirements; time, troops, and supplies available may all combine to make weathering the decon option of choice. Based on the recommendation of chemical personnel, commanders decide which type of decon is the most efficient and effective for their unit, given this type of METT-T analysis.

Generally, thorough decon operations are conducted beyond the range of enemy indirect fire systems. The forwardmost location suitable for thorough decon operations is typically the brigade rear area. If a contaminated unit requires thorough decontamination as part of reconstitution operations, the decon site is established near the reconstitution area. Generally, company-sized units are reconstituted in their brigade's rear area, while battalion level units are reconstituted in their division's rear area. Organizations larger than a battalion will be reconstituted in the corps rear area. Further information about reconstitution can be found in FM 100-5, ***Operations,*** and FM 100-9, ***Reconstitution.***

All echelons must conduct some planning and preparation for conducting thorough decon operations. Decon planning is conducted as part of the overall planning process. The commander should provide guidance on decon to the chemical staff early in the planning process. From the commander's general guidance concerning decon, the chemical staff can begin to develop the decon plan. The foundation of the decon plan is the type of decon to be used during the operation. The designated decon type can vary from phase to phase and unit to unit.

The chemical staff will select possible decon sites throughout the unit's area of operations. The selection of the decon sites is based upon the decon type, terrain, the mission, the threat, the road network, and the availability of water. After the decon sites are selected, link-up points are chosen to support each decon site. It is possible that one decon site may have more than one associated link-up point. The selection of the link-up points requires careful consideration. The decon link-up points must be easily recognizable to all parties.

Since the overall decon capability of a unit is typically limited, the commander must establish a priority of decon support. The priority of support lists the units in the order they will receive decon support. The priority of support can change from phase to phase during an operation. The chemical staff develops the priority of support by determining the decon level to be used (operational or thorough), the threat (what units are likely to become contaminated and when), and the likelihood the unit can accomplish decontamination. To give priority of support to the lead task force during the assault phase may not be the best choice since elements of the task force that become contaminated will most likely not stop to accomplish decon until after the assault is completed. The chemical staff should establish a priority of work that

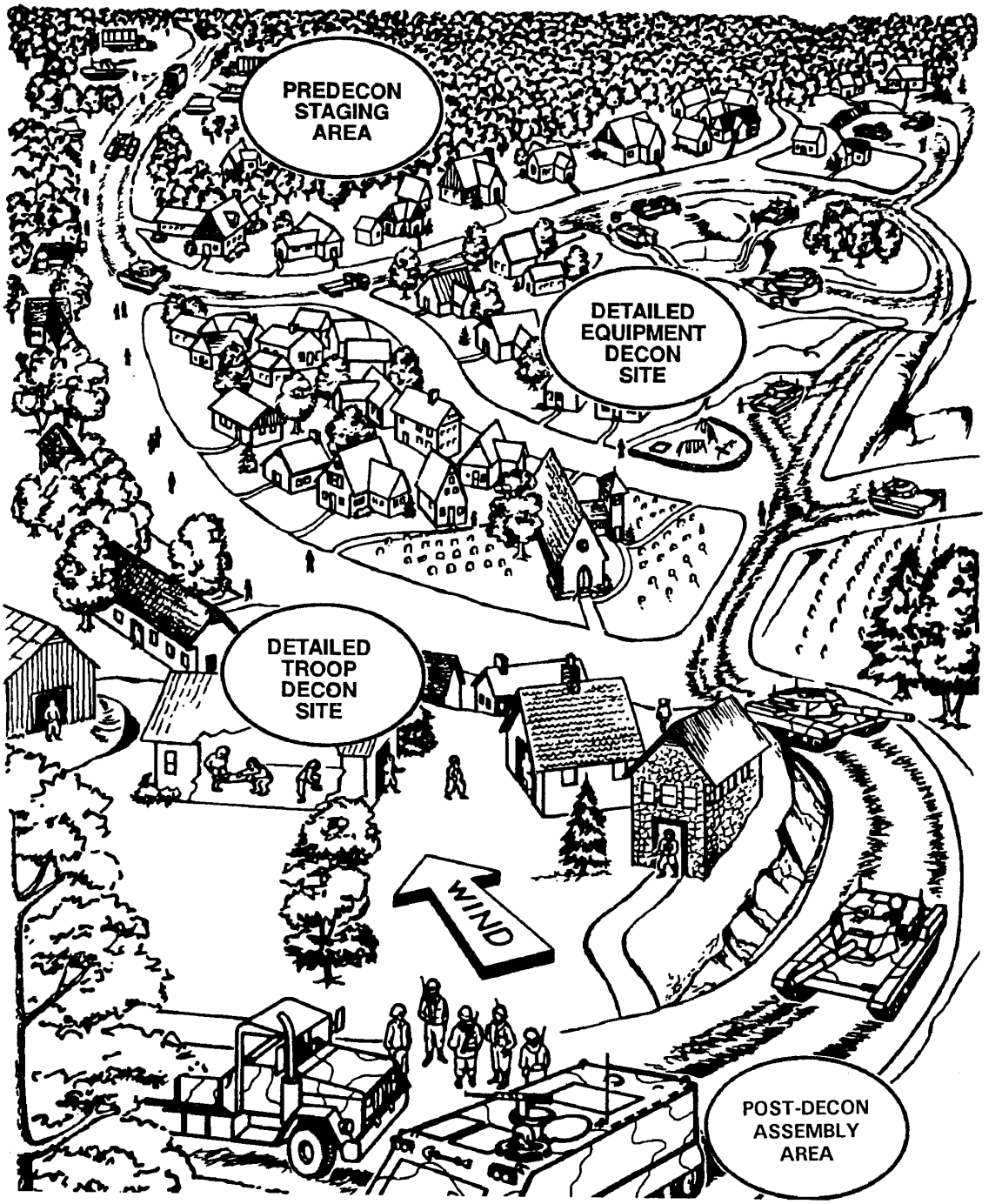


Figure 4-1. Thorough Decon.

specifies the order vehicles are decontaminated. A priority of work may look like this: Engineer equipment, Ml, M2, FIST-V. The priority of work may also vary from phase to phase of the operation.

A limiting factor that must be considered when planning any decontamination operations is the availability of water. A typical vehicle will require 500 gallons of water during detailed equipment decon. The actual amount of water required will vary by vehicle and its condition. The supported unit's chemical staff must develop a water resupply plan. In a water-scarce environment, such as deserts, the chemical staff must coordinate a water resupply plan with the logistics staff. A water resupply plan can be as simple as selecting a series of link-up points along a route where the chemical unit can link up with a bulk water truck from a logistics activity. More complex water resupply plans include linking up with bulk water trucks, caching water throughout the area of operations, coordinating for the movement of water bladders by aircraft to the decon sites, and the identification of water sources in the unit's area of operation. The use of nonpotable, salt, and brackish waters should be considered.

Preparation

Subordinate units review their higher headquarters decon plan to determine if the plan will support their unit's mission. If additional decon sites or assets are required, the subordinate chemical staff will forward those requirements to their higher headquarters.

The supporting chemical unit leader will conduct a leader's recon of the designated decon sites. Since the decon sites are initially selected by map reconnaissance, the actual site may not be suitable. If the selected site cannot support decon operations, the chemical unit leader will attempt to find another site close to original site and notify the supported unit and his higher headquarters of the change in site selection.

Execution

The actual decon operation begins once a unit becomes contaminated and requests decon support. The unit leaders must assess their situation and accurately report it to their headquarters. This situation report should include type and extent of contamination, current location, and the commander's assessment of his ability to perform their current mission while contaminated and when he expects his unit to become combat ineffective. The contaminated unit should perform immediate decon techniques to increase their survivability and to limit the spread of contamination.

The request for decon support must contain several essential elements of information to assist the chemical staff and the decon platoon leader in coordinating the decon operation. These essential elements of information are –

- Designation of the unit contaminated.
- Location of the contaminated unit.
- Time unit became contaminated.
- Earliest possible time the unit can move/begin decontamination.
- Type of contamination.
- Number of vehicle by type contaminated.
- Number of personnel contaminated.
- Special requirements (patient decon station, recovery assets, unit decon team, and so forth).

Supported unit's frequency and call sign to facilitate initial linkup.

Upon learning of a unit being contaminated, the supported unit's chemical staff must begin coordinating the decon operation. The supporting chemical unit is given a warning order to be ready to conduct a decon operation. Subsequent warning orders provide more detailed information to the chemical unit. After receiving the request for decon support, the supported unit will issue an OPORD/FRAGO to the chemical unit.

The supported unit's chemical staff must coordinate the movement of the contaminated unit to the link-up point and the decon site. If the contaminated unit moves out of the supported unit's area of operations, the move must be coordinated with higher headquarters. Depending on the size and type of the unit contaminated, the chemical staff may issue a warning order to any elements involved in the water resupply plan.

Once the chemical unit is in position and set up, the chemical unit leader moves to the link-up point. The most difficult part of the decon operation is the link up between the contaminated unit and the chemical unit element. It is possible that other elements will provide assets to support the decon operations. These elements include medical, engineer, air defense, military police, and others. These supporting elements should not be directed to the link-up point unless they are contaminated. Supporting assets must coordinate with the chemical unit to be met and led into the decon site.

Because of the complex and critical nature of thorough decon operations, it is likely that the supported unit will provide a command and control cell to the decon site to supervise the decon operation. The senior person present assumes control of the decon operation. For maneuver forces, the battalion or brigade executive officer may assume control of the decon operation. This allows the chemical unit leader to concentrate on the operations of his unit and its mission of providing equipment decon support.

After link up is achieved and all support assets are in position, the actual decontamination operation can commence. The chemical unit leader, in conjunction with the commander of the contaminated unit or the supported unit's command and control cell, supervises the decon operation. The supported unit's chemical staff must as-

Table 4-1. Thorough decon support matrix.

	UNIT								
	DIVISION CMLO	DIVISION	BRIGADE	DISCOM	FSB	CHEMICAL UNIT	CONTAMINATED UNIT	BATTALION	SITUATION DEPENDENT
Preparation Phase Tasks									
Request	S						P	S	
Coordination	S		S					P	
Site Selection		S or S				P			
Advance Party Link-up						S	P	S	
Site Setup				S	S	P	S		
Execution Phase Tasks									
Site Control/Security						S	P		
Predecon Actions						P	S		
Processing						P	S		
Site Clearance Phase Tasks									
Cleanup						P	P		S
Marking & Reporting						P			S

sert staff supervision during all phases of the decon operation.

Thorough Decon Site

The thorough decon site consists of four main areas: the predecon staging area, the detailed equipment decon (DED), the detailed troop decon (DTD), and the postdecon assembly area. The chemical unit leader selects all four areas based on operational guidance, road network, available cover and concealment, and water supply. The predecon staging area is used by the contaminated unit to ready themselves for DED and DTD operations. The DED is the process of removing, neutralizing, or reducing contamination on interior and exterior surfaces of equipment to negligible risk. The DTD is the process of decontaminating individual fighting equipment to negligible risk and removing contaminated MOPP gear from soldiers. The postdecon assembly area is the location where vehicle and soldiers exiting the DED and DTD are linked up prior to their movement from the decon site.

Predecon Staging Area

The contaminated unit moves to a predecon staging area approximately 250 to 500 meters downwind of the thorough decon site. The contaminated unit performs predecon actions in this area. Predecon actions are designed to prepare the unit for the thorough decon operation. Predecon actions include-

- Segregate contaminated vehicles from uncontaminated vehicles, if possible.
- Allow vehicle crews to dismount and prevent further transfer/spread of contamination.
- Prepare vehicles for detailed equipment decon.

- Move contaminated vehicles and troops to the detailed troop and equipment decon lines.

Segregate Vehicles

Check all vehicles for contamination using detection equipment. For chemical contamination, use the CAM and M8 detector paper. Also visually check the vehicles for contamination using M9 paper. M9 paper affixed to vehicles reveals the presence of contamination and provides an indication of the level of contamination (see Figure 4-2). When using the CAM, ensure there is sufficient distance between vehicles to prevent chemical vapors drifting from a contaminated vehicle being detected on an uncontaminated vehicle. If the vehicles are parked too close together, vapor drift from contaminated vehicles may falsely identify uncontaminated vehicles as contaminated.

For radiological contamination, use the AN/PDR-27-series or AN/VDR-2 radiac detectors. If the vehicle only has isolated areas of contamination, use an Mll or M13 to decontaminate the chemically contaminated area. Vehicles determined to have no contamination are sent to the reconstitution assembly area.

Crews Dismount

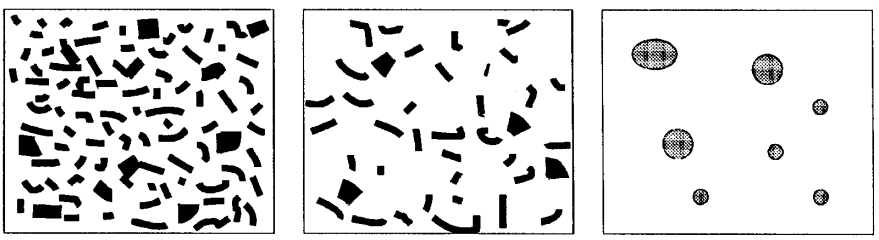
The vehicle crew, except for drivers, dismount. As the crews dismount, they remove all equipment from the top of the vehicle. Once the crew has exited the vehicle, they will not reenter. This prevents further contamination from being spread into the vehicle interior.

Prepare Vehicles

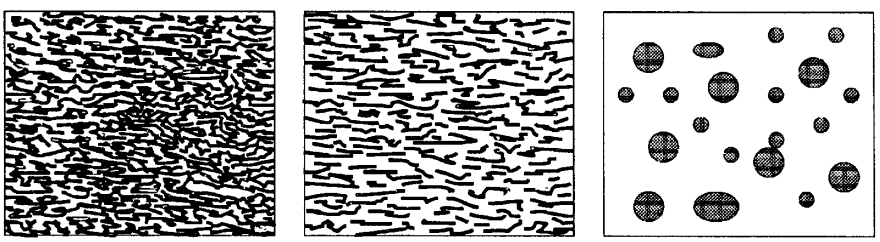
The crews prepare their vehicles for processing through the DED. Using the pioneer tools from the contaminated vehicle, the crew removes all heavy mud and debris from the vehicle. The crew concentrates on the vehicle undercarriage. The undercarriage is the most likely place for contamination to collect and is the hardest place to decontaminate. Once the crew is finished with the pioneer tools, they are placed back on the vehicle. Initial removal of mud and debris removes contamination both on and in the mud and makes it more likely that the initial wash will remove any remaining mud.

Seat covers (when applicable), canvas items, camouflage netting, and any other materials that can absorb liquid contamination are removed. These items create a potential transfer hazard and are not easily decontaminated. Appendix B provides guidance on hard-to-decon items. Left untreated, absorbed chemical agents will desorb after being decontaminated and create a vapor hazard. Items that cannot be decontaminated by the standard methods used in the DTD are also removed and placed at a collection point. Unit chemical personnel will provide advice concerning the decontamination or disposal of these items.

It is important that vehicle load plans be designed to minimize the amount of equipment carried on the outside of the vehicle that cannot be readily decontaminated. Whenever possible, NBC covers should be used when a chemical attack is expected (see FM 3-4).



Moderate liquid contamination on M9 paper (1 gram/square meter).



Heavy liquid contamination on M9 paper (10 grams/square meter).

Figure 4-2. Contamination levels.

All NBC covers are removed and disposed of as contaminated waste during the predecon actions.

Move to DED and DTD

In coordination with the chemical unit leader operating the decon site, the contaminated unit will begin to send contaminated vehicles and personnel to the DED and DTD. The commander of the contaminated unit has prioritized his vehicles for processing, sending the most important first. Communication is maintained between the predecon staging area and the chemical unit leadership. All assistant vehicle drivers are the first individuals sent through the DTD to ensure there is a driver exchange at station 3 of the DED.

Detailed Equipment Decontamination

The DED process consists of five stations: primary wash, DS2 application, contact time/interior decon, rinse, and check. The objective of DED is to reduce contamination levels to negligible risk levels. This chapter provides a detailed discussion of the DED and how various chemical units can set up a DED.

Detailed Troop Decontamination

The DTD process consists of eight stations individual gear decon, overboot and hood decon, overgarment removal, overboot and glove removal, monitor, mask removal, mask decon, and reissue. The objective of DTD is to remove contaminated MOPP gear from soldiers and reduce the contamination on individual equipment to negligible risk levels. This chapter provides a detailed discussion of the setup and operation of the DTD. Individual actions within the DTD are also discussed.

Postdecon Assembly Area

The unit assembles in the postdecon assembly area after completing DTD and DED operations. The unit occupies the postdecon assembly area prior to moving to a tactical assembly area for preparation for future operations or to a reconstitution location. The chemical unit leader will select the general location. It should be big enough to hold the entire unit undergoing thorough decontamination with proper cover and concealment. The assembly area should be located approximately 1 kilometer upwind from the DED and DTD.

Detailed Troop Decon

The major action in detailed troop decon is to remove contaminated MOPP gear to include the protective mask. If DTD is not performed, chemical agents may eventually penetrate the overgarment and contaminate underclothing or skin. How long the chemical agent will take to penetrate the clothing depends on the condition of the MOPP gear and the amount of agent on the gear. If contaminated with radiological contamination, the hazard will remain until removed. Depending on the type and amount of radiological contamination, soldiers may continue to accumulate a radiation dose.

The contaminated unit or their higher headquarters is responsible for setting up, operating, and closing the DTD in a thorough decon site. The chemical unit leader determines the general location of the DTD within the decon site. The chemical unit can provide technical advice on the setup, operation, and closure of the DTD. AU soldiers needed to operate the DTD must be provided by the supported unit. The supervisor of the DTD must establish a work/rest cycle in accordance with Appendix I.

The DTD has eight stations. The following pages discuss actions at each station and the resources required.

Station 1, Individual Gear Decon.

Actions at this station remove contamination to a negligible risk level from individual equipment (LCE, mask carrier, helmet, and weapon).

Preparation

The following equipment and supplies are needed:

- Three 30-gallon containers.
- Two long-handled brushes.
- Sufficient STB slurry mix.
- Two ponchos or plastic tarps.

Dig a sump 6 feet square and 4 feet deep. Place three 30-gallon cans near the sump (see Figure 4-3). Fill two cans with an STB slurry mixture. The other can is filled with clean water for the rinse. Place two long-handled brushes at each can of STB slurry.

To prepare the slurry, mix 100 pounds of STB with 20 gallons of hot water. The chemical unit provides the hot water. Change the mixture after 20 soldiers have decontaminated their gear. Change rinse water after every 10 soldiers or when it appears dirty.

Place a poncho or plastic tarp on the ground at the checkpoint. Divide the poncho or tarp in half using engineer tape. This is the contamination control line. The checkpoint will beat a minimum of three meters from all other stations in order to get a true reading on detection equipment. Place the following chemical detection/identification equipment at the check station for an average company-sized unit:

- One CAM.
- Eight books of M8 chemical detector paper.
- Four M256-series chemical agent detector kits.
- One hundred plastic trash bags.

Three soldiers are required to operate this station. One soldier supervises the decontamination of the in-

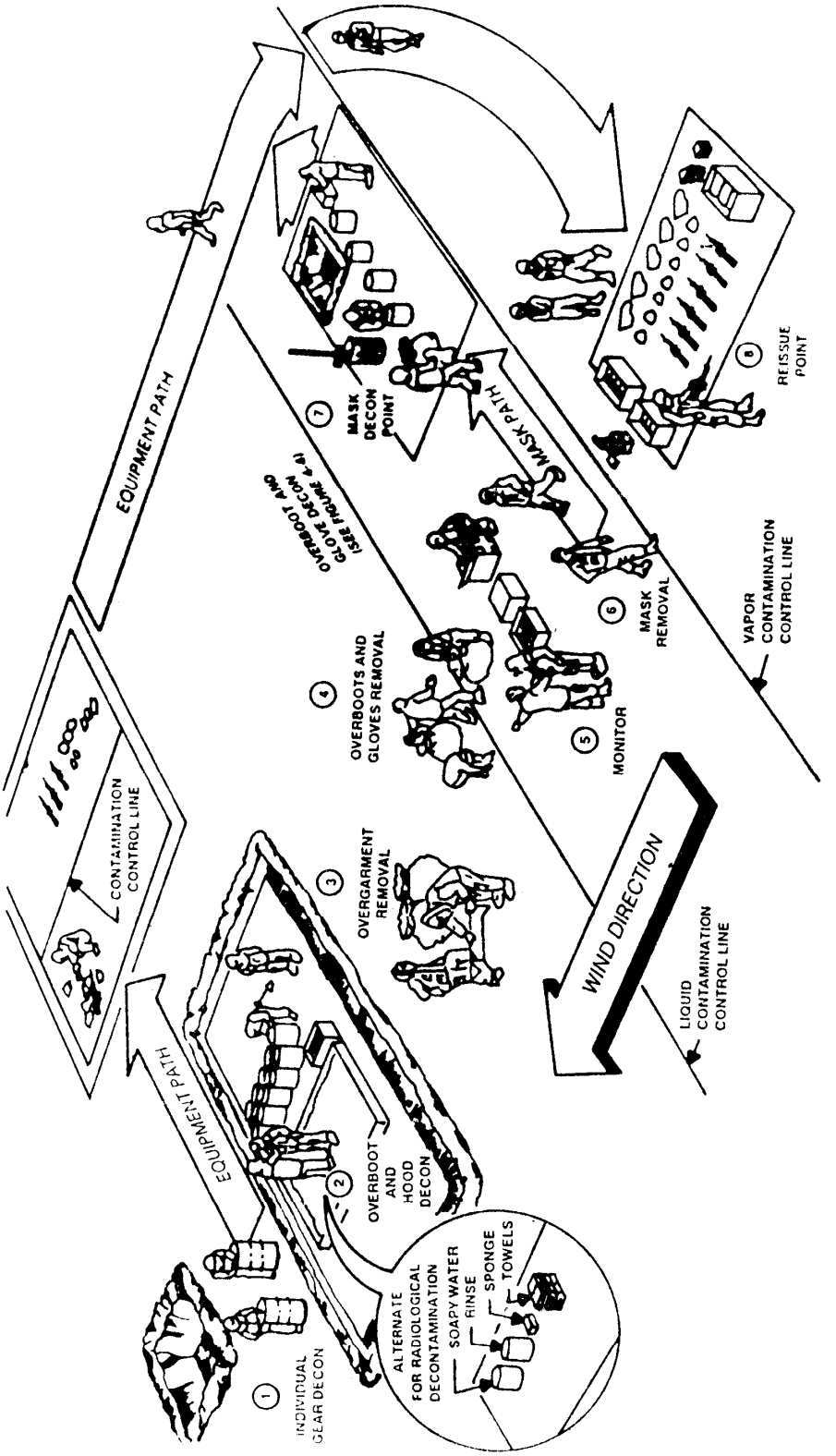


Figure 4-3. Detailed troop decon layout.

dividual gear and takes the decontaminated equipment to the check station. He also prepares new slurry mixtures as necessary. One soldier remains at the checkpoint and checks all gear for completeness of decontamination using the detection equipment. One soldier transports the decontaminated gear to the reissue station.

Execution

Decontaminate gloves with water or STB slurry mix. If wearing the M24, M25A1, or M42 mask, use hot, soapy water and sponge or STB dry mix to decontaminate the hose and canister. Decontaminate gear by washing in decontaminant container and scrubbing the gear for six minutes. Then dip the gear into rinse water for four minutes. The station attendant will take the gear to the equipment checkpoint. Place the decontaminated gear on the "dirty" side of the contamination control line. The monitor checks the gear for contamination using the appropriate detection devices. The monitor holds the detection device one inch from the gear and checks for residual contamination. If the residual contamination exceed negligible risks, recycle the gear and decontaminate again. If the gear passes the check, place it on the clean side of the contamination control line. An attendant carries the equipment to the reissue point.

Depending on the time available, more extensive washing and checking procedures may be used. The longer the gear is washed or left out in the air after washing, the further the contamination level will be reduced. The amount of chemical agent vapors desorbing out of the gear will be reduced. Gear may be put in closed areas or plastic bags and checked for hazardous vapors with the M256 chemical detector kit.

NOTE: The preceding paragraph outlines the minimum that should be done. Depending on time available, more extensive washing and checking procedures may be useful. You may decide to wash equipment longer or let it air outside after washing. This further reduces the amount of agent vapor desorbing (or bleeding) out of pistol belt, mask carriers, helmet covers, and so forth. Equipment can be put in closed areas or plastic bags and checked for hazardous vapors with CAM or M256-series chemical agent detector kit. The CAM will only detect nerve agent (G) and blister agent vapors (H).

Risk

If scrubbing and washing are not done properly, contamination may remain on equipment. The resulting vapor hazard could cause casualties to unmasked personnel, particularly in closed areas (vehicle interiors, for example) or heavily wooded areas where air circulation is poor.

Station 2, Overboot and Hood Decon.

Actions at this station neutralize gross contamination on overboots and lower trouser legs. Gross contamination on the protective mask and hood is also decontaminated.

Preparation

Prepare a shuffle pit by digging a shallow pit about three feet wide by three feet long by six inches deep. Fill the shuffle pit with an STB dry mix. Prepare the STB dry mix by mixing three parts earth to two parts STB. Add more STB to the mix after 10 soldiers have processed through the shuffle pit. The chemical unit will provide 10 drums of STB to prepare the dry mix.

The following equipment/supplies are needed at this station

- Cutting tool.
- One M258A1 or M291 skin decontaminating kit per person.
- 6 feet by 6 feet piece of plastic.
- Trash bags (as required).
- Ten drums of STB.

One soldier is required to operate this station. The attendant assists the personnel as they decontaminate their overboots and hoods.

Execution

Walk into shuffle pit composed of STB dry mix (three parts earth, two parts STB). Use gloved/protected hands to rub STB dry mix on boots and lower trousers. Take special care to rub the rear of the GVO. Remove or decontaminate the hood according to one of the two following procedures.

Replacement hood available – If a replacement hood is available, cut the hood off the mask as follows. Cut off the underarm straps and neck cord of your buddy's hood. Pull the hood inside out over the front of the mask, being careful not to touch your buddy's neck or head. Gather the hood in one hand. Use scissors or a knife to cut away the hood.

WARNING

If you pull too hard on the hood, you will break the seal of the mask.

Cut as close as possible to the eyelenses, voicemitter, and inlet valve covers. Make sure nothing is left dangling below the bottom of the mask. Let your buddy repeat the procedure on you.

No replacement hood – If a replacement hood is not available, roll the hood as follows. Loosen your buddy's neck cord and hood straps from under the arms and reattach the straps over the shoulders to the Velcro® patches on the hood. Use the skin decon kit to decontaminate the hood and exposed parts of your buddy's mask (including

the hose and canister of the M24, M25A1, or M42 masks). Use as many skin decon kits as needed. Decontaminating the hose and canister of the M24, M25A1, or M42 masks may be time consuming and require additional skin decon kits. Once the decon of the hose and canister is complete, hold your canister and hose (or have the station attendant hold it) away from your contaminated overgarment to avoid recontamination.

When you have finished decontaminating your buddy's mask, decontaminate your gloves with the skin decon kit in preparation for rolling your buddy's hood.

Roll your buddy's hood. Leave the zipper on the hood closed. Lift the hood straight up off your buddy's shoulders by grasping the straps where they connect to the back of the hood (do not grasp under the hood). Pull the hood (by the straps) up and over the head until the bottom of the back of the hood is to the top of the eye lens outsets but not over. Check for liquid contamination on the underside of the hood edges and decon if necessary. Put one fold (about two inches) on the forehead then begin rolling (tightly) at both temples (simultaneously) by tucking in with the thumbs as you roll towards the bottom of the zipper.

M17/M24/M25A1: Make a continuous roll (like a horseshoe); then roll from the zipper (tightly) to the voicemitter (or the hose of the M24/M25Al).

M40/M42 Hold the mask firmly in place to avoid breaking the seal. Make the rolls from each side of the hood come to a point at the bottom of the zipper, forming a V. Put a half twist in the V, forming the two sides into a tail. Then fold the tail between the upper part of the canister and the mask (tie tail over and under the hose of the M42). Reverse roles and decontaminate your buddy's hood. When both hoods are completed proceed to station 3.

NOTE: Buddies should check each other's overboots and overgarment for damage. Any rips, tears, or punctures in overboots, rubber gloves, or overgarment should be reported to the attendant at station 5. This will allow the attendant at station 5 to check you for chemical, agent symptoms and your clothing for possible contamination.

Risk

If this step is not done properly, you will risk transferring contamination to underclothing and combat boots. You also risk transferring contamination to the head and neck area from the hood.

Station 3, Overgarment Removal.

Performing this step removes contaminated overgarments before an agent penetrates overgarment material and touches undergarments or skin.

Preparation

The materials and equipment needed at this station are:

- Two 30-gallon garbage cans.
- One hundred plastic bags (or at least one per soldier).
- Ten boxes M258A1 or M291 decon kits.

This station requires only one soldier. He supervises the actions of the soldiers processing through the station.

Execution

Buddy teams will split up and continue the decontamination process individually. Station attendant assists in the removal of the overgarment. Cut or remove the M9 paper if it is binding around the wrist. Station attendant unfastens the Velcro® closure over the jacket zipper, the jacket's waist cord, and the wrist Velcro® straps first. Then unfasten the three back snaps by grasping the outside of the jacket around the snaps (not underneath) and pulling firmly. When removing the jacket, the soldier keeps his fingers together (like a salute) as the station attendant pulls the wrist straps and each arm comes out. The jacket is discarded.

To remove the trousers, first cut or remove the M9 paper if it is binding around the ankles. Unfasten the trouser cuff Velcro® straps and zippers. Then carefully unfasten the front waist snaps and lower the front zipper. Avoid loosening the side waist tabs if at all possible. Very seldom is it necessary to loosen the waist tabs to remove the trousers. While squatting in front of and facing the buddy, the attendant grasps the trousers near the knees and works the trousers down below the knees, ensuring that contaminated parts of the trousers do not fold in and touch the clean uniform. The station attendant will have the soldier lift one leg and point that foot down and bend slightly at the knees for stability. The attendant then grasps the cuff of the elevated foot with a hand on each side and pulls the cuff in an alternating, jerking motion until the soldier can step out of the trouser leg. The station attendant cautions the soldier not to rub the contaminated boot against his clean leg. The attendant ensures the soldier steps wide enough so as not to rub his clean leg against the overgarment. The process is repeated for the other leg. The trousers are discarded. The soldier proceeds to station 4.

Risk

If this step is done improperly, agent may be transferred to the underclothing or skin.

Station 4, Overboots and Gloves Removal.

This step removes contaminated overboots (footwear covers) and gloves to limit the spread of contamination. Overboots and gloves are also decontaminated for reissue.

Preparation

The following equipment and materials are needed

- Engineer tape.

- Cutting tool.
- Eight 30-gallon containers (garbage cans).
- One hundred plastic bags (or one per soldier).
- Two scrub brushes.
- Two ponchos or large plastic sheets.
- CAM.
- M8 paper.
- 10-percent STB/HTH solution.
- Hot, soapy water.
- Cold rinse water.

The station will be setup as shown in Figure 4-4. Fiill two 30-gallon containers with hot, soapy water. Fill two 30-gallon containers with 10-percent STB/HTH solution and place the two scrub brushes near the containers. Fill two 30-gallon containers with cold rinse water.

One soldier is needed to supervise and assist soldiers at this station. He assists personnel wearing M24, M25A1, or M42 masks. The other two soldiers decontaminate the overboots and gloves. One person processes the overboots, whale the other person processes the gloves.

Use engineer tape to mark the liquid contamination control lime on the ground. Place the cutting tool, two containers, and the plastic bags on the "dirty" side of the liquid contamination control line (see Figure 4-3, page 4-7).

Execution

The liquid contamination control line separates the "dirty" from the "clean" areas. The exception to this "clean" area will be the contaminated gloves. However, no liquid agent should be tracked along the ground after the liquid contamination control line. The attendant unfastens or cuts the strings or elastic closures on the GVOs/footcovers. If soldier is wearing the chemical protective footcover, the station attendant holds the footcover while the soldier steps out and across the control line. The action is repeated for the other footcover. The station attendant discards the footcovers in the designated container. If the soldier is wearing the GVO, he stands next to and faces the control line. Have the soldier step back about 12 inches with the foot of the GVO he wants to remove first. If the soldier steps back with the right foot, the attendant uses his right foot to step on the back of the soldier's GVO. If the soldier steps back with the left foot, the attendant uses his left foot, also. The attendant steps on the back of the GVO as the soldier lifts his heel and works his foot out of the GVO and steps across the control line. Repeat the process with the other foot. If the GVO cannot be removed by this process, the attendant cuts off the GVO. The station attendant discards the GVO in the designated container. The soldier works the chemical protective gloves loose using the pinch-pull method, and the station attendant pulls the gloves off. The station attendant discards the gloves in a container on the "dirty" side of the control line. The station attendant from station 6 meets personnel wearing the M24, M25A1, or M42 protective masks at this station and carries the canister for that person until the mask is removed. The station 4 attendant performs his duty from the dirty side of the liquid contamination control line.

The GVOs and chemical protective gloves are decontaminated in the following process:

Step 1. Submerge the gloves and GVOs into the container of hot, soapy water. Some of the contamination will be removed during this step. When the GVOs and gloves are removed from the container, ensure that no water remains inside of the GVO and gloves. Do not decon any item that is unserviceable.

Step 2. Submerge GVOs and gloves in the container of HTH solution. Thoroughly scrub the items until no visible contamination remains. After scrubbing, submerge each item once more before moving to the rinse container.

Step 3. Thoroughly rinse the scrubbed items, making sure that the items are rinsed inside as well as out. Check all gloves and GVO for holes, tears, or punctures and discard any that are found.

Step 4. Dry usable items. Discard into a pile any glove or GVO having punctures, tears, rips, holes, or other damage. Place usable items on the poncho or plastic sheet to air dry and weather.

Step 5. Place the items into plastic trash bags, along with an M256 detector ticket. If the detector ticket shows no contamination, the items can be reissued or stored for issue at a later time. If the detector ticket shows contamination remaining, the station attendants can recycle the items or discard them.

Risk

If you do not remove overboots, you cannot check for agent on the combat boots. If overboots are not properly removed, you risk contaminating your combat boots and spreading contamination to clean areas. If rubber gloves are not properly removed, you risk contaminating your skin and underclothing at this and following stations.

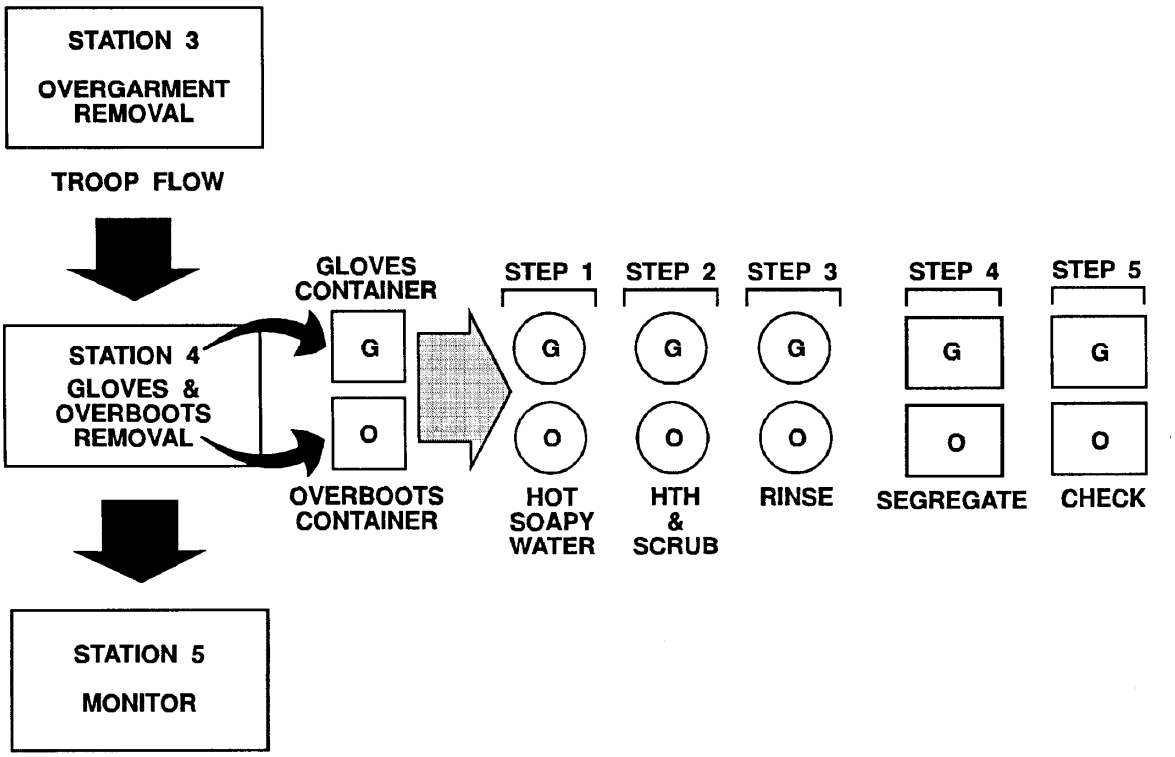
Station 5, Monitor.

Performing this step identifies contamination on personnel, provides spot decon capability, and provides medical aid, as required.

Preparation

The following materials and equipment are needed:

- First aid supplies.
- One CAM.
- Five packs M8 detector paper per one hundred soldiers.
- One case M258A1/or M291 skin decontaminating kits per soldier.



NOTE: Water in the containers will be replaced once 20 items are processed. Decon Platoons, when available, will assist with the water requirement.

Figure 4-4. Layout of station 4.

Two soldiers are needed to operate this station. An aidman should be present to treat any personnel suffering from chemical agents symptoms. If an aidman is unavailable, a combat lifesaver should be present.

Execution

The monitor checks the individuals for contamination. Administer first aid as required. Liquid agent can be detected with M8 detector paper. Small quantities of agent vapor can be detected with the CAM. Symptoms of agent poisoning are the most obvious indication of skin contamination. At this step the medic checks each soldier for symptoms and treats as required. Soidiers should report any damage to their MOPP gear that was identfied at stations 2, 3, and 4. Any areas identified as contaminated can be decontaminated with the M258A1 or M291 decontaminating kit by the station attendants. Individuals will be remonitored after decon. It is possible that all liquid chemical contamination is absorbed into the clothing. Chemical detector paper (M8 and M9) will indicate negative, even though there is a hazard.

Risk

If this station is omitted, you risk becoming a casualty. No other check for contamination or any further decon is done on the individual. Commanders can choose to conduct more extensive contamination checks here if more medical assistance and time are available. This will decrease the risk of casualties.

Station 6, Mask Removal.

Performing this step removes the mask without contaminating the soldier. The mask is taken to a mask decon point, limiting agent transfer at the site.

Preparation

The following equipment is needed

- M8A1 automatic chemical agent alarm.

Two soldiers are needed to operate this station. They remove and carry masks to the mask decon point (station 7).

Execution.

If hood is still attached to mask, attendant pulls hood over front of mask, grabs mask by voicemitter cover, and pulls mask off soldier. Soldier holds breath as mask is removed. If the mask has optical inserts, the attendant holds the mask open so the soldier can remove the inserts without touching the outside of the mask, The soldier walks upwind 5 meters, crosses the vapor contamination control line, then resumes breathing. Station attendant brings mask to station 7, mask decon point.

No chemical vapor hazard is expected beyond the vapor hazard contamination control line, if the wind direction remains constant. Position the M8A1 automatic chemical agent alarm upwind of the site to warn of vapor hazards. The person getting decontaminated moves straight ahead while his or her mask, which may still give offvapors, is held on the vapor dirty side of the line and taken to station 7 where it is decontaminated.

Risk

There is a high probability vapor hazard is still present from mask and hood. This procedure must be done properly or the soldier could breathe toxic vapors. The station attendant removes the mask from the soldier. The soldier does not touch the outside of the mask because it could contaminate his or her bare hands.

Station 7, Mask Decon Point.

Performing this step removes all contamination from the mask.

Preparation.

The following material and equipment are needed

- Four containers (about 3-gallon capacity).
- CAM (for chemical only).
- Hot, soapy water.
- Rinse water.
- Mask sanitizing solution.
- Immersion heater 30-gallon container.
- Two sponges.
- One case paper towels per company.

Dig a sump (4 feet wide by 4 feet long by 4 feet deep) in which to discard used falters and canisters. Place the equipment and materials as shown in Figure 4-3.

Three soldiers are needed to operate this station. Two soldiers will strip, wash, rinse, sanitize, and dry masks. The other soldier checks masks and carries them to reissue point.

Execution

Discard winterization kits, if used. Remove eyelens outserts, and hood, if hood was not cutoff at station 2. Remove and discard falters or canisters. Put the items into the properly marked containers. Wash mask, hood, and outserts and hoses on M24, M25A1, M42 and M43 masks in hot, soapy water. Rinse in clean water, dip into sanitizing solution, agitate for five minutes, then rinse in clean water again. Add one tube of mask sanitizing solution (calcium hypochlorite) to each quart of water. Wipe with rags until almost dry. Discard each gallon of mask sanitizing solution into a sump after every 10 masks. The attendant checks for contamination with an CAM. If the mask is still contaminated, the attendant recycles it for more decon and then decontaminates his or her rubber gloves. If the mask is not contaminated, the attendant takes the unassembled

mask to the reissue point. The attendant must take care not to contaminate the reissue point or himself.

Risk

Not properly performing this step will cause the risk of contaminating soldiers when reissuing masks at the reissue point. Even though the step is done correctly, there is still a possible danger when many masks are stacked together. Small amounts of residual vapor from each mask can become potentially dangerous.

Station 8, Reissue Point.

Performing this step will insure that you receive all of your individual gear and your protective mask with all components.

Preparation

You will need the protective mask PLL parts. The unit supply sergeant and chemical NCO setup the reissue point to provide soldiers with replacement parts for all types of protective masks and assist in mask maintenance.

Execution

Reissue mask with components to soldier who assembles mask in the assembly area. Unit chemical NCO will affix canisters to cleaned M24, M25A1, and M43 hoses. Individuals pickup individual gear and move to postdecon assembly area.

Risk

Not properly performing this step, can cause the soldier to be inadequately equipped for future operations.

The supporting chemical unit (decon or smoke/decon) must supply the majority of the equipment and supplies required to operate the DTD. This does not relieve the supported unit from the requirement to maintain adequate supplies to conduct detailed troop decon procedures. The supported unit provides the supporting chemical unit with replacement supplies and material at the end of the decon operations. This shortens the time the chemical unit is nonmission capable following a decon operation. The supported unit must coordinate for the supplies and equipment necessary to operate the DTD. Typical nonchemical units do not have more than two CAMs per company-sized unit. However, the DTD requires a minimum of three CAMs. The supported headquarters may need to provide additional CAMs. The overall list of supplies and equipment to operate a company level DTD is listed in Table 4-2.

Table 4-2. Equipment recapitulation for detailed troop decon of an average-sized company.

Three containers (2-gallon capacity). One will hold an immersion heater.	Two books of M8 paper per squad.
Three containers (3-gallon capacity). Four additional containers required for radiological decon.	One roll of M9 paper per squad.
Two M258A1 or M291 decon kits per person.	Four M1 chemical agent monitors (CAMs).
Two boxes of plastic bags.	Four M8A1 automatic chemical agent alarms.
Ten 50-pound drums of STB.	Two immersion heaters with fuel.
One 5-pound drum of general purpose detergent.	Two Shovels.
One 1-gallon container of mask sanitizing solution per ten masks.	First aid supplies and antidotes.
Four long-handled brushes.	One M256A1 detector kit per squad.
Four large sponges (four additional sponges for radiological decon).	One roll plastic per company.
Four bundles of rags.	One case paper towels per company.
Four cutting tools (scissors, knives).	Engineer tape.
One filter-pair or filter canister per mask.	Protective mask PLL parts.
One hood per mask.	NOTE: If only one radiacmeter is available, use it at Station 5 to monitor personnel. Pile together decontaminated equipment from Station 1 and decontaminated masks from Station 7. After a squad has been monitored through Station 5, an attendant should monitor the equipment pile.
Three AN/PDR27 radiacmeters or AN/VDR2 (for radiological only).	

Table 4-3. Detailed Troop Decon personnel and equipment recapitulation.

Satation	Personnel	Equipment
Station 1 Individual Gear Decon	2 attendants 1 monitor (CAM operator)	3 30-gal containers 2 long-handled brushes 2 ponchoes or plastic sheets 1 CAM 8 M8 detector paper 4 M256A1 kits 100 trash bags
Station 2 Overboot and Hood Decon	1 attendant	2 cutting tools 60 M258A1 or M295 (or one per person) 2 ponchoes or plastic tarps 100 trash bags
Station 3 Overgarment Removal	1 attendant	10 M258A1/M295 2 30-gal containers 100 trash bags
Station 4 Overboot and Glove Removal	1 attendant	2 30-gal containers 100 trash bags Engerineer tape Cutting tool
Station 5 Monitor	1 attendant (CAM operator) 1 aidman (or combat lifesaver)	1 CAM 5 M8 detector paper 24 M258A1/M295
Station 6 Mask Removal	2 attendants	1 M8A1 chem alarm
Station 7 Mask Decon Point	2 mask decon attendants 1 monitor	4 3-gal containers 1 CAM 2 sponges 1 case paper towels 1 immersion heater w/container Mask sanitizing solution
Station 8 Reissue Point	Unit supply NCO Unit NBC NCO	Mask PLL

Detailed Equipment Decon

Chemical units (decon and smoke/decon platoons) are responsible for the setup, operation, and closure of the DED portion of the thorough decon operation. The DED for chemical and biological contamination is comprised of five stations. For radiological contamination, the DED uses all but station 2, DS Application. Actions at each of the stations are described Abelow.

Station 1, Initial Wash.

The objective of this station is to remove the gross contamination and dirt from the vehicle. The vehicle is sprayed for two to three minutes with hot, soapy water. The vehicle is then scrubbed to help remove caked-on dirt. The mechanical action of scrubbing also helps remove thickened chemical agents. Although the undersurfaces are difficult to reach try to remove as much dirt as possible. After scrubbing the vehicle, spray again for two to three minutes to remove loosened dirt and contamination. This station will use approximately 250 gallons of water per vehicle. Larger vehicles or vehicles with large quantities of dirt will use more water. The runoff from this station is contaminated and must be treated as hazardous. This station requires high water pressure systems (M12A1 PDDA, M17 LDS) rather than high water volume systems (65-gpm pumps).

The effectiveness of the wash depends upon on the type of wash (hot soapy water, hot water, cold water, steam). The relative effectiveness rankings of hot soapy water, hot water, cold water, and steam for agents HD, THD, GD, TGD, and VX are listed in Table 4-4 for selected surfaces.

Table 4-4. Effectiveness of types of wash.

Agent/Surface	Relative Effectiveness
TGD on Alkyd-painted metal	Hot Water = Steam, Hot Soapy Water, Cold Soapy Water1
TGD on CARC-painted metal	Hot Soapy Water = Hot Water = Steam, Cold Water
THD on Alkyd-painted metal	Hot Water, Steam, Hot Soapy Water, Steam, Cold Water
THD on CARC-painted metal	Hot Soapy Water, Hot Water = Steam, Cold Water
HD on Alkyd-painted metal	Hot Soapy Water, Steam, Hot Water, Cold Water
HD on CARC-painted metal	Hot Soapy Water = Steam, Cold Water = Hot Water
VX on Alkyd-painted metal	Steam, Cold Water = Hot Water = Hot Soapy Water
TGD on Canvas/Webbing	Steam, Hot Water = Hot Soapy Water, Cold Water
GD on Canvas/Webbing	Steam, Hot Soapy Water = Hot Water, Cold Water
THD on Canvas/Webbing	Steam, Hot Soapy Water, Cold Water, Hot Water
HD on Canvas/Webbing	Steam, Hot Water, Hot Soapy Water, Cold Water
VX on Canvas/Webbing	Steam, Hot Water = Hot Soapy Water, Cold Water
Overall	Steam, Hot Water = Hot Soapy Water, Cold Water

1 Read as Hot Water and/or steam are best for removing TGD from an alkyd-painted metal surface. Hot, soapy water is next in effectiveness, followed by the least effective, the application of cold water.

Hot soapy water is water heated to about 120 to 140°F to which a detergent has been added to reduce its surface tension. The detergent removes the agent by emulsification followed by mechanical displacement of the suspension. Hot water alone is less effective than hot soapy water. Because of the high temperature, some agents are best removed by steam through vaporization. Finally, for some chemical agents cold water exhibits better solvent characteristics.

Station 2, DS2 Application.

The objective of this station is to apply decontaminant to the entire vehicle. The vehicle is divided in four parts and a member of the scrubbing team is assigned that part of the vehicle. This limits the workload of each member of the scrubbing team and avoids duplication of work. DS2 is applied starting at the top of the vehicle and working towards the undercarriage. Every effort is made to apply DS2 to the undercarriage, especially if the vehicle has crossed a contaminated area. The mop is the least tiring method of applying DS2. Using a mop to apply DS2 creates a large amount of spillage. However, continual use of the M13 DAP requires the scrub team to exert more energy than using the mop. The M13 DAP can be used to apply DS2 in hard-to-reach areas.

Prior to the start of the decon operation, the scrub team pours 5-gallon cans of DS2 into 30-gallon trash cans if mops are going to be used instead of M13 DAPs. Each member of the scrub team will wear TAP aprons or wet weather gear to protect themselves from the DS2.

Water adversely affects DS2's ability to react with chemical agents. When water in DS2 reaches 20 percent by weight, the reaction between DS2 and the chemical agent stops. If there is excess water remaining on the vehicle from station 1, there are several options

- Wait for the majority of the water to evaporate.
- Remove the excess water.
- Increase the amount of DS2 applied.

There must be sufficient DS2 on the item being decontaminated for complete neutralization to occur. The DS2-to-agent ratio needs to be 55 to 1 for H agents and 25 to 1 for G agents. For a vehicle the size of an M1A1 tank, this corresponds to 15 and 7 gallons, respectively.

DS2 should be applied with scrubbing. Scrubbing increases the mixing of the agent with DS2, especially when thickened chemical agents are present.

Table 4-5. Planning factors for DS2 application.

Planning Category	Tank	Truck	APC
Gallons of DS2	15	8	7
Minutes to apply	35	29	18

Station 3, Wait /Interior Decon.

The objective of this station is to allow the DS2 to completely neutralize the chemical agent and to decontaminate the interior of the vehicle. Vehicles are moved to concealed position. Vehicles will remain in station 3 for no less than 30 minutes. DS2 reacts with most chemical agents within 5 minutes. However, by allowing the DS2 to remain on the contaminated surface for 30 minutes the amount of agent that will later desorb (off gas) will be signicantly reduced. When there is a 30-minute contact time there will be no resorption after decon operations for most chemical agents. However, studies indicate that HD vapor will

desorb after decon, even if DS2 is allowed to remain for 30 minutes.

While the vehicle is held in this station for the DS2 to completely react, the driver inspects the interior of the vehicle for liquid contamination. The driver will be given M8 detector paper. If the driver identifies chemical contamination, he will be given decon supplies to decontaminate the interior of his vehicle. The best decon solution for use in the interior of vehicles is a 5 percent solution of HTH or STB. The driver wipes all reasonably accessible surfaces with a rag or sponge soaked in the HTH solution. Do not attempt to decon areas where these is little likelihood of contamination (electrical assemblies, beneath the turret floor, and so forth).

CAUTION

Do not mix HTH or STB with DS2. If mixed, a violent reaction will occur.

Once interior decon is completed, the driver dismounts from the vehicle and proceeds to the start of the DTD. The assistant driver, having completed the DTD, mounts the vehicle and moves it to the next station. Drivers must exercise caution when entering or exiting the vehicle. A DS2-coated surface is slippery and DS2 may react with chemical protective footwear. Personnel should avoid stepping in DS2 and tracking it into the vehicle.

For radiological contamination, use an AN/PDR27-series or AN/VDR2 radiac meter to determine the extent and location of contamination inside the vehicle. If there is contamination, determine the intensity of the contamination inside of the vehicle. If the contamination has an intensity greater than 0.33cGy (the negligible risk), the interior of vehicle must be decontaminated. Use hot, soapy water to wash the contaminated areas. Use a sponge to mop up the water and the contamination.

Table 4-6. Preparation of decon mixtures.

Decon Mixtures		
Solution	**1 gallon of water**	**5 gallons of water**
5 percent	.6 pounds STB/HTH	3.6 pounds STB/HTH
10 percent	.75 pounds STB/HTH	4.5 pounds STB/HTH

Station 4, Rinse.

The objective of this station is to remove the DS2 from the vehicle. The vehicle is sprayed with water from top to bottom. Take care to rinse the undercarriage. This station uses approximately 200 gallons of water. Failure to remove all DS2 from the vehicle may cause false positive readings at station 5. If high water pressure systems (M12A1 PDDA, M17 LDS) are not available, large volume water pumps (65-gpm pumps) should be used at this station.

Table 4-7. Planning factors for the rinse station.

Planning Category	Tank	Truck	APC
M12A1 rinse (gal)	325	158	152
M12A1 rinse (min)	12	7	9
M17 LDS rinse (gal)*	57	42	31
M17 LDS rinse (min)*	14	11	10
* with spray wands			

Station 5, Check.

The objective of this station is to check the completeness of the decon. This station determines whether the vehicle has a negligible risk or still has significant contamination remaining. Detection procedures will vary depending on the type of contamination. If significant contamination is found on the vehicle, the vehicle will be recycled to station 2 for chemical contamination or station 1 for radiological contamination.

Chemical

The CAM is used to check for the presence of vapor from residual liquid contamination. A one bar or lower reading on the CAM indicates a negligible risk. Once the CAM indicates the presence of vapor contamination, M8 detector paper is used to verify the presence of liquid contamination. If it is suspected that both the CAM and M8 paper are producing a false positive, use an M256 chemical detector ticket to confirm or deny the presence of contamination. If the vehicle has significant contamination remaking, recycle it. The commander may modify the recycle criteria, based upon mission requirements, using the chemical agent weather tables.

There will be resorption of chemical agents from the surfaces after decontamination. On CARC-painted surfaces, the resorption of vapors will stop sooner than alkyd-painted surfaces. Consider this when checking decontaminated items for overall decontamination effectiveness.

Radiological

Use the AN/PDR27-series or AN/VDR2 to determine if any contamination remains. If there is contamination remaining, determine the intensity of the contamination inside and outside of the vehicle. If the contamination has

Table 4-8. Common interferences that can cause false positive readings on the CAM.

Interferent	G-Bar Response	H-Bar Response
M258A1 decon kit		High
M280 DKIE		High
DS2	Low	
Insect repellent	Low – Very High	
Brake fluid	High – Very High	Very High
Cleaner, general purpose	High	
Burning kerosene		High
Breath mints	High	
Gasoline vapor	Low	Low
Burning grass	Low – High	Low
Burning gas	Low	
Green smoke	Low	Low – High
Breakfree oil	Low	
Ammonia	Very High	

an intensity greater than 0.33cGy (the negligible risk), the vehicle is recycled to station 1.

Recycle Criteria

The commander, in conjunction with the chemical unit leader, will establish the recycle criteria before the start of decon operations. The recycle criteria determines which vehicles return to station 1 after contamination is detected at station 5. If the unit has sufficient time and resources, any vehicle having more contamination than a negligible risk should be recycled. However, time and resources are usually limited and not all vehicles can be recycled. The recycle criteria is based on the weathering effects.

DED Configurations

Decon and smoke/decon platoons establish thorough decon sites differently because of organizational and equipment differences. This section describes the optimum set-up configuration for each type of platoon. The optimum configuration provides the maximum output for platoons at 100 percent personnel and equipment. The equipment and personnel requirements for the optimum configuration are identified for both the chemical unit and supported unit augmentation.

Other conifigurations are discussed because it is likely that all platoons will not be at 100 percent strength. For each alternate configuration, chemical unit equipment requirements are identified. However, personnel requirements are not identified by chemical unit and supported unit. The total number of personnel needed are identified, with a minimum number of chemical unit personnel.

Alternate Layout Planning Considerations

Chemical unit leaders use METT-T to determine the best possible DED layout to execute their mission. When determining alternate DED layouts, the following guidelines apply

- Retain the ability to spray hot, soapy water or steam under pressure at station 1.
- Station 2 requires the largest number of persons.
- Experienced and qualified CAM operators are required at station 5.
- Water does not have to be hot to rinse off DS2; however, the lower the water pressure the more water required for the rinse.

Decon Platoon

The optimum setup of a DED for a M12A1 PDDA-equipped platoon requires the use of all authorized equipment and personnel (Figure 4-5, page 4-20). While this DED configuration is manpower- and equipment-extensive, it provides for the rapid decontamination of vehicles and equipment (8 vehicles processed per hour). This layout uses dual lanes at stations 1, 4, and 5 to process two vehicles at one time. Since the most time and labor-intensive work takes place at station 3, this station is designed to process three vehicles at a time. The processing rate of this configuration will be affected by any work-rest cycle.

WARNING

Work/rest tables are found in Appendix I. Chemical unit leaders must consider the impact of the work/rest cycle on the ability of their operation to process vehicles through the DED. Failure to initiate a work/rest cycle could result in heat casualties and mission failure.

It may not be possible, for a variety of reasons, for a decon platoon (M12A1 PDDA-equipped) to use the optimum layout configuration. Limited personnel or equipment will affect the layout of the DED. Figure 4-6, page 4-22 shows an alternate ED layout configuration.

Smoke/Decon Platoon

Smoke/decon platoons equipped with the M17 LDS will set up the DED differently from M12A1 PDDA-equipped units. The optimum setup of a DED for an M17 LDS equipped platoon is shown at Figure 4-7, page 4-24. While this DED configuration is manpower- and equipment-intensive, it provides for the rapid decontamination of

vehicles and equipment (8 vehicles processed per hour). This layout uses a dual lane at stations 1, 4, and 5 to process two vehicles at one time. Since the most time and labor extensive work takes place at station 3, this station is designed to process three vehicles at a time. The processing rate of this configuration will be affected by any work-rest cycle.

It may not be possible, for a variety of reasons, for a smoke/decon platoon (M17 LDS equipped) to use the optimum layout configuration. Limited personnel or equipment will affect the layout of the DED. Figure 4-8, page 4-26 shows an alternates DED layout configuration.

Clearing the thorough Decon Site

Once all vehicles and personnel from the contaminated unit have processed through the thorough decon site, the site can be closed. Coordination with the supported unit is necessary prior to actually closing the site. This is to ensure that all contaminated elements have been processed.

The chemical unit (decon or smoke/decon platoons) closes the DED first. Once the DED is closed, the chemical unit processes through the DTD. After the chemical unit has processed through the DTD, the DTD is then closed. Once the DTD is closed, the chemical unit marks the area as a contaminated area and report its exact location to the supported unit, using an NBC-4 report.

The exact procedures for closing the DED and DTD are described below.

Closing the Detailed Equipment Decon Area

The DED is closed in sequence, starting at station 1. All vehicles, equipment, and nonexpendable supplies are inspected for contamination. If contamination is found, it is decontaminated. The actions at each station are described below.

- Station 1, Initial Wash. Spray all vehicles and equipment with hot, soapy water to remove any contamination that could have been transferred during initial wash operations. Drain the water billets or fabric tanks of water. Inspect all equipment and vehicles for contamination using the appropriate detection equipment. If no contamination is detected, load the equipment on the vehicles. Spread one can of STB into each of the sumps and then cover the sumps. Post NBC hazard markers near the covered sumps.
- Station 2, DS2 Application. Throw mops and brushes used in applying DS2 into a sump or bury them. Load unused cans of DS2 and M13 DAPs on a vehicle.
- Station 3, Holding Area/Interior Decon. Inspect any unused supplies and equipment for contamination. If no contamination is detected, load the equipment and supplies on a vehicle. Throw contaminated supplies into the nearest sump.
- Station 4, Rinse. Spray all vehicles and equipment with hot, soapy water to remove any contamination that could have been transferred during rinse operations. Drain the water billets or fabric tanks of water. Inspect all equipment and vehicles for contamination using the appropriate detection equipment. If no contamination is detected load the equipment on the vehicles. Spread one can of STB into each of the sumps and then cover the sumps. Post NBC hazard markers near the covered sumps.

  NOTE: While DS2 destroys the chemical agents, some of the by-products created are also toxic.
- Station 5, Monitor. Check all equipment is checked for contamination. If it is not contaminated, load it on a vehicle. If it is contaminated, decontaminate it in accordance with the appropriate TM. Throw contaminated supplies into the nearest sump.

Move all vehicles just upwind of station 5 and inspect again for contamination. If any contamination is detected, the crew will use M11 or M13 DAPs to decontaminate the identified areas. Once the vehicles are laggered, all personnel will proceed to the DTD.

Closing the Detailed Troop Decon Area

Once all personnel from the DED have processed through the DTD, the DTD may be closed. After the last person has exited the DTD –

- Pick up all used supplies from station 7 and put them in the station 7 sump. Take up the contamination control line. If engineer tape was used, dispose of it in station 7 sump.
- Move all usable supplies and equipment from all the stations to station 1. Discard unusable supplies from stations 5, 4, and 3 into station 1 sump.
- Decontaminate all supplies and equipment collected at station 1 using the decontaminant and rinse water at station 1. Empty the rinse and decontaminant containers from station 1 into the sump.
- Mark entire decon area. Remove overgarments using the MOPP gear exchange technique and dispose of overgarments in the sump at station 1.
- Move any equipment used to fill the sump upwind of the decon area. Decontaminate rubber gloves and move all equipment and supplies in station 1 upwind of the decon area. Keep this equipment and supplies separate from that used to fill the sump.
- Your overboots and gloves may now be contaminated. Remove them. Dig a hole and bury them. Mark the hole and or area.

Thorough Decon Under Unusual Conditions

Night Operations

Decon operations are not restricted to daylight hours. The enemy may employ chemical and biological weapons at night, since weather conditions are usually more favorable for their employment at that time. Chemical agents tend to be more persistent at night due to stable air conditions. Biological agents are not subjected to sunlight's harmful ultraviolet rays. Consequently, NBC contamination encountered at night may require decon before daylight. The enemy may also use nuclear weapons against targets during nighttime to maximize flash blindness.

Conducting decon operations at night is a challenge. "White light" cannot be used without possibly revealing your location. However, decon personnel must have illumination to perform such essential decon tasks as spraying water, applying decontaminants, using detection equipment, and doffing the MOPP gear.

Use chemical agent detector paper to check for chemical contamination and how well chemical decon was performed. If contamination is present, this paper changes color to red and cannot be seen if red-filtered light is used. The CAM and M256- series detector kit can be used for the identification and detection of chemical agents, but will require a light source in order to obtain a reading.

Several vehicles awaiting or undergoing decon present a significant infrared "signature" due to hot engines. Entry, exit, and movement within the decon site is difficult under blackout conditions.

Night decon operations are difficult, but can be accomplished. Whenever possible conduct thorough decon operations in built-up areas. Use a building for the DTD area and warehouses for DED operations. This allows for the use of white light. Soldiers can see what they are decontaminating, see where they are going, and can read the color changes of detector paper.

There will be a need for additional soldiers to act as ground guides in the DED. The NCOICs of stations 1, 2, and 4 will inspect each vehicle with a flashlight or chemlight before the vehicle proceeds to the next station. There should be at least two flashlights at each station in both the DED and DTD.

Desert Operations

Thorough decon operations require large amounts of water. Special arrangements must be made to ensure there is sufficient water available for decon operations. Desert areas are not always categorized by high temperatures that enhance the evaporation of chemical agents. Whenever possible, consider the effects of evaporation when deciding to conduct decon.

Decon site selection should consider the effect of limited cover and concealment. It may be necessary to disperse the decon site over several kilometers to avoid presenting a large signature. Also the use of camouflage netting is necessary to minimize enemy acquisition.

NOTE: Chapter 6 provides information and guidance for conducting decontamination operations in cold weather; in urban areas and mountain, jungle, and desert terrains.

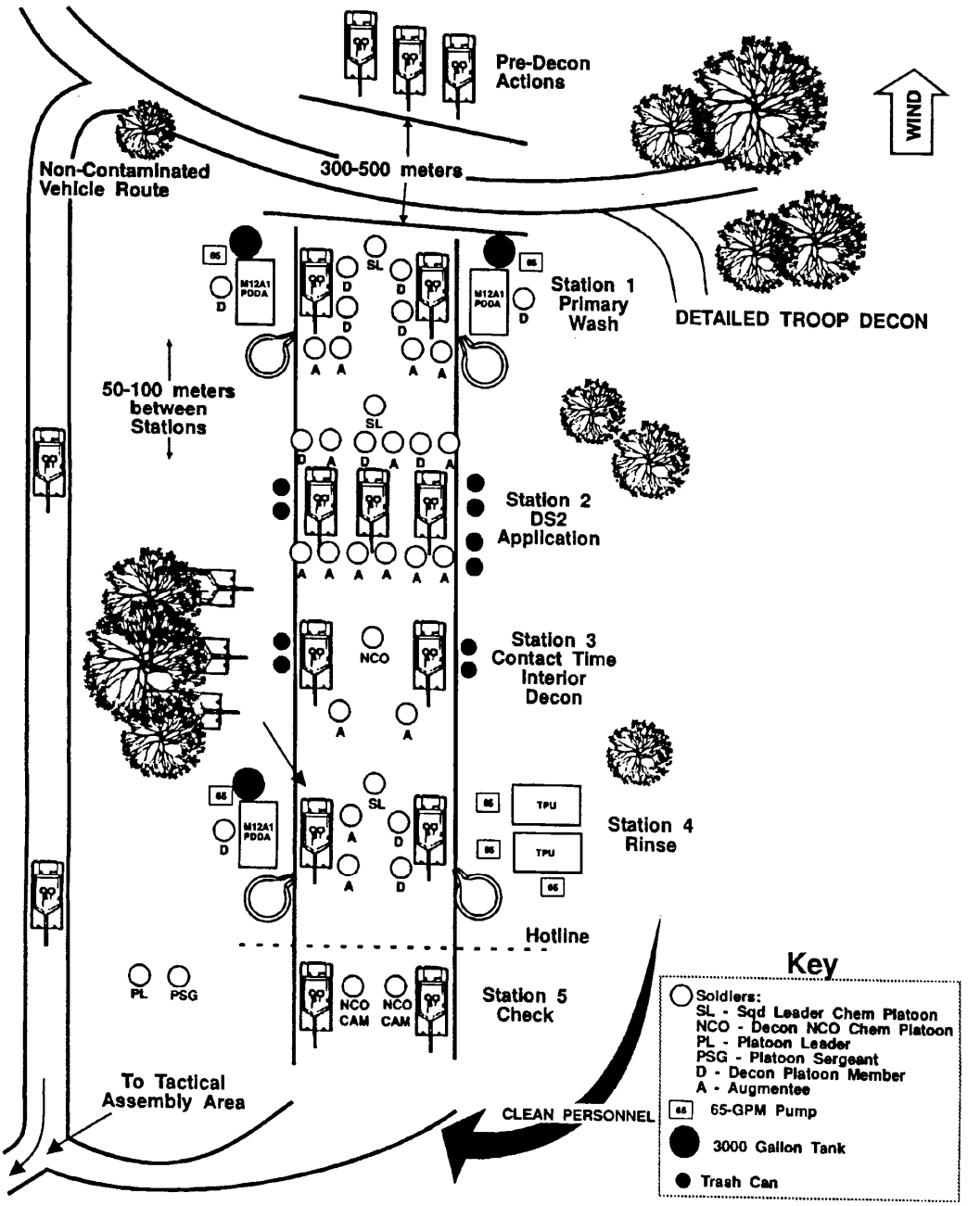


Figure 4-5. M12A1 PDDA-equipped unit-optimum DED layout.

Table 4-9. Personnel and equipment requirements for optimum M12A1 PDDA-equipped DED setup. (see figure 4-5)

	Personnel		Equipment
	Decon Platoon	**Augmentee**	
Station 1 Initial Wash	1 sqd ldr 2 PDDA op 4 sprayers	4 scrubbers	2 M12A1 PDDAs 2 3,000-gal tanks 2 65-PM pumps 6 long-handled brushes 8 TAP aprons Liquid detergent
Station 2 DS2 Application	1 sqd ldr 3 appliers	9 appliers	18 long-handled brushes 9 mops with extra mop heads 3 30-gal containers 9 M13 DAPs Sufficient DS2
Station 3 Wait/Interior Decon	1 NCO	2 interior decon assistants	2 AN/VDR2 or AN/PDR27() 3 TAP aprons 6 30-gal containers 10 M8 detector paper 30 sponges 8 M256A1 50 trash bags 1 clipboard w/pen 1 stopwatch
Station 4 Rinse	1 sqd ldr 1 PDDA op 2 pump op	2 sprayers	1 M12A1 PDDA 1 3,000 gal tank 3 65GPM pumps 2 TPU 2 TAP aprons
Station 5 Check	2 NCO/CAM op		2 CAM 10 M256A1 20 M8 detector paper 2 AN/VDR2 or AN/PDR27() 2 M8A1 chem alarms
C2	1 PL 1 PSG		1 Hummwv/CUCV w/radio 3 NBC marking kits
Total Personnel	20	17	

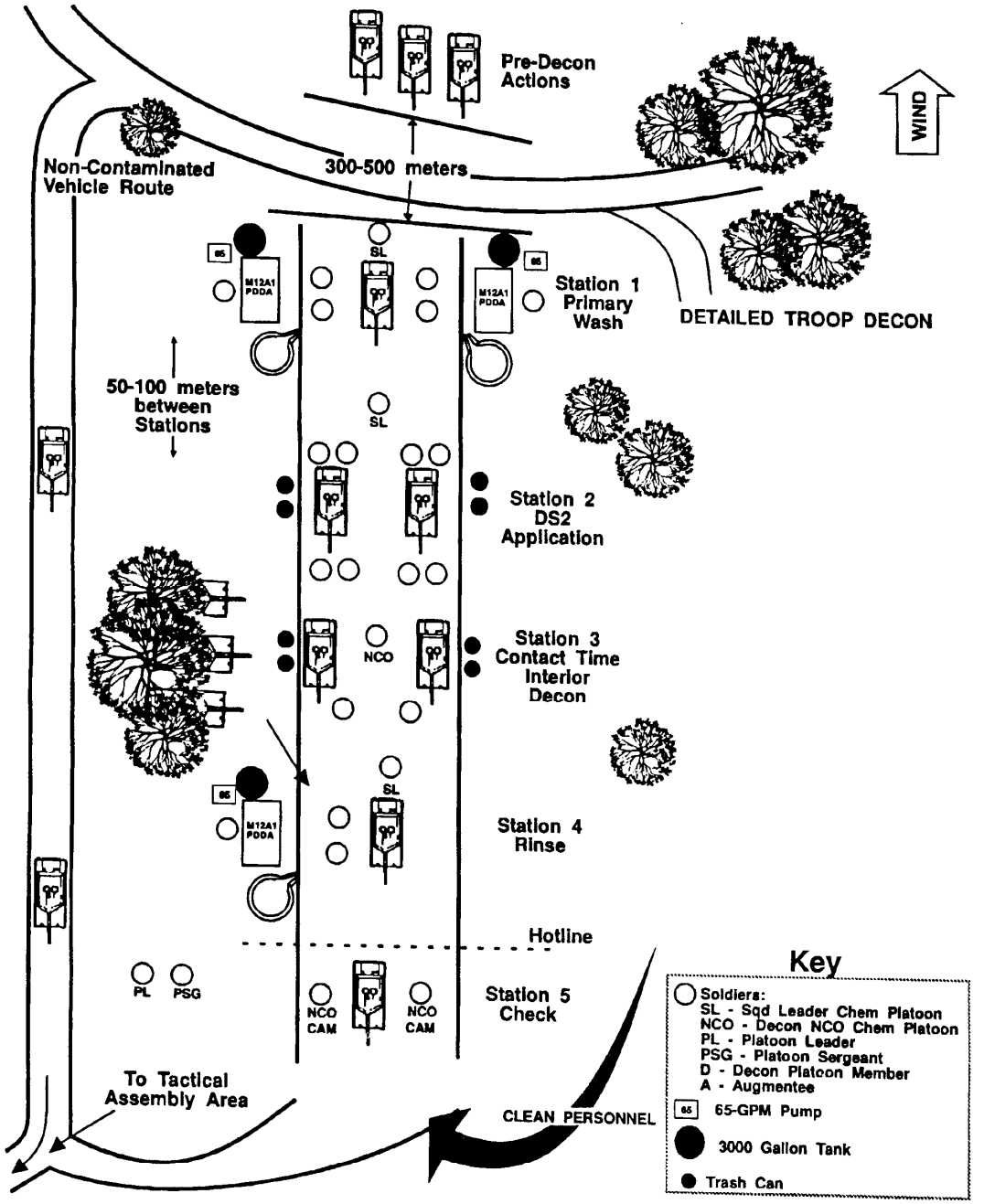


Figure 4-6. An alternate DED layout for an M12A1 PDDA-equipped unit.

Table 4-10. Personnel and equipment requirements for an alternate M12A1 PDDA-equipped DED setup. (see figure 4-6)

	Personnel	Equipment
Station 1 Initial Wash	1 NCOIC* 2 PDDA op* 4 sprayers 2 scrubbers	2 M12A1 PDDAS 2 3,000-gal tanks 2 65-GPM pumps 4 long-handled brushes 6 TAP aprons Liquid detergent
Station 2 DS2 Application	1 NCOIC* 8 appliers	14 long-handled brushes 8 mops with extra mop heads 3 30-gallon containers 8 M13 DAPs Sufficient DS2
Station 3 Wait/Interior Decon	1 NCO* 2 interior decon assistants	2 AN/VDR2 or AN/PDR27() 3 TAP aprons 6 30-gal containers 10 M8 detector paper 30 sponges 8 M256A1 50 trash bags 1 clipboard w/pen 1 stopwatch
Station 4 Rinse	1 NCOIC* 1 PDDA op* 2 sprayers	1 M12A1 PDDA 1 3,000-gal tank 1 65-G5GPM pump 1 TPU 2 TAP aprons
Staiton 5 Check	2 NCO/CAM op*	2 CAM 10 M256A1 20 M8 detector paper 2 AN/VDR2 or AN/PDR27() 2 M8A1 chem alarms
C2	1 PL (decon platoon) 1 PSG (decon platoon)	1 Hummwv/CUCV w/radio 3 NBC marking kits
Total Personnel	29 (Minimum of 11 soldiers from the decon platoon)	

*These individuals should be from the decon platoon.

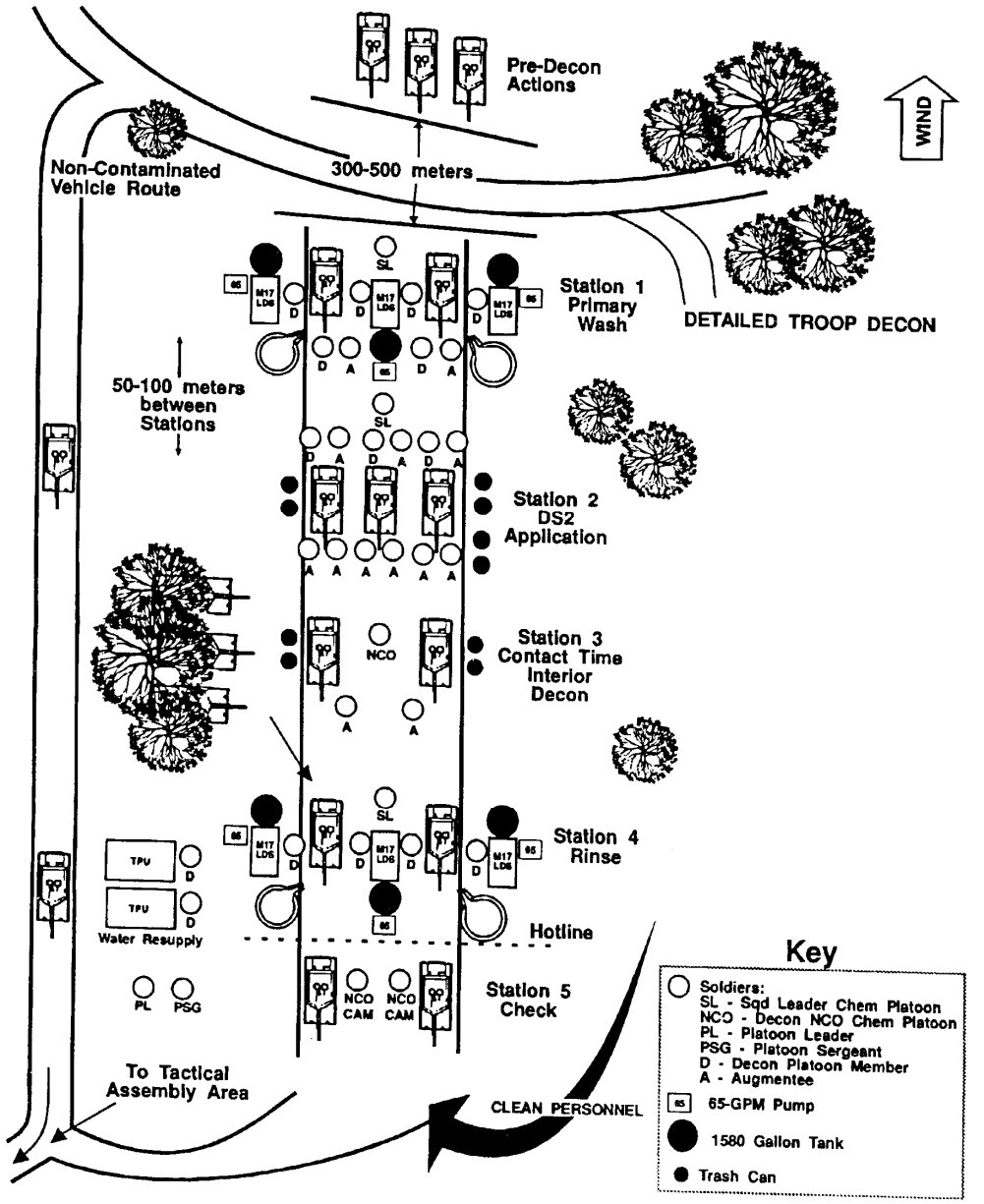


Figure 4-7. Optimum DED layout for an M17 LDS-equippred unit.

Table 4-11. Personnel and equipment requirements for optimum M17 LDS DED setup. (see figure 4-7)

	Personnel		Equipment
	Decon Platoon	**Augmentee**	
Station 1 Initial Wash	1 sqd ldr 4 sprayers 2 scrubbers	2 scrubbers	3 M17 LDS 3 1,500-gal tanks 3 65-GPM pumps 6 long-handled brushes 8 TAP aprons Liquid detergent
Station 2 DS2 Application	1 sqd ldr 3 appliers	9 appliers	18 long-handled brushes 9 mops with extra mop heads 3 30-gal containers 9 M13 DAPs Sufficient DS2
Staiton 3 Wait/Interior Decon	1 NCO 2 Interior decon assistants		2 AN/VDR2 or AN/PDR27 () 3 TAP aprons 6 30-gal containers 10 M8 detector paper 30 sponges 8 M256A1 50 trash bags 1 clipboard w/pen 1 stopwatch
Station 4 Rinse	1 sqd ldr 4 sprayers		3 M17 LDS 3 1,500-gal tanks 3 65-GPM pumps 4 TAP aprons
Station 5 Check	2 NCO/CAM op		2 CAM 10 M256A1 20 M8 detector paper 2 AN/VDR2 or AN/PDR27() 2 M8A1 chem alarms
C2	1 PL 1 PSG		1 Hummwv/CUCV w/radio 3 NBC marking kits
Total Personnel	24	11	

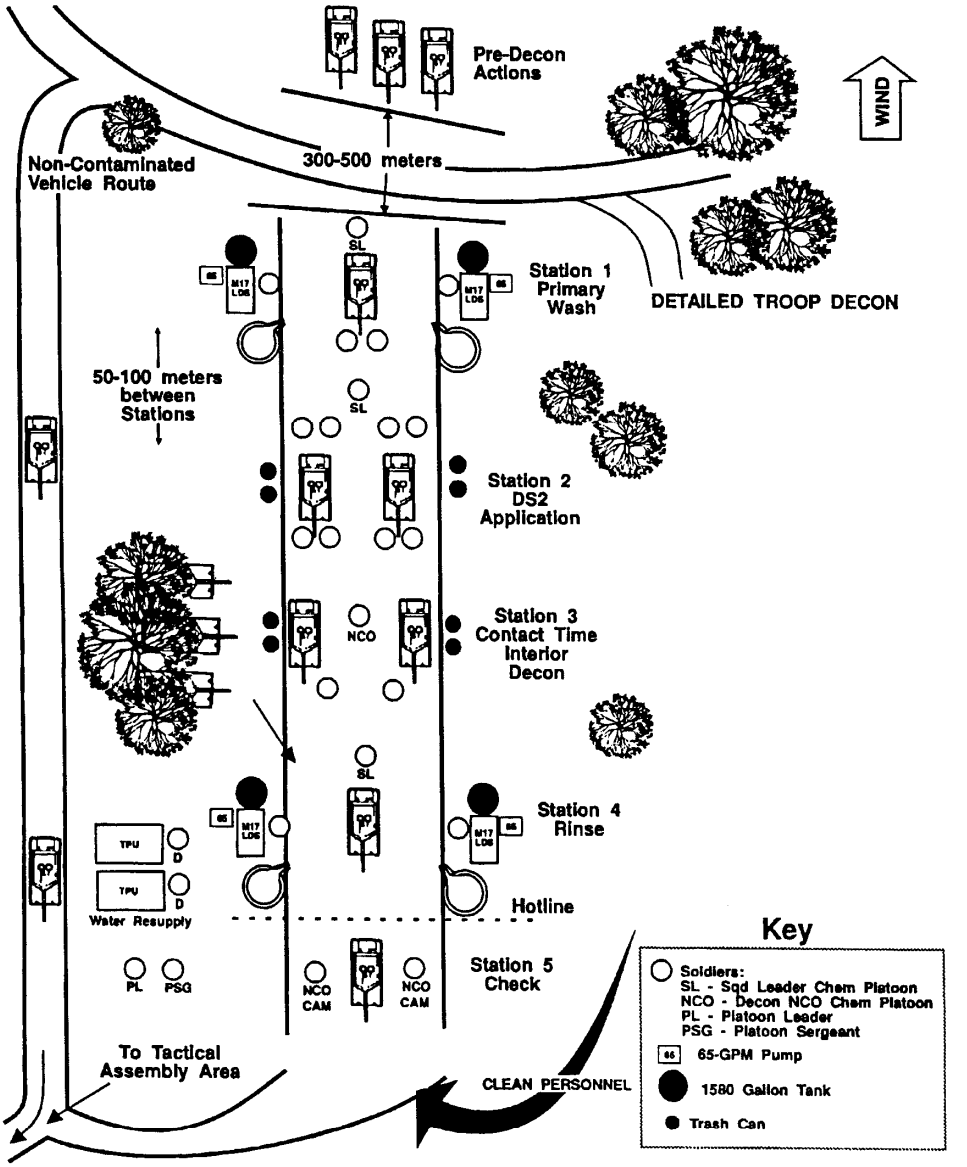


Figure 4-8. An alternate DED layout for an M17 LDS-equippred unit.

Table 4-12. Personnel and equipment requirements for alternate M17 LDS DED setup. (see figure 4-8)

	Personnel Duties	Equipment
Station 1 Initial Wash	1 NCOIC* 4 sprayers 4 scrubbers	3 M17 LDS 3 1,500-gal tanks 3 65-GPM pumps 4 long-handled brushes 8 TAP aprons Liquid detergent
Station 2 DS2 Application	1 NCOIC* 8 appliers	14 long-handled brushes 8 mops with extra mop heads 3 30-gal containers 8 M13 DAPs Sufficient DS2
Station 3 Wait/Interior Decon	1 NCO* 2 interior decon assistants	2 AN/VDR2 or AN/PDR27 () 3 TAP aprons 6 30-gal containers 10 M8 detector paper 30 sponges 8 M256A1 50 trash bags 1 clipboard w/pen 1 stopwatch
Station 4 Rinse	1 NCOIC* 4 sprayers	2 M17 LDS 2 1,500-gal tanks 2 65-GPM pumps 4 TAP aprons
Station 5 Check	2 NCO/CAM op*	2 CAM 10 M256A1 20 M8 detector paper 2 AN/VDR2 or AN/PDR27() 2 M8A1 chem alarms
C2	1 PL (smk/decon plt) 1 PSG (smk/decon plt)	1 Hummwv/CUCV w/radio 3 NBC marking kits
Water Resupply	2 drivers*	2 TPUs
Total Personnel	32 (Minimum of 10 soldiers from the smk/decon plt)	

* These individuals should be from the smk/decon platoon.