Chapter 7

Aviation

Contamination on the battlefield possesses a unique problem in the area of aviation. Aircraft use their high mobility to maneuver across the entire battlefield so avoiding contamination can be very difficult. Once an aircraft is contaminated, it is very difficult to decontaminate. Because of this, aviation units need to prepare effective SOPs that emphasize contamination avoidance, protection and methods to decontaminate each type of aircraft utilizing immediate, operational and thorough decon.

Contamination Avoidance

Contamination avoidance is critical due to the difficulty in decontamination. Aircrews must be aware of the hazards of NBC operations. For instance, an aircraft that hovers or lands in a contaminated area could splash contamination onto itself. Likewise, contaminated passengers or ground crew pose a danger of transferring contaminants into the aircraft where they are difficult to remove. Aircraft could also possibly pick up some contamination by flying through an invisible vapor cloud. Hazards that will only incapacitate ground personnel for a short time can be fatal in the air.

Some things that can be done to limit contamination

- Know what areas are contaminated and avoid these, if possible.
- If aircraft must land in contaminated areas, pick landing zones that will have a reduced splash effect.
- Limit the spread of contamination into the aircraft from outside. For example, ground crews at the forward arming and refueling point (FARP) should conduct arming and refueling without requiring the aircrew to exit the aircraft.
- Contaminated crews should conduct inspections without touching or shaking items. Many inspection points can be inspected visually.
- Increase the use of covers when not flying. Use engine covers, flyaway gear, and hatches. If possible, provide overhead cover for parked aircraft.
- Limit the number of aircraft that must operate in a contaminated area or use aircraft already contaminated.
- When carrying contaminated personnel or casualties, lining the troop compartment with plastic is a field expedient way to limit the spread of contamination. A plastic curtain can be fastened between the troop compartment and the flight compartment with tape or velcro to limit contamination transfer. The aircraft's heater can be used in conjunction with the curtain to create an overpressure in the pilot's compartment. This will limit vapors from entering the compartment.
- Apply M9 paper to the landing gear of the aircraft. FARP personnel should always check the M9 paper before servicing the aircraft. Another piece of M9 paper can be placed on the windscreen where the aircrew can see it.

Decontaminants

Only approved cleaning compounds may be used to decontaminate aircraft. Caustic decontaminants such as DS2, STB, bleaches, or sodium hypochlorite are not considered safe. STB corrodes metal components and aircraft skin, and DS2 corrodes rubber, plastic, and plexiglass.

Soap and water, kerosene, JP8, and diesel fuels are approved as decontaminants on selected parts of the aircraft. JP8 is effective in removing some agents from aircraft skin and components; however, it does not neutralize the agents. Personnel must use care when handling JP8. When using a cloth soaked in JP8 to wipe contaminated areas, personnel must avoid wiping internal components near the exhaust. If water is available, personnel should use it to rinse off the JP8. Many portions of the aircraft are delicate and cannot stand high pressure water or extreme hot air.

Sodium carbonate is a fair decontaminant against G-nerve agents, but is not effective against V-nerve and blister agents. The chemical reaction of V-nerve and sodium carbonate is extremely slow and produces a product that is very toxic. Most of the field expedeient decontaminants are corrosive and could cause damage to the aircraft skin or plexiglass windows.

Decon Techniques

When aircraft become contaminated, aircrews must rely on the protection of their MOPP gear. However, wearing MOPP gear degrades the ability of the crew to perform their jobs over time. Their performance will steadily deteriorate until the hazard is gone. This may occur through simple weathering of the agent over time,

or decontamination of the aircraft may be required. Aviation units should develop effective SOPs for decontamination that take into account the unit's mission and the type of aircraft being used.

Aircraft have some advantages over other vehicles for decontamination. If air and ground crew are careful when operating in a contaminated environment, contamination can be contained on the exterior of the aircraft. Most contamination on the exterior can be weathered off just by flying the aircraft. The increased airflow over the aircraft's skin will increase the rate of evaporation. Still, some agent will remain and continue to be a hazard. Thickened agents will evaporate more slowly and may remain a hazard even after prolonged flight. If the interior is contaminated, flying the aircraft with the doors open can help reduce the hazard. The interior of engine compartments will not need to be decontaminated. The heat from the running engine will evaporate agents.

However, to reduce the risk to acceptable levels on aircraft, more active methods of decontamination will probably still be needed. Use the three types of decon—immediate, operational and thorough — with modifications to meet the needs of aviation aircrew spot decon, aircraft washdown, and detailed aircraft decon (DAD).

Table 7-1 shows the types of aircraft decontamination. The crews of contaminated aircraft will continue to use the techniques described in previous chapters to survive and operate. Unit personnel conduct aircrew spot decon and aircraft washdown, but a chemical decontamination unit usually conducts DAD.

Aircrew Spot Decon

Ground forces and aircrews share most immediate decon needs. If aviators become contaminated, they must decon their skin immediately. Within 15 minutes of contamination, both aviators and ground soldiers conduct a personal wipedown (described in Chapters 1 and 3). After personal wipedown, aviators may spot decontaminate their aircraft (see Table 7-1).

Aircrew spot decon provides the same benefits as the operator's spraydown. It limits the transfer and spread of contamination by decontaminating the surfaces that must be touched during operations. The spot decon applies to the first six functional activities. The major goal always is to limit the transfer and spread of contamination while sustaining flight operations and by decontaminating those areas most touched, such as landing gear, fuel ports, doors, and handholds.

Air or ground crews may do spot decon. Wash exterior surfaces with decontaminants to flush off contamination. Fuel, soap, and water are most commonly used. Exact procedures and areas to decon are identified in the aircraft technical manual.

See Table 7-2 for guidance on aircrew spot decon.

Aircraft Washdown

Aircraft washdown sites area single station operation. Aircrews should fly their aircraft at high speeds before arriving at the site to help in the evaporation of exterior contamination. If the interior of the aircraft has been contaminated, the doors should be opened, but should be shut before arriving at the washdown site. At the washdown site, aircraft will land and reduce idle speed. If the crew of the aircraft are contaminated, they should exit and perform MOPP gear exchange. If the crew must perform MOPP gear exchange, the aircraft will be shut down. The aircraft are sprayed down and rinsed with the M12A1 PDDA or M17 LDS using hot, soapy water. Spray aircraft from top to bottom, working from right to left. Sprayers must avoid the tail rotor when aircraft are not shut down. Aviation personnel should follow the

Table 7-1. Three types of aircraft decontamination.

Type of Decon	When, Who, and Why	What	Type of Decon Agent
Aircrew Spot Decon	After immediate decon, decon by crew to allow continued operations	Essential operating surfaces on the aircraft	M258A1 M291 JP8 (NOTE 1)
Aircraft Washdown	Within 6-24 hours, by unit decon PDDE crew or decon unit to reduce contact hazard (NOTE 2)	The entire exterior surface of the aircraft (NOTES 3 and 4)	Hot, soapy water
Detailed Aircraft Decon	Mission allows decon units to reduce hazard to negligible risk levels	The entire exterior surface and selected interior surfaces of the aircraft	10 percent sodium carbonate solution (10 pounds of sodium carbonate to 12 gallons of water)

NOTES
1. Do not use JP8 inside the aircraft.
2. This technique is most effective if conducted within one hour of contamination.
3. Perform aircrew spot decon to reduce contact hazard inside the aircraft. Do not spray water inside the aircraft.
4. See Figure 7-3 for no direct water pressure contact areas.

Table 7-2. Guidance for aircrew spot decon.

Location and Action	Areas to Decontaminate	Who is Responsibile	Decontaminant to Use	Procedures	Remarks
Refueling at FARP.	Fuel ports/hatches. All areas that FARP personnel touch.	POL handler.	Diesel fuel; JP8; hot, soapy water.	Wipe fuel ports and hatches with sponge dipped in decontaminate. Do not allow the decontaminate to enter the fuel system. Control runoff because agent will not be neutralized. This method simply flushes contamination from the surface.	If FARP personnel are contaminated, they should conduct a hasty decon before servicing aircraft.
Arming at FARP	Armament system.	Ammo handler.	JP8; hot, soapy water.	Wipe armament system with sponge dipped in decontaminate. Control runoff because agent will not be neutralized. This method simply flushes contamination rom the surface.	CAUTION: Take care to prevent certain areas of the armament system from being exposed to decontaminants. Check technical manual on armament system to know what areas to avoid.
Entering and exiting aircraft anywhere.	Door handles, steps, ladders, handholds, and all other areas that aircrew is likely to touch.	Crew members, FARP personnel.	JP8; hot, soapy water.	Apply decontaminat. Take care to prevent the spread of liquid contamination from the outside of the aircraft to the inside. This includes controling the contaminated runoff. This method only flushes contamination from the surface. Precautions might include having the crew chief do the decon. This reduces the chance of contamination spreading into the pilot and copilot's compartment. All crew members should diligently practice NBC avoidance.	Procedures should be developed for each type of aircraft. Before entering, the M258 should be used on boots and gloves. FARP personnel can decontaminate area for existing aircrew members.
Pre- and post-flight checks anywhere. Maintenance inspections at aviation intermediate maintenance (AVIM) facilities.	Areas that must be touched as part of the inspection.	Aircrew.	Diesel fuel; JP8; hot, soapy water on exterior surfaces. Use hot air on interiors or areas not compatable with decontaminants or liquids.	Wipe areas required to be touched for pre- and post-flight checks with sponge dipped in decontaminate. Wash gloves in decontaminate before touching uncontaminated surfaces. Decontaminate gloves with M258 kit after inspection is complete. Control runoff. This method doesen't neutralize contamination.	Do not use overheated air directly on instrumentation. Crews may want to wear wet weather gear to keep most of the contamination off overgarments.

Table 7-2 Continued. Guidance for aircrew spot decon.

Location and Action	Areas to Decontaminate	Who is Responsibile	Decontaminant to Use	Procedures	remarks
Repair and recovery anywhere.	Situation dictates which parts or areas will need to be decontaminated.	Battle-damage repair team.	Diesel fuel; JP8; or hot, soapy water on exterior surfaces. Use hot air on interior or parts not compatable with liquid decontaminants.	Situation dependent. Decontaminate only those parts that need to be touched during repair.	Do not bring a contaminated aircraft into an unconytaminated area.
Cannibalization anywhere on the battlefield.	The part that is being decontaminated.	Maintenance personnel. Someone who knows what assembly they want or need.	DS2; STB; diesel fuel; 5% chlorine solution; or hot, soapy water on exterior parts or surfaces. Use hot air on interiors or parts not compatable with liquid or corrosive decontaminants.	Situation dependent. Decontaminate only those parts that need to be touched during repair.	Caustic decontaminants should be used only on those areas that have been removed from the aircraft. Assemblies must be thoroughly before replacing.
Overhaul at AVIM facilities.	All areas and equipment required to be worked on during overhaul to return aircraft to flight status.	Maintenance personnel and/or a chemical decon platoon from division or corps.	DS2; STB; diesel fuel; 5% chlorine solution; or hot, soapy water. Surfaces easily destroyed by liquid or corrosion should be decontaminated using hot air.	Wash with diesel fuel, then hot, soapy water, and rinse. Check with M8 paper or CAM. if time allows, equipment may be allowed to weather to reduce chemical contamination to negligible risk levels.	Caustic decontaminants should be used only on those assemblies that have been removed from the aircraft. Rinse thoroughly before replacing. This process has the same results as deliberate decon.

aircraft maintenance manual guidelines during aircraft wash down operations.

Caution

Use caution during this process because aircraft skin and components can be damaged when spraying aircraft with pressurized water.

The aviation unit must provide a C2 element to control the flow of aircraft into the washdown site. Figure 7-1 shows a typical layout for an aircraft washdown point. The support aviation must assist the chemical unit in selecting the site to ensure it is a suitable landing zone for the type of aircraft contaminated.

Aircraft washdown is important when operating an aircraft contaminated by gross amounts of chemical agent. It limits the absorption of the chemical agent into the paint, plastic, and rubber portions of the aircraft where it will pose a vapor hazard and be difficult, if not impossible, to decontaminate later.

NOTE: Many (but not all) aircraft have been painted with chemical agent resistant coating (CARC) paint. Aircraft will be painted with CARC paint when sent to the appropriate maintenance shop that paints aircraft. Contamination stays on top of CARC surfaces where it can be more easily neutralized or removed (See Appendix E).

Aircraft washdown should be conducted within six hours and is most effective if conducted within one hour. Some amounts of chemical contamination may remain after aircraft washdown. Aircrews should continue to, as a minimum, wear their protective mask and rubber gloves for protection until a deliberate decon can be conducted.

There is a lot to gain by washing down an aircraft contaminated by radiological or biological contamination. Not all the biological contamination will be removed, but you may be able to remove enough of the contamination hazard to operate at reduced MOPP levels.

Presently, there is no timely detection method to check the effectiveness of decon for biological contamination.

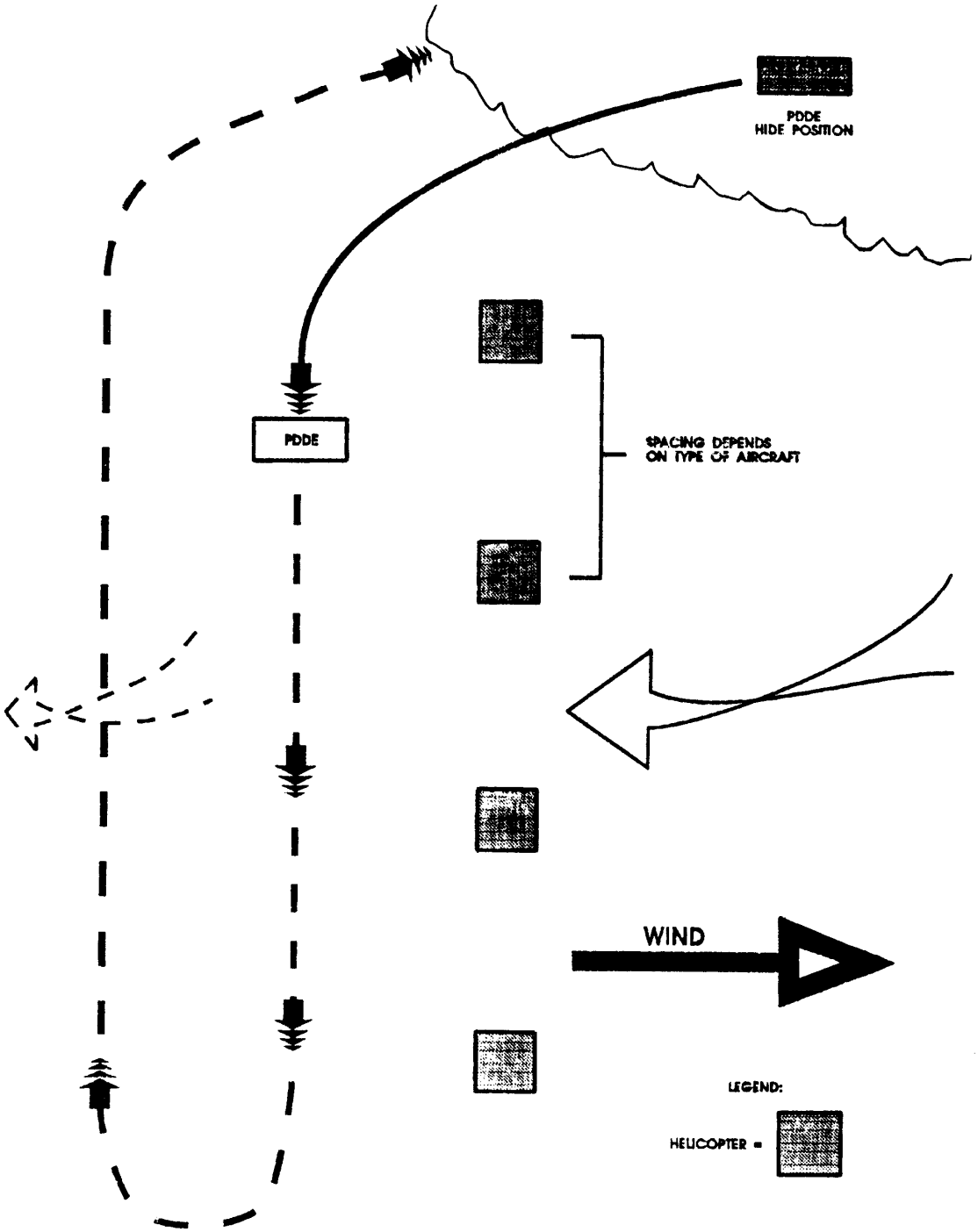

Figure 7-1. Aircraft washdown point.

Medical personnel will monitor aircrew disposition if biological contamination is suspected.

For radiological contamination, use the radiation exposure status (RES) of the crew and the operational exposure guidance (OEG) to control use of the aircraft.

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Detailed Aircraft Decon

The goal of DAD is to reduce contamination hazards to a negligible risk level so air and ground crews can operate the aircraft without protective measures. Detailed troop decon can be conducted at the same time. The decon site should be set up in a similar fashion to the thorough decon site described in Chapter 4. The decon site consists of four main areas: predecon staging area, DAD area, the DTD, and a postdecon assembly area. It is not possible to decontaminate aircraft and ground vehicles in the same site for safety considerations. A separate DED can be established in the vicinity to support contaminated aviation unit ground vehicles.

Aviation units do not have the resources to establish and operate a detailed aircraft station decon site. Support from a chemical (decon or smoke/decon) unit is necessary to set up and operate the DAD site. The chemical (decon or smoke/decon) unit must be assisted by the supported aviation unit. Additionally the aviation unit, like ground units, must set up and operate the DTD. See Chapter 4 for DTD operations.

Typically DAD is performed as part of a reconstitution effort or prior to maintenance operations. When aircraft are overhauled or grounded for scheduled maintenance, contamination hazards should be reduced to negligible risk levels by going through DAD. When components are removed from the aircraft for repair, care must be taken because some residual contamination may remain. Personnel must decontaminate these components before cannibalization or overhaul. Once components have been decontaminated, they must be rinsed before being installed on the aircraft.

Chemical units (decon and smoke/decon platoons) are responsible for the setup, operation, and closure of the DAD portion of the thorough decon operation. The setup of site is the same for all types of contamination (chemical, biological, and radiological). The DAD area is comprised of five stations — initial wash, decon solution application, wait/interior decon, rinse, and check. Actions at each of the stations are described below.

Station 1, Initial Wash

The objective of this station is to remove the gross contamination from the aircraft. Spray the aircraft for two to three minutes with hot, soapy water. Avoid hitting the aircraft skin at a 90-degree angle. Water, under pressure, hitting the aircraft skin perpendicularly can damage its skin. Additionally, sprayers must avoid specific areas of the aircraft. These sensitive areas (for most Army aircraft) are shown on Figure 7-3.

Station 2, Decon Solution Application

The objective of this station is to apply a decon solution to the exterior skin of the aircraft. Apply the decon solution using the M12A1 PDDA or the M17 LDS. After the solution is applied, a member of the scrubbing team scrubs the aircraft's skin. This allows mixing of the chemical agent with the decon solution, especially when thickened chemical agents are present. A 10 percent solution of sodium carbonate is the preferred decontaminant for G-nerve agents. DS2, STB, and HTH should not be used because of their corrosive nature.

Station 3, Wait/Interior Decon

The objective of this station is to allow the decon solution to completely neutralize the chemical agent and to decontaminate the interior of the aircraft. Aircraft will remain in station 3 for no less than 30 minutes. The decon solution reacts with most chemical agents within 5 minutes. However, allowing the decon solution to remain on the contaminated surface for 30 minutes ensures a higher level of neutralization to occur.

While the aircraft is held in this station for the decon solution to completely react, an attendant will inspect the interior of the aircraft for liquid contamination. If proper contamination avoidance procedures have been followed, little or no interior decontamination will be needed. The attendant will use the CAM and M8 detector paper. If liquid chemical contamination is identified, the attendant will decontaminate the interior of the aircraft.

Decontaminate the interior of the aircraft with hot, soapy water as long as maintenance personnel approve the use of hot, soapy water on certain pieces of equipment. Use the M291/M258A1 decontamination kits or damp soapy water cloths to decontaminate optical and electronic equipment and instruments.

NOTE: The M291 decontamination kit leaves a charcoal residue on surfaces.

Field studies using Herman-Nelson portable duct heaters have shown them to be effective in decontamination of chemically contaminated vehicle and aircraft interiors. However, the use of hot air decon has several drawbacks — time required, heat damage, and downwind vapor hazard. Hot air decon for a helicopter or light aircraft requires about 30 to 120 minutes to remove all the contamination.

Times are based on the amount of contamination and interior surface materials. Enough time must be provided to get the contaminated surface hot enough to allow vaporization of the agent. The Herman-Nelson discharges air at a temperature between 150 and 280 degrees Fahrenheit. Pressurized containers, such as fire extinguishers, must be removed prior to start of hot air decon. These items will fail catastrophically and could cause severe damage. The heat will also damage sensitive electronic equipment. Additionally, chemical agents irreversibly bind to many materials, particularly gaskets, vinyl coatings, seat belts, and seat cushions. These items should be removed since they cannot be decontaminated. Hot air decon does not destroy the agent. The air exiting the aircraft contains hazardous levels of the chemical agent. A downwind exclusion area of about 150 meters must be designated to prevent unwanted casualties.

While hot air decon is an alternate to using hot, soapy water or individual decon kits, the technique has many drawbacks. Maintenance personnel must be consulted prior to using this technique to ensure the aircraft is not damaged by the heat.

WARNING

Personnel should not be in the aircraft during this operation. Soldiers in MOPP4 are more prone to heat injury.

For radiological contamination, use a AN/PDR-27-series or AN/VDR-2 radiac meter to determine the extent and location of contamination inside the aircraft. If there is contamination, determine the intensity of the contamination inside of the aircraft. If the contamination has an intensity greater than 0.33cGy (the negligible risk), the interior of aircraft must be decontaminated. Use hot, soapy water to wash the contaminated areas. Use a sponge to mop up the water and the contamination.

Station 4, Rinse

The objective of this station is to remove the decon solution from the aircraft. Spray the aircraft with water from top to bottom. Take care not to damage the skin of the aircraft. This station will use approximately 250 gallons of water. Failure to remove all the decon solution from the aircraft's skin may cause corrosion.

Station 5, Check

The objective of this station is to check the completeness of the decon. This station will determine if the aircraft 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 aircraft, it will be recycled to station 2 for chemical contamination or station 1 for radiological contamination.

Chemical. Use the CAM 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, use M8 detector paper 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 aircraft has significant contamination remaining, recycle the aircraft. 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/PDR-27-series or AN/VDR-2 radiac meter to determine if any contamination remains. If contamination remains, determine the intensity of the contamination inside and outside of the aircraft. If the contamination has an intensity greater than 0.33cGy (the negligible risk), recycle the aircraft to station 1.

Recycle Criteria

The commander, in conjunction with the chemical unit leader, establishes the recycle criteria before the start of decon operation. The recycle criteria determines which aircraft are returned to station 2 after contamination is detected at station 5. If the unit has sufficient time and resources are available, any aircraft having more contamination than a negligible risk should be recycled. However, time and resources are usually limited and not all aircraft can be recycled.

Decon Site Configuration

Decon and smoke/decon platoons establish detailed aircraft decon sites in a similar manner. This section describes the optimum setup configuration. The equipment and personnel requirements are identified in Table 7-3. Chemical units can establish other conjurations based on METT-T.

It may not be possible, for a variety of reasons, for a chemical platoon to use the optimum layout configuration. Limited personnel or equipment will affect the layout of the thorough aircraft decon site. The platoon leader will use METT-T and the concepts outlined in this chapter to establish a DAD station within his capabilities.

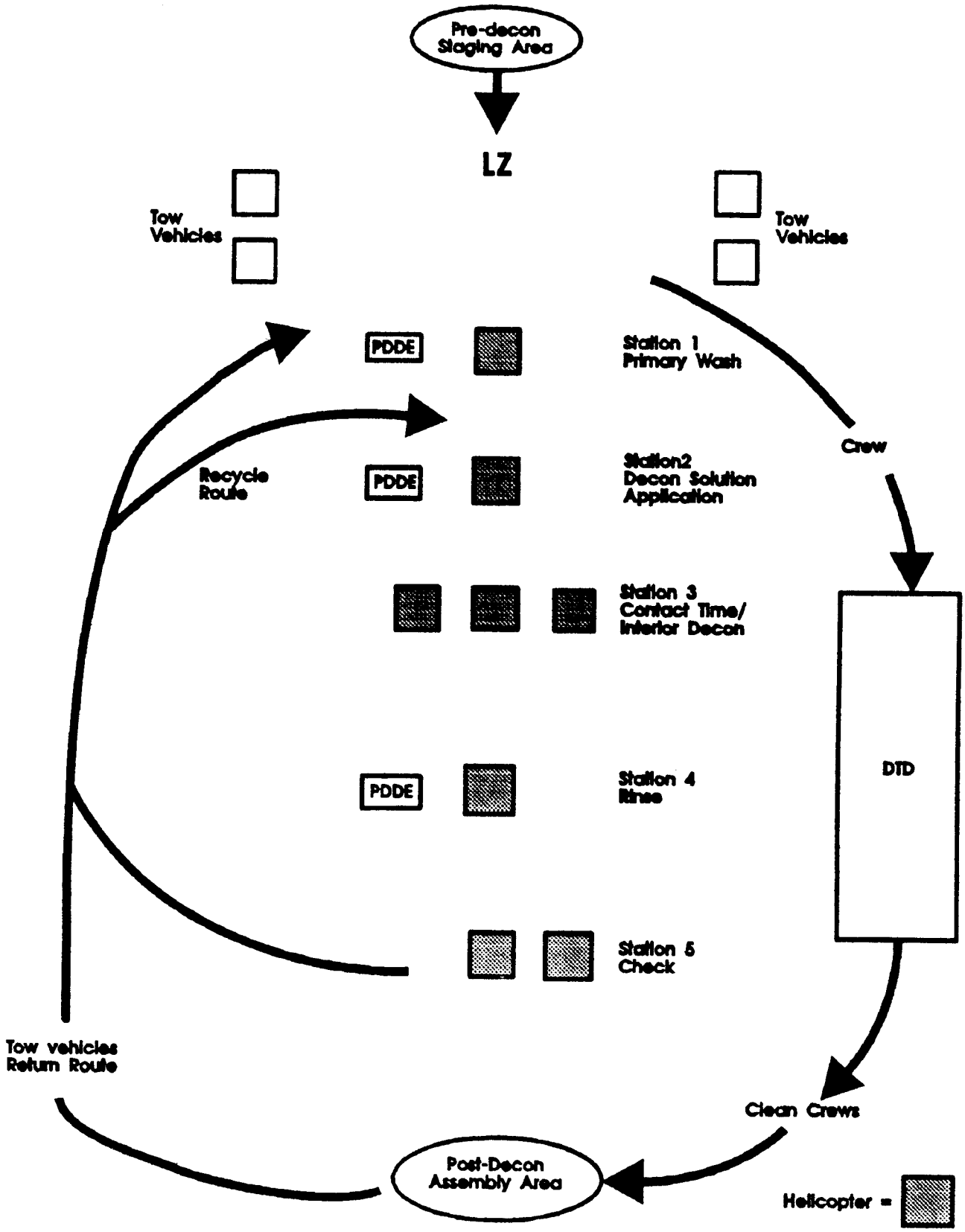


Figure 7-2. Optimum layout configuration of a detailed aircraft decon station.

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 aircraft. Failure to initiate a work/rest cycle could result in heat casualties and mission failure.

Table 7-3. Personnel and equipment requirements for optimum DAD setup

	Personnel		Equipment
	Decon Plt	**Augmentee**	
Station 1 Initial Wash	1 squad leader 1 PDDE operator 2 sprayers	2 scrubbers	1 PDDE 1 3,000-gal tank 2 65-GPM pump 6 long-handled brushes 5 TAP aprons Liquid detergent
Station 2 Decon Solution Application	1 squad leader 2 appliers 2 sprayers 1 PDDE operator	4 appliers	1 PDDE 18 long-handled brushes 9 mops with extra mop heads 3 30-gal containers Sufficient sodium carbonate solution
Station 3 Wait/Interior Decon	1 NCO (CAM operator)	2 interior decon assistant	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 stop watch 1 CAM
Station 4 Rinse	1 squad leader 1 PDDE operator 2 sprayers		1 PDDE 1 3,000-gal tank 3 65-GPM pump 1 TPU 2 TAP aprons
Station 5 Check	1 NCO 2 CAM operators		2 CAM 10 M256A1 20 M8 detector paper 2 AN/VDR2 or AN/PDR27() 2 M8A1 chem alarms
C^2	1 Platoon leader 1 Platoon sergeant		1 HMMWV/CUCV w/radio 3 NBC marking kits
Aircraft Moving Team		6 drivers 18 ground guides	6 HMMWV/CUCV 6 Aircraft tow bars
Total Personnel	20	32	

Operation of the Thorough Aircraft Decon Site

The chemical platoon establishes the aircraft thorough decon site prior to the arrival of the contaminated aircraft. The supported unit will provide the necessary augmentation to operate the DAD station. The supported unit will also setup and operate the DTD station. The supported aviation unit must provide a C^2 element to control the flow of aircraft into and out of the DAD.

All contaminated aircraft fly and land at the predecon staging area. The supported unit is responsible for clearly marking this area and controlling the arrival and departure of all aircraft from the area. Contaminated aircraft fly at maximum airspeed for as long as possible while moving to the predecon staging area. The increased air flow increases the amount of chemical agent that evaporates prior to the start of decon operations. This may reduce the resources necessary to decontaminate the aircraft.

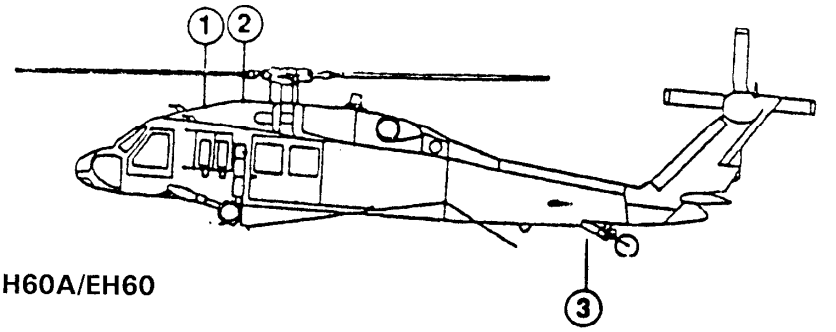
Once the chemical platoon is ready to accept aircraft, the supported unit will send the first contaminated aircraft to the landing zone just downwind from Station 1. The aircraft lands and shuts down. The crew exits the aircraft and proceeds to the DTD. Once the aircraft's crew has exited, a towing crew tows the aircraft to Station 1. The tow vehicle will also be processed at each station to prevent the spread of contamination throughout the decon station.

The aircraft will be towed from Station 1 through Station 5 to the clean assembly area. The tow crew releases the aircraft and proceeds to LZ. After completing DTD procedures, the crew links up with their aircraft. Once the aircraft is ready for flight, the supported unit clears the aircraft for movement to the designated assembly area. The supported unit is responsible for controlling the fight of all aircraft in and around the decon site.

Once all contaminated aircraft are processed through the DAD, the chemical platoon will close the DAD using the procedures outlined in Chapter 4.

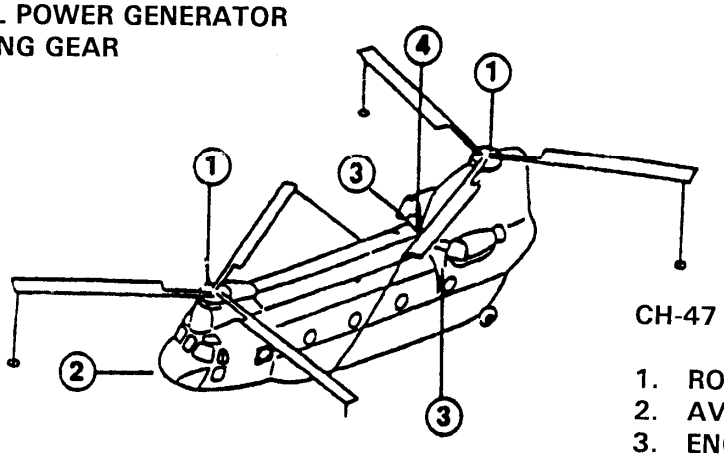
Selection of Aircraft Decon Sites

Operational and thorough decon sites for aircraft must be selected with care. The decontamination area must be able to accommodate the required number of aircraft, have a readily available water source, and allow for adequate drainage. The site should be relatively secure, but close enough to the forward line of troops (FLOT) area of operations and FARP to allow for a reasonably quick turn-around of aircraft. The site must not have an angle of slope exceeding the capabilities of the aircraft assigned to the unit. Tentative decon sites should be considered and integrated into the tactical plan.



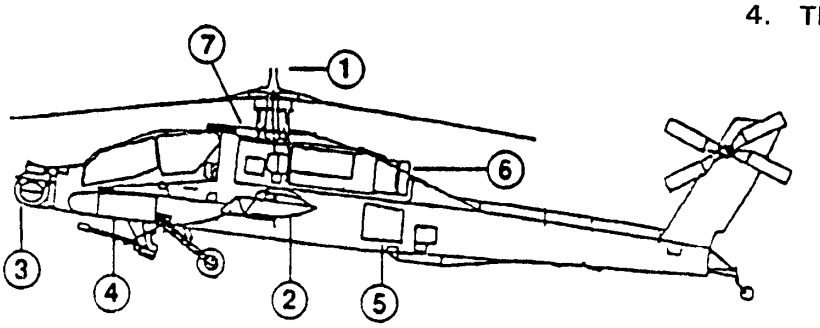
UH60A/EH60

1. FLIGHT CONTROL AREA
2. ELECTRICAL POWER GENERATOR
3. TAIL LANDING GEAR



CH-47

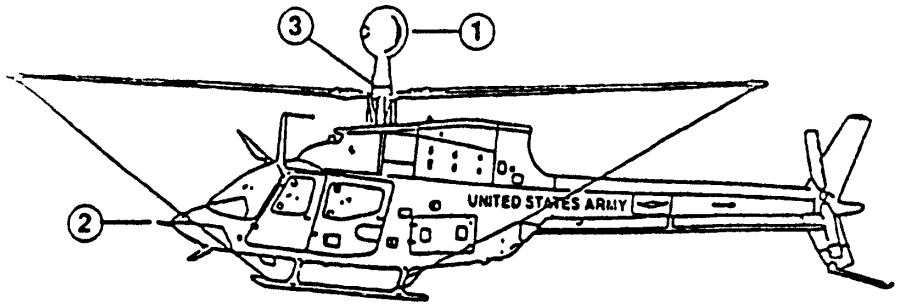
1. ROTOR SYSTEM
2. AVIONICS
3. ENGINE
4. TRANSMISSION



AH-64

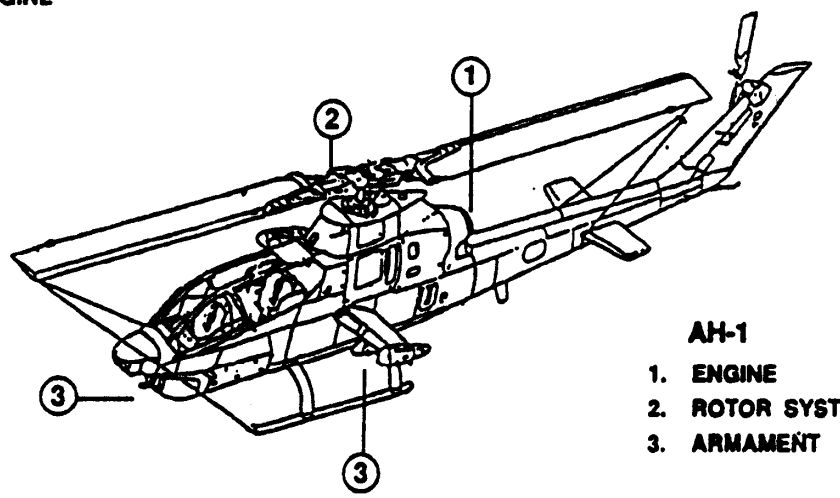
1. AIR DATA SENSOR AND MAIN ROTOR TRANSMISSION
2. PILOT TUBE
3. TADS-PNVS TURRET
4. FORWARD AVIONICS BAY ACCESS DOOR
5. NACELLE DOOR ASSEMBLY/COMPLETE NOSE GEARBOX
6. ENVIRONMENTAL CONTROL UNIT (ENCU)
7. INFRARED COUNTER MEASURE DEVICE

Figure 7-3. No direct water pressure areas.



OH-58

1. ADDITIONAL SPECIAL DEVICE
2. AVIONICS
3. ROTOR SYSTEM/ENGINE



AH-1

1. ENGINE
2. ROTOR SYSTEM
3. ARMAMENT

UH-1

1. AVIONICS
2. ROTOR SYSTEM
3. ENGINE

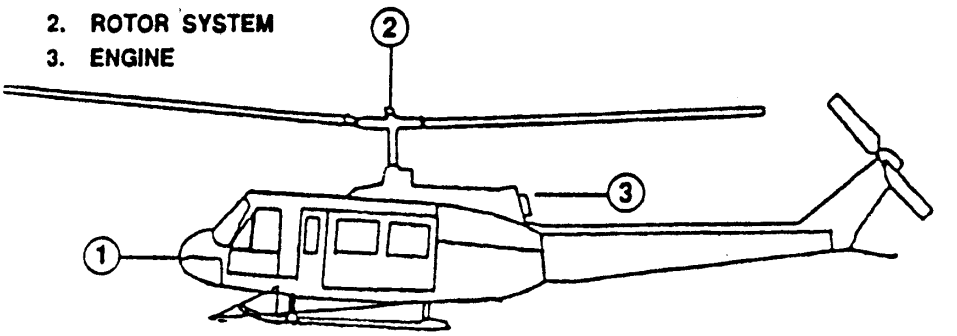


Figure 7-3 (continued). No direct water pressure areas.