Chapter 8

Maintenance

Time is the critical factor when performing maintenance functions in time of combat. In a war, maintenance units will not be able to perform all necessary repairs. Instead, they must perform all nomnission capable repairs in the time available. Contamination allows fewer repairs in the available time. Contamination hazards require protection, protection hinders efficiency.

Repair Problems

Under ordinary battle conditions, maintenance officers must decide which repairs will best support the battle. Mechanics must perform battle damage assessment (BDA) to determine whether to repair, recover, cannibalize, or evacuate equipment.

Contamination complicates this in two ways. First, the mechanics may need to wear MOPP4 during assessment and repair. Second, the equipment may need to be decontaminated before the repairs are made. These actions take extra time. Maintenance officers must decide the level of protection needed and whether repairs are possible. If repairs cannot be done at organizational level, the equipment must be evacuated to direct support (DS) maintenance.

The problems caused by contamination make it doubly important that maintenance units protect themselves. When possible, maintenance activities should occupy protected areas such as underground garages or concrete buildings. Such areas provide some cover from liquid chemical agents and shielding from radioactive contamination. Remember, however, that closed spaces concentrate and hold vapor hazards. If nothing better is available, use tents as protective covers for fallout and persistent agents.

Maintenance sections may not get directly attacked with chemical contamination. However, they still must take precautions because of the contaminated equipment they must repair. Oil, grease, and dirt seriously degrade the protective qualities of the chemical overgarment. Mechanics should keep themselves clean. Keep extra overgarments on hand to replace dirty ones. Wet weather gear helps keep overgarments clean, but heat buildup increases and the overgarments eventually will be penetrated. Using the protective gear and wet weather gear together provide good (but extremely hot) protection from mixtures of toxic chemical, grease, and oil contamination. The fuel handler's aprons can also provide added protection.

Petroleum products tend to trap chemical contaminants. A vehicle safe for an operator to use without MOPP4 protection may be unsafe for a mechanic to repair. Chemical contamination is also likely to collect in bolt threads, hydraulic fluids, and closed assemblies. A mechanic who breaks open an air falter, for example, might be exposed to hazardous concentrations of chemical vapor. Therefore, unless all repairs and preventive maintenance to contaminated vehicles are done in MOPP4, casualties are a probability.

Unit Level

Three guiding principles control or limit spread of contamination at the organizational level:

- Do not spread contamination.
- Avoid too much decon.
- Use the contaminated to repair the contaminated.

Do Not Spread Contamination

Do not spread contamination to clean areas. Do not bring contaminated equipment into a clean shop. Maintenance teams should make every effort to repair contaminated equipment where they find it, or they should repair it in an already contaminated facility. Return repaired (but contaminated) equipment to contaminated units when possible. Even if equipment has gone through deliberate decon, it still maybe hazardous to handle. A previously contaminated unit conducts periodic contamination checks and uses the equipment safely because of the precautions they take. Contaminated equipment and tools must be stored at a location safely downwind of clean areas.

Every effort should be made to control the spread of contamination. Decontaminate vehicles and equipment before they are evacuated to the rear. Mark the vehicles with the date, time, and decon techniques. The purpose of the decon is to avoid spreading the contamination. Some

commands may wish to set up a consolidated evacuation decon point for this purpose. Direct support maintenance should still treat all customer equipment coming from a contaminated area as though it were contaminated.

Avoid Too Much Decon

Maintenance facilities may receive equipment that has undergone some form of decon, but that probably still has enough residual contamination to be a hazard to mechanics. Therefore, equipment that is clean enough to be a negligible risk to its crew may remain contaminated enough to be dangerous to unprotected mechanics. Mechanics may need to wear a mask and rubber gloves when they repair equipment.

Maintenance facilities should not attempt to decontaminate more than that done during thorough decon. Grease, oil, hydraulic fluids, and seals are very hard to decontaminate. They probably will be replaced during maintenance operations anyway. Protect mechanics by using appropriate levels of MOPP. Use detection equipment to identify what is contaminated and what is not. MOPP levels can be adjusted, based on the extent of the contamination. Decontaminate only what is needed to minimize contamination spread.

Use the Contaminated to Repair the Contaminated

It may be difficult to decontaminate equipment well enough to present only negligible risk to mechanics. So, it may be impractical or unnecessary to decontaminate tools and equipment constantly being used. Segregate tools and equipment used to repair contaminated equipment from other tools. Use contaminated tools to repair contaminated equipment. This is the same principle a maneuver unit would use operating in a contaminated area. It would be pointless to conduct thorough decon if the unit expects to get contaminated again. It would be better to use operational decon while constantly in contact with contaminants.

Suppose chemical attacks have begun. A battalion maintenance section has not been contaminated, but must now support a contaminated company. They must send a maintenance team forward to repair or recover a vehicle. The team must be in MOPP4. They must test the equipment for contamination. The testing must be continuous. Vapor hazards may not be present in open terrain, but as soon as the vehicle is moved into an area where air does not circulate, vapor hazards may concentrate.

If contamination exists, the maintenance team must decide whether or not they can make the repairs in MOPP4. If they cannot, the equipment must be evacuated. Spray down any surfaces the team must touch either to repair or to recover the vehicle. Use an on-board decon apparatus (such as Mll or M13). This will not reduce the level of MOPP needed by the team, but it will offer additional protection and limit contamination spread. Maintenance teams must carry one each extra on-board decon apparatus (such as Mll and M13) for this purpose or bulk decontaminant and cylinders to refill decon apparatuses. This helps limit transferring liquid contamination from the recovered equipment onto the soldiers and equipment of the recovery team.

Equipment and tools used for contaminated maintenance should be left contaminated. Use rags to wipe off only the gross contamination. Dispose of the rags. Maintenance teams may go through a MOPP gear exchange or detailed troop decon, but their equipment should be left alone. It might not be cost effective to constantly decontaminate tools if MOPP levels cannot be lowered. So, it might suffice by wiping gross contamination off tools rather than to attempt extensive decon.

A determination should be made with the hazards remaining as to how much decon is practical. A fresh team can utilize contaminated tools on other contaminated equipment. This means you must rotate your maintenance teams often. Fresh teams relieve contaminated teams who move back and undergo detailed decon. After a rest, the fresh team moves forward and relieves the contaminated team.

Unit and Intermediate Maintenance

Unit and intermediate (direct support and general support (GS)) maintenance should treat contaminated equipment the same. There are four guiding principles:

- Inspect all equipment for contamination.
- Segregate equipment.
- Provide protection from contaminated equipment.
- Mark equipment to protect others.

Inspect all Equipment for Contamination

Once nuclear, biological, or chemical attacks have occurred within the maintenance support unit's area of responsibility, the unit must assume that all the equipment it receives is contaminated. The unit must setup an inspection and decon point to conduct battle damage assessment.

All vehicles, personnel, and supplies must pass through this inspection point before they enter the maintenance area. Here, inspectors in MOPP4 use Herman-Nelsons (and other heaters or torches) to warm equipment while they check it for contamination. Vapor hazard from liquid contamination may be undetectable at 65°F (18°C) in the open; yet it can become lethal at 80°F (26°C) or when brought into closed areas. Biological contamination may not be detectable.

NOTE: The falter systems for vehicles or equipment exposed to any NBC environment must be considered contaminated. Therefore, mask and wear gloves for protection against possible vapors or contaminated dust.

Assume contamination is present if the equipment came from an area known to have been contaminated. Radiacmeters will easily detect radiological contamination.

Identify both organic and unit contaminated vehicles with the standard triangular contamination sign in the vicinity of the driver's compartment. The sign should be visible from the outside of the vehicle and maybe removed only by a designated inspector at DS or GS maintenance. Mark nonvehicular equipment in a similar manner in a conspicuous place.

Segregate Equipment

The inspection team must segregate the equipment. Uncontaminated equipment can go straight to the maintenance holding area. The maintenance officer must choose to do one of two things with the contaminated equipment – let it weather or decontaminate it.

For weathering, the contaminated equipment must be marked and placed in a holding point. Waiting for equipment to weather before repair may be a luxury a commander cannot afford.

The second choice is to decon. Before any repairs are made, the equipment should go through thorough decon. Decontaminate priority equipment first. This requires coordination between maintenance and operational staffs. Decontaminate only if it is worthwhile.

Provide Protection from Contaminated Equipment

At present, the Army's ability to detect contamination in the field has improved and expanded, but is still limited in detecting some chemical and biological agents. Even after decon, maintenance teams must take precautions against vapor hazards trapped by oils or held inside closed assemblies to ensure they will not appear at some point during the maintenance process.

Because decon cannot guarantee safety for unprotected mechanics, the maintenance officer must decide what MOPP level the mechanics should use. This is a tactical decision. Mechanics should use MOPP levels consistent with the threat and the mission. Decon provides additional protection for the mechanics and prevents contamination from spreading when the equipment is returned to the battlefield.

Safeguards must be taken to protect people inside and outside of contaminated areas. The checkpoint, decon site, any contaminated runoff from the decon site, and any contaminated holding areas should be downwind of the maintenance area. Contaminated runoff from the decon site must be directed to a sump marked as contaminated. Observe chemical decon personnel for signs or symptoms of chemical poisoning.

Radiological decon personnel should wear a dosimeter and be closely monitored for radiation exposure levels. They should avoid exceeding safe exposure levels. The amount of radiological contamination tolerable depends on OEG and the tactical situation. When the highest acceptable levels are reached, replace personnel, mission permitting.

Priorities for monitoring equipment should go to the decon point, if needed. One radiacmeter should go to company headquarters and the rest to the maintenance teams.

Use chemical agent detection equipment while contaminated equipment is being repaired. If contamination is detected after an assembly is opened, the assembly can be quickly decontaminated by flushing with diesel or motor gasoline (MOGAS). Mark it and take it to the contaminated holding area where it can weather or undergo more thorough decon. Either wait until the assembly no longer gives off vapor or replace it with a new assembly. The fuel used for flushing the chemical agent from the assembly also must be marked contaminated and dumped in the contaminated sumps at the decon site, burned, or buried. Maintenance personnel periodically should withdraw to a clean area for decon and rest.

Mark Equipment to Protect Others

Combat may make it necessary to place repaired equipment still contaminated with units that are not contaminated. Equipment that has been decontaminated to negligible risk levels for operators and crews probably will present a real hazard to mechanics. They must know that the equipment has been contaminated. Place the standard NBC markers on the driver's side of the contaminated vehicles, the marker must be visible so it can provide an early warning to the mechanics and protection can be assumed accordingly. However, small items such as Class IX repair parts that are exposed to chemical contamination and will pose vapor hazard should be tagged with the NBC hazard warning tag (see Figure 8-1). The tags can be obtained through the logistic channel, NSN 9905-00-537-8955. The tags are moisture and waterproof. The front of the tag lists the type of hazard. The reverse carries decon information. Weathering will gradually decontaminate the equipment, but until this has been verified by a detailed inspection, the NBC contamination marker must remain on the equipment.

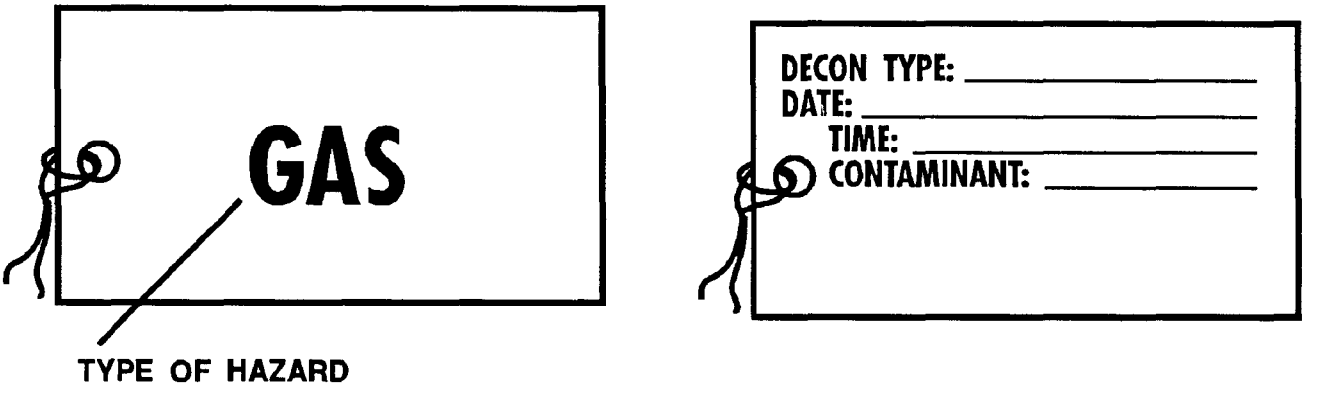

Figure 8-1. NBC hazard warning tag.

Effects of DS2 on Grease

The procedures for DED involve application of DS2 to neutralize chemical agents. DS2 deteriorates lubricants contained in fittings and seals. This suggests that vehicle or equipment operators must lubricate their equipment after a thorough equipment decon operation. The lubricant order indicates the lubrication points and type of lubricants required. Refer to this when you lubricate equipment

Unit and intermediate maintenance level personnel conduct a visual inspection of the seals and/or fittings for damage. If damage or deterrants are detected, rinse seals and fittings with solvent, then relubricate.

Maintenance crews must wear protective clothing when working on such equipment because of the possibility of residual contamination.