Department of the Army
Pamphlet 700–48

Logistics

Handling Procedures for Equipment Contaminated with Depleted Uranium or Radioactive Commodities

Headquarters
Department of the Army
Washington, DC
27 September 2002

UNCLASSIFIED

SUMMARY of CHANGE

DA PAM 700–48
Handling Procedures for Equipment Contaminated with Depleted Uranium or Radioactive Commodities

This revision, dated 27 September 2002--

- Updates office through out.
- Removes the obsolete publication, AR 385-11.
- Adds technical references TM 3-6665-343-10, TM 3-6665-321-12&P,and TB 3-6665-321-30.

This new Department of the Army pamphlet, dated 3 December 1999,--

- Delineates actions as a result of combat and non-combat situations (chap2).
- Prescribes guidance for conducting surveys and decontamination of Army fielded radioactive commodities (chap 4).
- Prescribes guidance for handling foreign equipment that may be contaminated (chap 5).
- Describes the functions of the Army Contaminated Equipment Retrograde Team (ACERT).

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Logistics

Handling Procedures for Equipment Contaminated with Depleted Uranium or Radioactive Commodities

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the Secretary of the Army

History. This publication is an administrative revision. The portions affected by this administrative revision are listed in the Summary of Change.

Summary. This pamphlet prescribes handling procedures for equipment contaminated with Depleted Uranium (DU) and/or other low-level radioactive materials. The policies and procedures regarding the management of contaminated equipment are prescribed in AR 700-48.

Applicability. This pamphlet applies to Department of the Army (DA) commands, installations, and activities. This includes the U.S. Army Reserve (USAR) and the Army National Guard of the United States (ARNGUS). This pamphlet remains applicable to DA personnel deployed to either humanitarian or peacekeeping missions where the degree of readiness to respond to hostile fire requires the availability of radioactive commodities, such as depleted uranium ammunition, as a contingency.

Proponent and exception authority. The proponent of this regulation is the Deputy Chief of Staff, G–4. The DCS, G–4, has authority to approve exceptions to this regulation that are consistent with controlling law and regulation. The DCS, G–4, may delegate this approval authority, in writing, to a division chief within the proponent agency in the grade of colonel or the civilian equivalent.

Suggested Improvements. Users are invited to send comments and suggested improvements to this regulation. Internet users can send in comments and suggested improvements through the electronic Department of the Army DA Form 2028 (Recommended Changes to Publications and Blank Forms) found within the DCS, G–4, regulations and pamphlets. Anyone without Internet access should submit comments and suggested improvements on DA Form 2028 directly to Director, U.S. Army Logistics Integration Agency, ATTN: LOIA–AP, 5001 Eisenhower Avenue, Alexandria, VA 22333–0001.

Distribution. This publication is available in electronic media only and is intended for command level B for the Active Army, the Army National Guard of the United States, and the U.S. Army Reserve.

Contents (Listed by paragraph and page number)

*This publication supersedes DA Pamphlet 700–48 dated 3 December 1999.

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Contents—Continued

Contents—Continued

Glossary

Chapter 1
Introduction

1–1. Purpose
This pamphlet provides specific guidance on the handling of U.S. and foreign equipment that may have been contaminated with radioactive materials as a result of DU munitions/armor or damaged radioactive commodities.

1–2. References
Required and related publications and prescribed and referenced forms are listed in appendix A.

1–3. Explanation of abbreviations and terms
Abbreviations and special terms used in this pamphlet are explained in the glossary.

1–4. Deviations
a. Limit deviations to those from Army standards and procedures. Deviations from Federal and DOD regulations and standards are not authorized.

b. The following personnel may authorize deviations from Army standards and procedures.

(1) Each MACOM commanding general.

(2) The Superintendent, U.S. Military Academy.

(3) The Chief, National Guard Bureau (NGB). (The Chief, NGB may delegate deviation authority to the State Adjutant Generals.)

c. Only personnel listed in paragraph b may approve residual risk levels deemed to be too high or extremely high. Authority to accept residual risk will be IAW FM 101-5. For the purpose of this regulation, the personnel listed in paragraph b are considered MACOM commanding generals.

d. Grant deviations for one year or less. The respective approval authority may approve deviation renewals provided conditions cited in the original deviation remain the same.

e. Any accident or mishap occurring under an approved deviation will cause automatic termination of the approval until the respective approving authority completes an investigation and revalidates the deviation.

1–5. Policy
Damaged and undamaged Radiologically Contaminated Equipment (RCE) requiring retrograde will be processed consistent with a commander's assessment of conditions and risks in such a manner as to maximize individual safety and maintain radiation exposure to As Low As Is Reasonably Achievable (ALARA) levels.

1–6. Summary for Commanders
a. The Commander will assume responsibility for risk management based upon the Commander-in-Chief's (CINC's) assessment of the risks posed by the operation and the guidance and policies in this regulation.

b. In peacetime, comply with the Nuclear Regulation Commission (NRC) license requirements and all applicable federal, state, Army, and host nation laws (including status of forces (SOFA) agreements), regulations, and policies regarding radioactive materials and contaminated equipment.

c. Emergency medical considerations outweigh radiological contamination concerns. The health and safety of the individual is the primary concern. The condition of injured personnel should be assessed and stabilized prior to considering any decontamination operations.

d. In general, commanders—

(1) Should take prudent measures to keep radiation exposures to all personnel as low as is reasonably achievable consistent with the operational risks.

(2) Ensure that personnel who handle radioactive materials or come in contact with RCE will receive adequate training as specified in paragraph 2-3, AR 700-48, and be trained in the contents of this Pamphlet.

(3) Should make sure that personnel will be monitored during and after working with RCE and retrograde operations.

e. Local commanders will establish accident response teams. Commanders at all levels (including installation) should utilize the trained chemical, medical and maintenance personnel that are on their staffs to formulate response plans for radiological incidents and accidents.

Chapter 2
Essential Concepts
Commanders must appoint a Radiation Safety Officer/Radiation Protection Officer/Radiation Protection Staff Officer/ Radiation Control Officer (RSO/RPO/RPSO/RCO) at the appropriate unit level. Personnel handling RCE incur a risk of

exposure to and contamination from radioactive materials. Proper radiation safety oversight is essential to minimize personnel exposure potential and to ensure proper follow up after the incident is over. In addition to the precautions outlined in this pamphlet personnel handling RCE will ensure that trained personnel conduct radiation safety monitoring. Such monitoring will include as a minimum, surveys of personnel and equipment used and bioassays to document any exposure by RCE handlers. Consult appendices B, C, D, and E for further information regarding this requirement.

2–1. Risk Management

The risk management process per FM 101-5 will be utilized by commanders throughout the entire retrograde process to ensure that the needs for mission accomplishment, protection of personnel, and proper handling of the contaminated equipment are balanced. This should include:

a. Health Risk Assessments to the degree applicable to the operational environment.

b. Safety Risk Assessments in conjunction with Mission, Enemy, Terrain, Troops, Time (METT-T).

c. Guidance in this pamphlet and AR 700-48.

d. If there is no immediate need to operate or otherwise tamper with RCE, do not do so. The commander determines if RCE will be operated. If operated, workers should be made aware of the risks involved. Action should be delayed as much as possible until appropriate responders can arrive.

2–2. Combat Situations

Contamination from low level radioactive materials will not, in most cases, hinder the use of vehicles and equipment in combat. If otherwise combat ready, RCE should be used to address an imminent threat or other urgent situation. Attention should be devoted to monitoring personnel and decontaminating RCE after the mission is completed. Additional handling guidance is listed below for the various steps through which RCE must pass on the way to ultimate disposition. See Chapters 3 and 4 for more specific information.

a. Phase I—IMMINENT THREAT. Imminent Threat includes combat and incidents like fires, spills, or accidental releases involving radioactive materials and mixed waste.

(1) The commander will include operational exposure guidance into all phases of the RCE handling operations using the appropriate operational exposure guidance (see ACE Directive 80-63, FM 3-3-1, Joint Pub 3-11, and TB 9-1300-278).

(2) Vehicles radiologically contaminated from RCE that are otherwise mission ready should be used in an imminent threat situation.

(3) It is critical that radiological contamination incidents or RCE is reported as soon as possible after the situation stabilizes (especially to Battle Damage, Assessment and Repair (BDAR) organizations) to facilitate proper follow up.

b. Phase II—RECOVERY. Recovery includes battlefield damage assessment and repair.

(1) RCE should be recovered separately from non-contaminated material.

(2) All material and work equipment suspected of being radiologically contaminated will be treated as RCE until such a time as it is identified as clean. Work equipment will not be removed prior to a radiological survey.

(3) Recovery personnel should exercise caution while handling damaged material because of unexploded ordnance or contamination. Damaged or destroyed Abrams series Tanks, Bradley Fighting Vehicles, and other vehicles may contain unexploded or damaged ordnance. This ordnance, which may or may not be in its normal configuration, should be handled with extreme caution. Only personnel trained and qualified in explosive operations handling will move or handle these munitions. FAILURE TO FOLLOW THIS GUIDANCE COULD RESULT IN SERIOUS INJURY.

(4) As the equipment is inspected, the appropriate protective equipment should be worn especially if the BDAR mission requires entering systems that have been hit by depleted uranium rounds.

c. Phase III—EVACUATION. Evacuation is the process of physically moving contaminated and damaged material to a collection point or maintenance facility that will perform a more detailed damage assessment and/or repair the material.

(1) Recovery personnel should ensure that the Maintenance Control Point (MCP) is informed of the presence of radiological contamination on the equipment.

(2) Prior to movement, RCE should be covered and wrapped with canvas or plastic tarp to prevent spread of contaminants, personnel exposure, and ensure operational security of classified components during transport.

(a) Double-bag in plastic bags and prominently mark suspected radioactively contaminated items.

(b) Mark the bag with the following information: date, time, location of bagging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. See appendix C for more information on proper record keeping.

(3) All recovered items should be initially transported to a unit maintenance collection point (UMCP). The higher level MCPs may be in battalion, brigade, division, or corps support areas.

d. Phase IV—RETROGRADE. Retrograde of damaged RCE includes consolidating, cannibalizing, and otherwise assessing the contaminated equipment for disposition or further evacuation. See Figures 2-1 through 2-3 for retrograde process flow diagrams, and associated unit/command actions and functions for contaminated equipment.

(1) The Army Contaminated Equipment Retrograde Team (ACERT) may provide on-site technical assistance for retrograde during operations, see appendix F for more information on the ACERT. The U.S. Army Radiological Control (RADCON) Team, Appendix G, and the U.S. Army Radiological Advisory Medical Team (RAMT), Appendix H, can help the ACERT perform retrograde, surveying, and decontamination of the RCE.

(2) Retrograde operations may begin further forward but should be completed at the ACERT consolidation point, if one is established. Contact higher headquarters to obtain location of the consolidation point. All damaged and contaminated U.S. material will be consolidated at this location.

(3) Maintenance personnel will complete a detailed assessment of damaged RCE, repair material, cannibalize usable material components, or initiate retrograde operations.

(4) Repairable RCE is removed, decontaminated and repaired, and the remaining material prepared for shipment out of the theater to an USAMC designated location.

e. Phase V—RECLAMATION. Reclamation includes the decontamination of material that could not be decontaminated further forward.

2–3. Non-Combat Situations

In non-combat situations, RCE should not be used until decontaminated. Steps to isolate RCE, contain any release, and protect personnel from further radioactive contamination should be the first priority when an incident occurs. Request help if needed. Abbreviated handling guidance is listed below for handling RCE in peacetime. See chapters 3 and 4 for more specific information.

a. UNIT IMMEDIATE ACTION.

(1) Leave the vehicle or move away from the equipment. If a fire, move upwind at least 100M.

(2) Contact the Unit RPO or the Unit NBC personnel about the incident and document all actions. See appendix C for guidance in preparing documentation of the incident. If additional radiological assistance is needed beyond local capability then go through the chain of command. If no other assistance is available, contact the Army Operations Center (DSN 227-0218 or commercial (703) 697-0218).

b. RECOVERY. Once qualified response personnel are involved, identify and separate radioactive contaminated items. Use protective clothing and equipment as prescribed.

(1) "Double-Bag and Tag" the suspected items. On the bag mark the following information date, time, location of bagging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. See appendix C for more information on proper record keeping.

(2) Stay out of vehicles until cleared by radiation survey personnel.

(3) Ensure personnel handling RCE are monitored for radiation exposure.

c. EVACUATION. Transport RCE to a radioactive material collection point, established and operated at the command designated maintenance facility.

(1) Recover separately from non-contaminated material.

(2) Treat all material suspected of being radiologically contaminated as RCE until such a time as it is identified as uncontaminated. Work material and equipment will be considered RCE until properly decontaminated.

d. ROGRADE. Assess items identified as contaminated by radioactive material for the purpose of determining if the item can be decontaminated and then released for use; decontaminated and/or utilize per AR 750-1; or packaged appropriately as radioactive waste and disposed of per all relevant guidance.

(1) All radioactive commodities described in appendix I will be immediately assessed as radioactive waste. Do not open such items that are already adequately packaged. If necessary for transportation, the item will be over-packed.

(2) All non-radioactive commodities that have been turned-in as potentially contaminated will be surveyed by the appropriate means (see Appendix C for General Survey Tips and Techniques), and then either decontaminated and released for use or disposal as a normal item or packaged as radioactive waste.

2–4. Requesting Assistance

Commanders will respond to all incidents involving RCE, either through organic response teams or by requesting assistance through the chain of command. If a unit is not capable of responding to an incident, higher headquarters will orchestrate the appropriate response either through command assets or by requesting outside assistance. See appendices E, F, G and H as sources of assistance and for more detailed information regarding response capabilities and available assets.

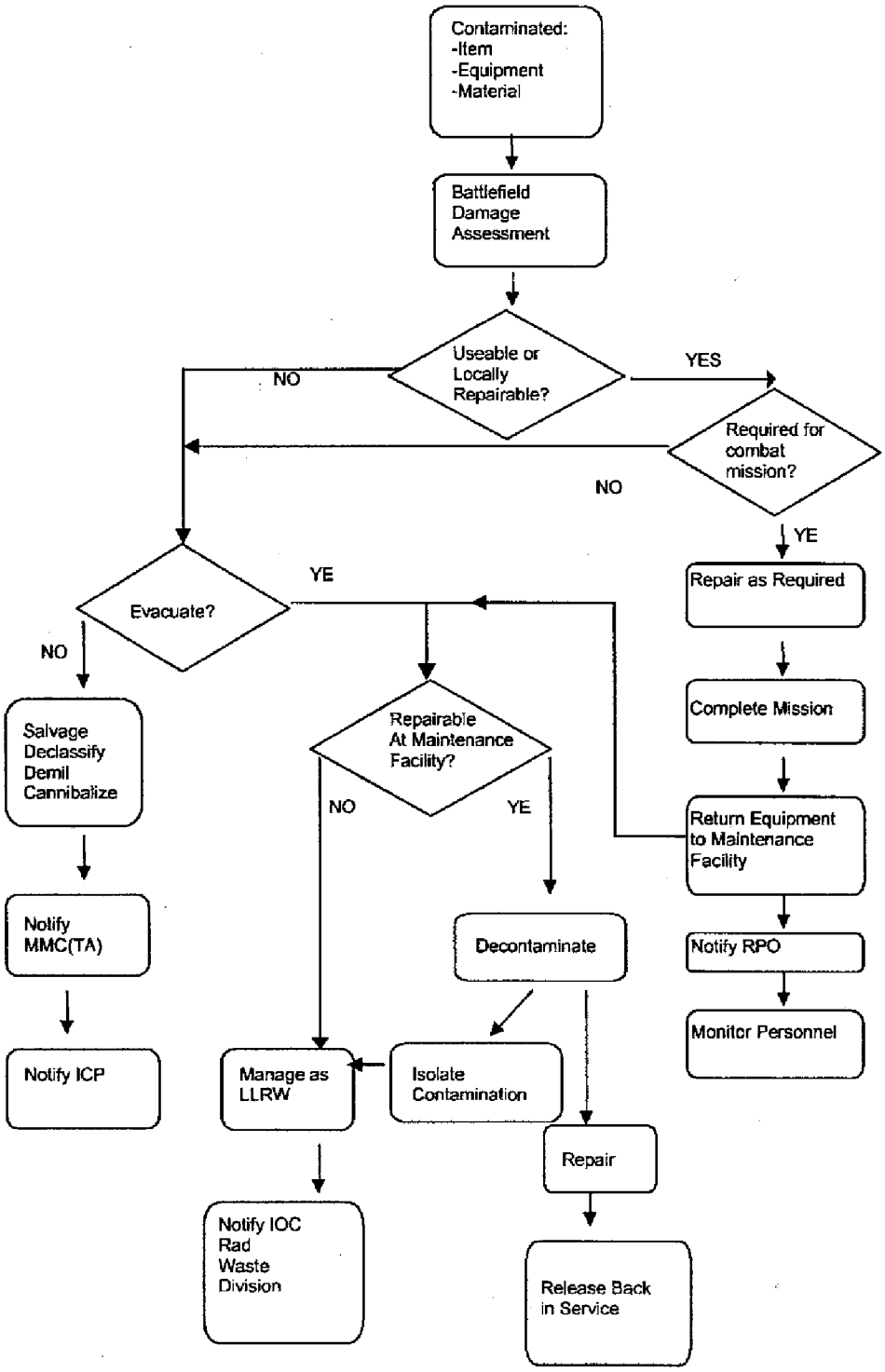

Figure 2–1. Flow Chart for Retrograde Material Condition 1

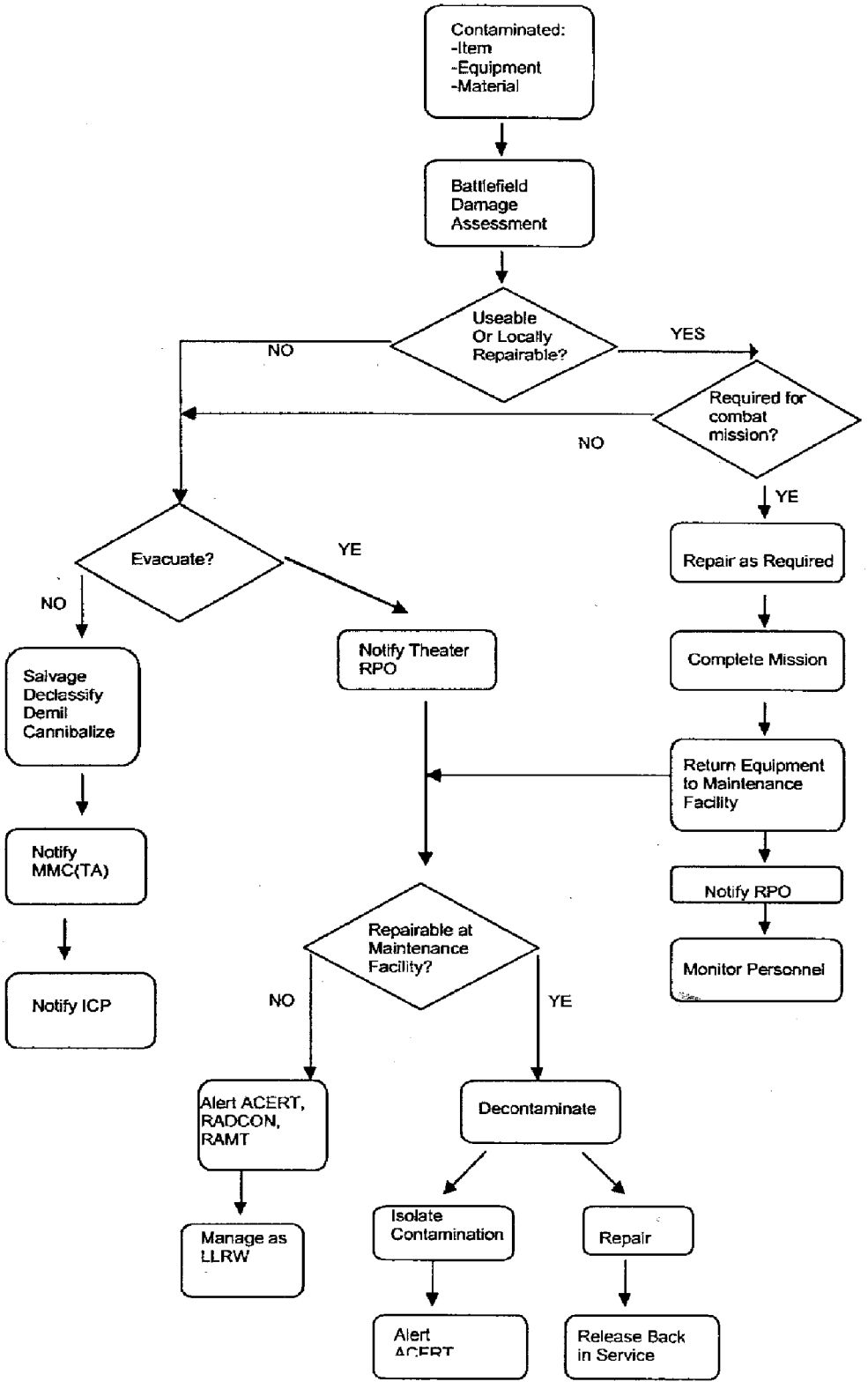

Figure 2–2. Flow Chart for Retrograde Material Condition 2

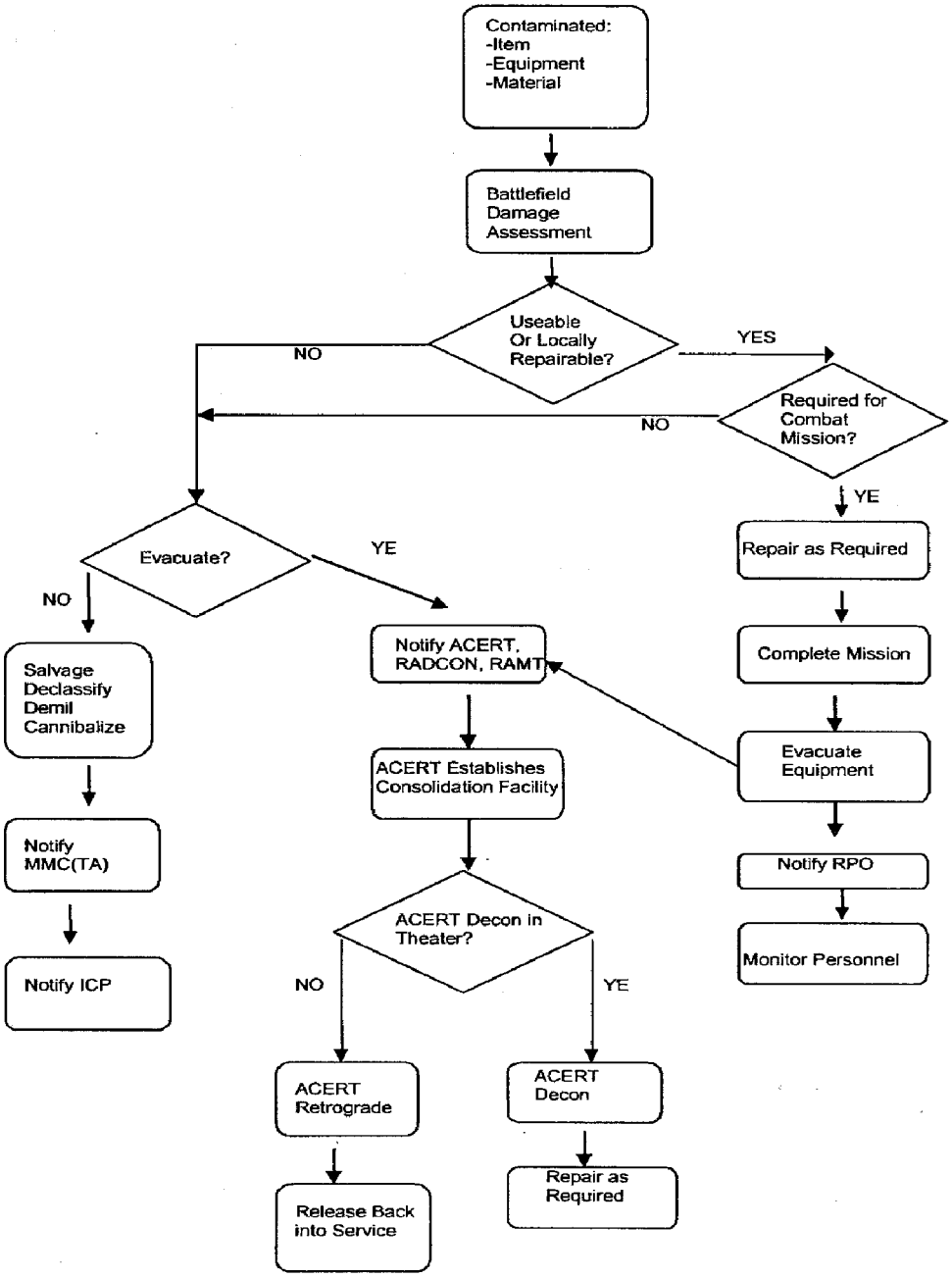

Figure 2–3. Flow Chart for Retrograde Material Condition 3

Table 2–1
Retrograde Conditions

	CONDITIONS	ON SITE PERSONNEL	LRPO	THEATER RPO	NRC LICENSEE	ACERT	RADCON	RAMT
CONDITION 1	Available on site -Expertise -Equipment -Supplies -Procedures -Capacity	Secure Site Notify LRPO Assist LRPO -Decon -Package RCE -Ship to Collection Point	Notify RPO Direct Actions -Decon -Package RCE -Ship to Collection Point	Notify Licensee Provide Technical Expertise	Notify NRC As Appropriate	Theatre Collection Point as Required Provide Requested Technical Assistance Dispose of Waste	Alert if Required	Alert if Required
CONDITION 2	Available on site -Expertise -Equipment -Supplies -Procedures -Capacity	Secure Site Notify LRPO Assist LRPO -Decon -Package RCE -Ship to Collection Point	Notify RPO Monitor Situation	Notify Licensee Direct Actions -Decon -Package RCE -Ship to Collection Point	Notify NRC As Appropriate	Theater Collection Point as Required Provide Requested Technical Assistance Dispose of Waste	Alert if Required	Alert if Required
CONDITION 3	Beyond Theater's Ability to Manage	Secure Site Notify LRPO Assist ACERT/ RADCON/ RAMT -Decon -Package RCE -Ship to Collection	Notify RPO Monitor Situation	Notify IOC & Licensee Request ACERT/ RADCON/ RAMT Assistance Provide Assistance to ACERT/RADCON/ RAMT	Notify NRC As Appropriate	Direct Actions -Decon -Package RCE -Ship to Collection Point Operate Theatre Collection Point as Required Dispose of Waste	Direct Surveys/ Risk Assessment As Needed Work with ACERT/RAMT	Direct Medical Surveys/ Radiation Exposure Monitoring As Needed Work with ACERT/ RADCON

Notes:

[1] CONDITION I – Lost, damaged, or broken individual source, captured enemy equipment containing RAM.

[2] CONDITION II – Multiple radiological sources involved, suspected personnel exposures, environmental contamination, high volumes of equipment contaminated, teams put on alert by CINC.

[3] CONDITION III – Vehicle or tank fire, mass casualties involving RAM exposure, contamination in warehouse/RAM collection point because of explosion/ fire.

Chapter 3
Depleted Uranium Contaminated Material

3–1. General

a. This chapter discusses management of RCE that is contaminated with DU. Additional guidance is included in DA PAM 40-18.

b. Proper handling of RCE will do the following.

(1) Accommodate the local situation and provide the maximum level of protection to exposed personnel.

(2) Allow safe return of RCE to units as soon as possible.

Note: See Appendices B, C and D for further information on decontamination procedures.

3–2. Combat Situations—General Guidelines

Accidents and fires can result in varying degrees of damage and contamination to vehicles and equipment.

a. In combat, hasty handling and/or decontamination of equipment may be necessary.

b. If the decision is made to re-use the contaminated vehicle due to operational necessity, then the vehicle should be decontaminated at the first opportunity. Personnel using the contaminated vehicle will wear full MOPP gear and be monitored for radiation exposure as soon as practical.

c. If the decision is made to not re-use, then tag the contaminated vehicle for removal as RCE. On the bag mark the following information: date, time, location of bagging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. See appendix C for more information on proper record keeping.

d. Do not enter the vehicle once operational necessity no longer requires it.

e. Limit the spread of contamination by covering appropriately all contamination with tape or cardboard.

f. Use the chain of command to request radiation survey assistance, if necessary. If assistance is needed beyond the local capability, contact the Army Operations Center (DSN 227-0281 or commercial (703) 697-0281). See Appendix E for further information.

3–3. Non-Combat Situations—General Guidelines

a. The handling of RCE in peacetime is different from that in combat. RCE is subject to federal, state, and, as applicable, host nation regulations and policies with respect to radiation and the environment. Therefore, RCE in non-combat situations should not be reused until checked and decontaminated as necessary. In the event of an incident:

(1) Leave the vehicle. Remain within sight, or, if there is a fire, move upwind at least 100M for non-uploaded vehicles and 2000M for uploaded vehicles (See TB 9-1300-278). Do nothing until the RPO and/or responsible authorities arrive.

(2) Call the unit RPO. Ensure the chain of command is notified to obtain any required assistance.

(3) Under the guidance and management of the RPO or other authority, perform actions to assess and contain any spill or release of radioactive materials. Refer to appendix J for the recommended maximum free release limits for radioactive contamination. Utilize proper protective equipment (see app K for information on equipment and supplies). Bag and Tag any small items or radioactive commodities used in the vehicles if possible. On the bag mark the following information: date, time, location of bagging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. See appendix C for more information on proper record keeping.

(4) After the incident has been resolved, personnel involved should be monitored for exposure to radiation.

(5) Document the incident as thoroughly as possible for future reference.

b. The RPO will ensure that the appropriate authorities are notified (NRC licensee, state, or host nation).

Chapter 4
Specific Guidelines for Radioactive Commodities Other Than Vehicles

Personnel handling RCE incur a risk of exposure to and contamination from radioactive materials. Proper radiation safety oversight is essential to minimize personnel exposure potential and to ensure proper follow up after the incident is over. In addition to the precautions outlined in this pamphlet, personnel handling RCE will ensure that trained personnel conduct radiation safety monitoring. Such monitoring will include as a minimum, surveys of personnel and equipment used and bioassays to document any exposure by RCE handlers. Consult the appendices for further information regarding this requirement.

4–1. General

This chapter provides guidance for immediate action if confronted with Army radioactive commodities that are damaged or destroyed. If there is no immediate need to operate or otherwise tamper with RCE, do not do so. The commander determines if RCE will be operated. If operated, workers should be made aware of the risks involved. Action should be delayed as much as possible until appropriate responders can arrive.

4–2. Depleted Uranium Munitions/Damaged Rounds

Unfired DU ammunition, in either an unknown or damaged condition should be handled with extreme caution. Only personnel trained and qualified in explosive operations handling will move or handle these munitions. FAILURE TO FOLLOW THIS GUIDANCE COULD RESULT IN SERIOUS INJURY. When handling unfired depleted uranium ammunition that is in an unknown or damaged condition:

a. EOD procedures should be performed, if required.

b. If ammunition appears intact, the DU is probably intact. Perform normal Technical Inspection (TI) and maintenance procedures.

c. If the ammunition appears damaged, perform wipe tests on outside of ammunition and hold wipe (in gloved hand) next to beta probe of the AN/VDR 2. If the meter reads more than twice background, contamination may be present.

(1) Treat as contaminated per the applicable ammunition TM.

(2) Tag the ammunition by marking the following information on it: date, time, location of bagging, suspected

isotope, suspected activity of the isotope, and the names of all personnel involved with the material. See Appendix C for more information on proper record keeping.

d. Perform a radiation survey of the area in which damaged systems were stored to rule out any contamination. See appendix J for recommended maximum free release limits for radioactive contamination. Use an AN/VDR-2, or an AN/PDR-77 RADIAC Meter with the beta probe to measure for any radiation levels. Levels more than twice the background indicate potential contamination. Wipe tests should be performed to definitely rule out contamination. Send the wipe tests to the Rock Island Independent Test Laboratory or to your supporting facility with a qualified laboratory. Addresses are given in Appendix E. Potentially contaminated areas should not be used for unrestricted activities until surveyed and cleared by the RSO.

e. Contact the NRC licensee (HQ IOC, address in App E) for further information.

4–3. Tritium Commodities

a. Before handling items containing tritium, such as fire control azimuths, level gauges, collimators, and muzzle reference sensors:

(1) Put on surgeon's gloves.

(2) Personnel who regularly inspect or repair tritium devices should have a baseline bioassay to measure for tritium in the urine. Contact the NRC licensee, U.S. Army ACALA (Address in App E), for further information.

b. Check the item to see if the part containing the tritium is glowing. If it is, then at least part of the tritium activity is still present. If it is not, the tritium charge is depleted-assume that the item is contaminated.

c. Place contaminated items in double plastic bags (at least 4 mil thickness). IT IS IMPORTANT NOT TO REMOVE THE ITEM FROM THE PLASTIC BAGS UNTIL THE ITEM REACHES ITS ULTIMATE DESTINATION. ENSURE THE PACKAGE CONTAINING THE ITEM IS MARKED CONTAMINATED. On the bag mark the following information: date, time, location of bagging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. See Appendix C for more information on proper record keeping.

d. Depending on the decision of the item manager, either send to the appropriate level of repair (based on the technical inspection), or turn into ACERT for disposal as radioactive waste.

e. Potentially contaminated areas should not be used for unrestricted activities until surveyed and cleared by the RSO. Perform a radiation survey of the area in which damaged systems were stored to rule out any contamination, See appendix J for recommended maximum free limits for radioactive contamination. Wipe tests should be performed to definitely rule out contamination. Send the wipe tests to one of the laboratories listed in Appendix E, or to your supporting facility with a qualified laboratory.

f. In CONUS, contact the NRC licensee (HQ ACALA, address in App E) for further information. The applicable TM also contains guidance on handling these devices.

4–4. Chemical Agent Detectors/Monitors

If working with M8A1/M43A1 Chemical Agent Detectors (containing americium 241) or the Chemical Agent Monitors (containing Nickel 63), or the Improved Chemical Agent Monitor (CAM/ICAM) or the M88/M22 Automatic Chemical Agent Alarms) containing nickel 63), follow these procedures:

a. Before handling these items, don plastic gloves.

b. If the items appear intact and unharmed, the radioactive cell(s) are probably intact also. Normal Technical Inspection (TI) procedures should be followed per TM 3-6665-312-12&P, TM 3-6665-312-30&P, TM 3-6665-331-10, TM 3–6665–343–10, TM 3-6665-331-23&P, TM 3–6665–321–12&P, or TB 3–6665–321–30.

c. If the items are damaged, contact the item manager for disposition instructions. Place items in double plastic bags (at least 4 mil thickness). IT IS IMPORTANT NOT TO REMOVE THE ITEM FROM THE PLASTIC BAGS UNTIL THE ITEM REACHES ITS ULTIMATE DESTINATION. ENSURE THE PACKAGE CONTAINING THE ITEM IS MARKED DAMAGED—POTENTIALLY CONTAMINATED. On the bag mark the following information: date, time, location of bagging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. See Appendix C for more information on proper record keeping.

d. Potentially contaminated areas should not be used for unrestricted activities until surveyed and cleared by the RSO. Perform a radiation survey of the area in which damaged systems were stored to rule out any contamination. Use an AN/VDR-2 or an AN/PDR-77 RADIAC Meter with the probe to measure for any radiation levels. Levels more than twice the background indicate potential contamination. See Appendix J for recommended maximum free release limits for radioactive contamination. Wipe tests should be performed to definitely rule out contamination. Send the wipe tests to your supporting facility with a qualified laboratory. Addresses are given in Appendix E. Potentially contaminated areas should not be used for unrestricted activities until surveyed and cleared by the RSO.

e. Contact the licensee (HQ SBCCOM, address in Appendix E) for further information.

4–5. MC-1 Soil Moisture Density Tester

The MC-1 Soil Moisture Tester contains two radioactive sources, an americium-241 and a cesium-137 source, that could emit hazardous radiation levels if damaged with the source area in the open position. Am-241 is an alpha emitter,

which poses no external hazard. However, the americium is combined with beryllium. The Am-241 alphas could cause the mixed beryllium to eject neutrons. So, in addition to containing Cs-137, the MC-1 is a neutron and gamma emitter and is very dangerous. Prior to handling or retrograding any MC-1 Tester, obtain a beta/gamma radiation survey instrument, such as a VDR-2 or PDR-77 as well as a neutron meter if possible, and, after verifying proper operation, approach the tester with the instrument "on" and the probe pointed toward the instrument. If the radiation levels are noticeably above background and rise as the tester is approached, assume the source is open and do not go further. Evacuate the area for a radius of 50 meters and call the RSO for help. Additionally, contact the US Army TACOM for further guidance (Address in App E) if this situation occurs. If working with the MC-1 Soil Moisture Density Tester:

a. Obtain a whole body radiation dosimeter and, if time permits, a neutron dosimeter. If a neutron dosimeter can not be issued, the RSO must annotate the types of sources the whole body dosimeter is exposed to on the "Dosimeter Issue Listing" computer print out. Contact your RSO for assistance.

b. If the tester appears undamaged and the source is locked in the closed position, the tester is probably intact and not contaminated. However, when approaching a tester that has been turned in or abandoned after combat, obtain a beta/gamma radiation survey instrument and a neutron survey meter, if available. After verifying proper operation, approach the tester with the instrument on and the probe pointed toward the instrument.

c. If the levels are less than twice background at 2 meters distance from the source and the levels do not rise dramatically as the tester is approached, then conditions are safe for continued operations. Perform normal TI operations and other handling per TM 5-6635-386-12&P, MC-1 Unit Maintenance Manual.

d. If the radiation levels are above background 2 meters from the source, assume the source is open and do not go further. Evacuate the area and call the RSO for help. The tester should be packaged and shielded as well as possible prior to turn-in. Store in an approved radioactive materials storage area. On the package mark the following information: date, time, location of packaging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. The package should be surveyed for radiation levels with a VDR-2 or a PDR-77 to ensure safe radiation levels exist in outside the package. See Appendix J for recommended maximum free release limits for radioactive contamination. See TM 5-6665-386-12&P for further information.

e. Once a defective tester has been removed to a proper radioactive materials storage area, the area should be surveyed and cleared by the RSO.

f. Contact the NRC licensee for further information (U.S. Army TACOM, address at Appendix E).

4–6. RADIAC Calibrators Containing Strontium (AN/UDM-2) or Plutonium (AN/UDM-6)

The AN/UDM-6 RADIAC calibrator contains Plutonium-239, a radioactive material that is an alpha emitter and an internal hazard. Pay particular attention to the chance of ingesting Plutonium when working with this item. Do not eat, drink, or smoke when handling this or any other radioactive item. Wear gloves and overgarment when handling this item. The AN/UDM 2 RADIAC calibrator could emit hazardous levels of beta and gamma radiation if the radioactive source is damaged and not properly contained. Prior to handling or retrograding any AN/UDM2 calibrator, obtain a beta/gamma radiation survey instrument and, after verifying proper operation, approach the calibrator with the instrument 'on' and the beta/gamma probe pointed toward the instrument. If the radiation levels are 2 mR/hr above background and rise as the calibrator is approached, assume the source is damaged and do not go further. Evacuate the area for a radius of 20 meters and call the RSO for help. Contact the US Army CECOM through command channels for further guidance (Address in Appendix E). When handling RADIAC Calibrators containing Strontium (AN/UDM-2) or Plutonium (AN/UDM-6):

a. RADIAC calibrators that appear undamaged probably contain intact radioactive sources. Nevertheless, caution should still be exercised when handling these items.

b. To evaluate the AN/UDM-6, obtain an alpha radiation survey instrument such as the AN/PDR-77 with alpha probe and verify the instrument's operation. Measure the radiation levels near the calibrator to determine the radiation level. If the radiation level is less than twice the background level, assume the levels to be safe. See appendix J for recommended maximum free release limits for radioactive contamination. To evaluate the AN/UDM-2, obtain a beta/gamma survey instrument and verify the instrument's operation. Measure the radiation levels as you approach the calibrator. If the radiation levels are less than 2 mr/hr, assume that the levels are safe.

c. Wear gloves and an overgarment. Obtain a radiation dosimeter, if one has already not been issued. Contact your RSO to obtain the dosimeter.

d. Perform normal TI procedures and handling per TM 11-6665-227-12 or TB 11-6665-227-12 (AN/UDM-2) or TM 11-6665-248-10 (AN/UDM 6).

e. Calibrators to be turned in for repair or salvage should be double-bagged in thick (at least 4 mil) plastic bags. On the bag mark the following information: date, time, location of bagging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. See Appendix C for more information on proper record keeping. Send to next level of repair or to theater collection point, whichever applies.

f. Perform a radiation survey of the area to verify that the area is not contaminated in excess of release limits.

g. Contact the licensee (HQ CECOM, address in App E) for further information.

4–7. Night Vision Devices Containing Thorium

a. For handling night vision devices containing thorium:

(1) If the night sight appears unbroken, the thorium coating is probably intact. The radioactive thorium is applied as a thin coating on the surface of the glass to improve its performance.

(2) With broken items, there exists a hazard from broken glass as well as from the radioactive coating on the glass.

(3) Likely problem with these items will involve breakage from combat or over purging. In case of breakage, protection will center on protection of the skin from shards of glass and the respiratory tract from thorium dust.

(4) Wear leather gloves when handling the thorium lenses and, if broken, a dust mask.

(5) Perform TI procedures according to the applicable TM.

(6) Double bag items to be turned in to the next higher level of maintenance or to the theater collection point. On the bag mark the following information, date, time, location of bagging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. See Appendix C for more information on proper record keeping.

(7) Perform a radiation survey of the area to verify that the area is not contaminated in excess of the release limits listed in Appendix J.

(8) Contact the NRC licensee (HQ CECOM, address in Appendix E) for further information.

4–8. Radium Devices

a. Devices containing radium-226 should not be in the supply system. Radium gives off alpha, beta, and gamma radiation and can emit significant radiation levels.

b. Immediately contact the RSO and IOC for details on how to remove the materials from the supply system.

c. Obtain a whole body dosimeter prior to surveying if possible. See appendix J for recommended maximum free release limits for radioactive contamination.

d. The detectors will pick up significant levels of activity. The commodity should be double bagged and tagged as soon as possible. On the bag mark the following information: date, time, location of bagging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. Prominently label the packaging and send to IOC. Survey the area using a beta/gamma probe where the commodity was to see if there was any significant contamination.

Chapter 5
Foreign Or Captured Items Containing Radioactive Material

5–1. General

a. Radioactive materials have long been used in both U.S. and foreign equipment to facilitate performance. The same kinds of radioactive components (night sights, surge arresters, calibrators, and other equipment) used by the U.S. will be found in foreign made material, both of U.S. allies and its adversaries.

b. Past experience indicates that many gauges and other luminescent devices in captured foreign material contain radium. Radium luminescent paint is easily rubbed off and could be ingested or inhaled by personnel. Take special care in surveying for, safeguarding, and decontaminating as necessary such luminescent devices.

5–2. Handling Guidelines

The radioactive materials in foreign or captured equipment are subject to the same kinds of contamination potential as the U.S. equipment. Therefore, any captured or damaged foreign equipment should be handled the same manner as similar U.S. equipment. Some guidelines:

a. Assume abandoned or captured equipment is contaminated until proven otherwise, especially if the equipment has been hit or damaged in combat. Exercise the basic precautions of using disposable gloves unless the material is DU contamination, in which case all U.S. source guidelines should be followed (see app D).

b. Follow all appropriate guidelines established in earlier chapters.

c. The specific radioactive materials (e.g. radium, tritium, americium, etc.) may or may not be the same activity as the American counterpart.

d. The precautions in handling foreign RCE should be based on the specific radioactive materials involved rather than the type of component in which the radioactive source is installed.

e. The precautions and guidelines used in this pamphlet will generally apply to foreign sources, once the specific radioactive source(s) has(ve) been identified.

f. If tasked with handling of allied equipment that contains radioactive sources, consult with the allied representative as to specific precautions to be taken for that item.

g. Consult the Foreign Science and Technology Center (FSTC) Guidebook No. AST-1500Z-100-93, Identification

Guide for Radioactive Sources in Foreign Material, for specific identification of the sources to be found in foreign (captured) equipment.

h. Be alert for gauges with damaged radioactive dial indicators. They are probably contaminated.

5–3. War Trophies

Equipment must comply with U.S. federal regulations (NRC, EPA, Department of Agriculture) prior to acceptance at the port of entry in the United States. The U.S. Customs Service prior to embarkation at port will inspect all equipment shipped back to an authorized collection point. Units claiming this equipment must ensure the equipment have been cleared of:

a. Security considerations.

b. Radioactive Material contamination considerations as discussed throughout this pamphlet.

c. Hazardous Materials considerations. Contact your unit surgeon and engineer for assistance in this area.

d. Agricultural contamination.

Appendix A
References

Section I
Required Publications

Allied Command Europe (ACE) Directive No. 80–63
Policy for Defensive Measures against Radiological Hazards during Peacekeeping Operations (Cited in para 2-2a(1).)

AR 700–48
Management of Equipment Contaminated with Depleted Uranium or Radioactive Commodities (Cited in paras 1-6d(2), 2-1c, and E-3d(1)(a).)

AR 750–1
Army Materiel Maintenance Policy and Retail Maintenance Operations (Cited in para 2-3d.)

DA Pamphlet 40–18
Personnel Dosimetry Guidance and Dose Recording Procedures for Personnel Occupationally Exposed to Ionizing Radiation (Cited in para 3-1a.)

FM 3–3–1
Nuclear Contamination Avoidance (Cited in para 2-2a(1).)

FM 3–5
NBC Decontamination Operations (Cited in para E-3b(1)(c).)

FM 101–5
Staff Organization and Operations (Cited in paras 1-4c and 2-1.)

Foreign Science and Technology Center (FSTC) Guidebook AST–1500Z–100–93
Radiation Protection Officer's Guidebook, Identification Guide for Radioactive Sources in Foreign Material (Cited in para 5-2g.)

JP 3–11
Joint Doctrine for Nuclear, Biological, and Chemical Defense (Cited in para 2-2a(1).)

TB 3–665–321–30
Direct Support Requirement, Procedures and Handling of the Radiation Wipe Test for the M88 Chemical Agent Detector Unit (Cited in para 4–4b.)

TB 9–1300–278
Guidelines for Safe Response to Handling, Storage, and Transportation Accidents Involving Army Tank Munitions or Armor which Contain Depleted Uranium (Cited in para 2-2a(1), 3-3a(1), and E-3d(1)(a).)

TB 43–0116
Identification of Radioactive Items In The Army (Cited in Figures C-2 and C-3.)

TB 11–6665–227–12
Safe Handling, Storage, and Transportation of Calibrator Set, RADIAC, AN/UDM-2 (Cited in para 4-6d.)

TM 3–6665–312–12&P
Operator's and Organizational Maintenance Manual including Repair Parts and Special Tools List for M8A1 Automatic Chemical Agent Alarm (Cited in para 4-4b.)

TM 3–6665–312–30&P
Intermediate Direct Support Maintenance Manual (including Repair Parts and Special Tools List) for M8A1 Automatic Chemical Agent Alarm) (Cited in para 4-4b.)

TM 3–6665–321–12&P
Operator's and Unit Maitenance Manual (Including Repair Parts and Special Tools List) For Alarm, Chemical Agent, Automatic (Cited in para 4–4b.)

TM 3–6665–331–10
Operator's Manual for Improved Chemical Agent Monitor (ICAM) (Cited in para 4-4b.)

TM 3–6665–331–23&P
Unit and Direct Support Maintenance Manual (including Repair Parts and Special Tools List) for the Chemical Agent Monitor (Cited in para 4-4b.)

TM 3–6665–343–10
Operator's Manual for Improved Chemical Agent Monitor (CAM). (Cited in para 4–4b.)

TM 5–6635–386–12&P
MC-1 Unit Maintenance Manual for Tester, Density and Moisture (Soil and Asphalt), Nuclear Method (Campbell-Pacific Model MC-1) (Cited in paras 4-5c and 4-5d.)

TM 11–6665–227–12
Operator's and Organizational Maintenance Manual for Calibrator Set, RADIAC, AN/UDM-2 (Cited in para 4-6d.)

TM 11–6665–248–10
Operator's Manual for Calibrator, RADIAC, AN/UDM-6 (Cited in para 4-6d.)

Section II
Related Publications

AR 11–34
The Army Respiratory Protection Program

AR 40–5
Preventive Medicine

AR 40–13
Medical Support-Nuclear/Chemical Accidents and Incidents

AR 385–40
Accident Reporting and Records

DoDI 6055.8
Occupational Radiation Protection Program

FM 3–4
NBC Protection

FM 8–9
NATO Handbook of the Medical Aspects of NBC Defense Operations

FM 9–43–1
Maintenance Operations and Procedures

FM 9–43–2
Battle Damage and Assessment

FM 9–43–2
Vehicle Recovery Operations

FM 21–10
Field Hygiene and Sanitation

FM 43–5
Unit Maintenance Operations

TB 43–0216
Safety and Hazard Warnings for Operation and Maintenance of TACOM Equipment

TM 3–261
Handling of Unwanted Radioactive Material

TM 55–315
Fire Fighting and Rescue Procedures in Theaters of Operations

Technical Report (TR) 94–11
U.S. Army CECOM, Tritium Commodities

Title 10, Code of Federal Regulations (CFR)
Energy (NRC Regulations).

Title 40, CFR
Environmental Protection Agency Regulations

Title 49, CFR
Transportation Regulations

U.S. Army Industrial Operations Command, AMSIO-DMW, Standing Operating Procedure MAY 97, Shipping Procedures for Unwanted Radioactive Materials

U.S. Army Industrial Operations Command Pamphlet 385–1
Handling of Unwanted Radioactive Material

Section III
Prescribed Forms

DA Form 7399
Survey/Decontamination Record

DA Form 7400
Record of Area/Equipment Survey

DA Form 7401
Radioactive Commodity Report

Section IV
Referenced Forms

DA Form 2028
Recommended Changes to Publications and Blank Forms

DA Label 80
U.S. Army Calibrated Instrument

Appendix B
Health Effects of Radiation

B–1. Radiation Basics

a. Radiation is energy coming from a source. There are many kinds of radiation from many different kinds of sources. Every kind of radiation is useful for something, but sometimes the radiation can also be harmful. Sunlight, x-rays, radio waves, and microwaves are some different kinds of radiation, and all of these are useful but can sometimes be harmful. Radiation of any kind becomes harmful when we are exposed to too much of it.

b. There are several forms of radiation. The most common types of ionizing radiation are alpha, beta, gamma, and neutron. Both nuclear radiation and x-ray radiation are extremely useful. They are both high energy radiation and both are very penetrating. Both nuclear radiation and x-ray radiation are commonly called ionizing radiation, because of what they do to atoms.

c. Forms of elements that emit nuclear radiation from the nucleus of the atoms are called radioactive (isotopes). Uranium and radon are common, naturally occurring radioactive elements. Uranium can be refined for nuclear reactor fuel. The energy from ionizing radiation from the uranium in reactors produces electricity. Radioactive cobalt, radioactive cesium, and radioactive iodine produce ionizing radiation used by doctors in hospitals to cure serious diseases like cancer. Tritium, americium, and radioactive nickel are used in military equipment for very useful purposes like lighting without batteries and chemical agent detection.

B–2. Radioactive Materials Used by the Military

a. Depleted Uranium.

(1) When uranium is refined to make nuclear fuel, waste uranium is also produced. The waste uranium is called DU. The waste DU produces only very small amounts of ionizing radiation, and because it is much more dense than lead, it is very useful for armor plating and armor piercing ammunition. The radiation from DU is only slightly stronger than the ionizing radiation normally coming from the soil and from the air, so soldiers can work around DU with minimal effects. Remember, as stated earlier, radiation only becomes harmful when we are exposed to too much. Protective clothing and gloves, respiratory protection for airborne DU, and good hygiene practices will minimize the hazard.

(2) Heavy metal poisoning is the main health concern associated with DU. Lead poisoning from sources like lead based paint is well known heavy metal poisoning. Like lead, DU is a heavy metal. Everyone is aware of the social problem of lead poisoning. All heavy metals, including lead and DU, can poison us if we take enough into our body. For this reason, we prevent and caution soldiers against inhaling or swallowing DU. Lead is a poison that affects virtually every system of the body. The risks of lead exposure are well known from studies of children and high dose occupational exposure. The U.S. now bears the high social costs related to lead poisoning. When military equipment containing DU burns or when DU ammunition is used, DU becomes scattered as contamination. The contamination will be in the dust. The dust will be inhaled or swallowed unless soldiers protect themselves when working in contaminated areas. In light contamination a kerchief over the nose may be sufficient, but in heavy contamination the NBC protective mask may be necessary. After leaving a DU contaminated area soldiers must get the dust out of their clothing and wash contaminated skin.

b. Tritium.

(1) Tritium is the radioactive form of the abundant element hydrogen. It is used whenever it is necessary to have light without an electrical source. Sometimes tritium is mixed with other gases in a glass tube and sometimes it is an ingredient of paint. Tritium produces very low energy nuclear radiation as beta radiation. The beta radiation from tritium causes other ingredients of the gas or paint to glow very brightly. That glow is a very useful light source.

(2) Tritium is a very minor heath concern for military personnel. The beta radiation from tritium has so little energy it cannot penetrate the glass tube containing the gas or the glass cover over painted sources. It cannot even penetrate skin. Tritium can only damage the body when a large amount gets inside the body where there is no skin to protect the cells from the beta radiation. This can happen when someone inhales the gas escaping from a broken or leaking glass tube containing tritium. Tritium can also build up in the air and on surfaces in storage areas where a tiny amount of tritium is constantly leaking from hundreds or thousands of undamaged stored items, such as tritium watches or compasses. Persons must exercise caution when close to damaged tubes containing tritium gas, especially immediately after breakage. Also exercise caution in tritium device storage areas and when handling large numbers of tritium items.

c. Americium.

(1) Americium is the radioactive element that is used in the M43A1 Chemical Agent Monitor of the M8A1 Chemical Agent Alarm system. It produces highly energetic alpha particles that also cause the americium atoms to produce weak x-rays.

(2) Outside of the body, americium is not a health concern. Alpha particles do not penetrate skin. But, inside the body the americium alpha radiation is very damaging to cells. The detector cell of the M43A1 is very rugged and will survive fires as well as nearly catastrophic destruction of the monitor. Leakage of americium is slightly possible from even undamaged monitors and detector cells. As a precaution, all detector cells should be considered contaminated unless the cell outlet port has recently been wipe tested and is negative for contamination. Americium contamination will usually only enter the body through swallowing. Thorough hand washing after handling will prevent ingestion.

B–3. Other Radioactive Elements

Several other radioactive materials are used for various purposes in many other military items of equipment. Uranium, tritium, and americium are by far the most commonly used nuclear radiation emitters. The other radioactive materials require similar precautions and pose similar hazards. All items of equipment emitting ionizing radiation are required to bear the standard radiation trefoil warning marker. All personnel working with trefoil marked equipment must be fully

informed of the precautions and hazards. In all cases the Technical Manuals of marked equipment contain the information necessary for safe operation.

B–4. Other Sources of Information

To find out more about the health effects of radiation:

a. Contact Unit Radiation Safety Officer.

b. Consult Technical Manuals for Radioactive Commodities involved. See Appendix A for list of TMs.

c. View the following videotapes, available at Army Training Aid Support Centers:

(1) US Army Videotape, TVT 3-92, "Depleted Uranium Hazard Awareness."

(2) US Army Videotape, TVT 3-99, "Contaminated and Damaged Equipment Management Operations."

d. Contact the nearest USAMC Logistics Assistance Representative for the item involved.

e. Contact the nearest U.S. Army Medical Department Activity or Medical Center, ATTN: Preventive Medicine Department.

f. Contact the U.S. Army Chemical School, ATTN: ATZN-CMN-B, Fort McClellan, AL 36205, telephone DSN 865-5919/4489 or commercial (205) 848-5919/4489.

g. Contact the U.S. Army Center for Health Promotion and Preventive Medicine, ATTN: Medical Health Physics Program. Address is at Appendix E.

Appendix C
General Survey/Decontamination Tips and Techniques

Section I
General Survey Tips and Techniques

C–1. Identifying contaminated material

Once a piece of equipment has been identified as potentially contaminated, MARK IT! That is probably the single best thing that can be done to limit exposure of personnel and prevent extra work later. If the item enters the logistics system, all paperwork accompanying the item should be marked"contaminated."

C–2. Touching contaminated equipment

Avoid touching equipment that might be contaminated. Wear a good grade of leather gloves as a minimum. The handling of equipment that has been in combat might result in sharp edges that will cause cuts and scratches to bare skin. Contamination will enter the body unless the wounds are covered. Wear surgeon's gloves under the leather gloves. See Appendix K for more information. The use of respiratory protection may be required. Recommend personnel remain upwind, if possible, from potentially contaminated equipment and areas.

C–3. Isolate suspected contaminated items

a. When the tactical situation permits, isolate the equipment in a location specified by unit chemical or medical personnel. The selected area will be away from bivouac locations, medical facilities, dining areas, and bathing/laundry facilities. The objective is to limit the spread of contamination while determining logistical requirements.

b. The exclusion zone for damaged and contaminated equipment that contains or may contain unexploded ordnance is at least 366 meters. The exclusion zone for radiologically contaminated equipment is at least 50 meters in any direction.

c. Assemble equipment that will be needed ahead of time. Survey equipment, etc. should all be together for ease of usage. Appendix K provides a list of suggested supplies and equipment involved with these operations.

d. Separate contaminated items from non-contaminated items. Establish a "hot line" around the equipment work area or vehicle. Do NOT exit the contaminated area without surveying shoes and clothes for contamination. Contact chemical personnel or RSO for assistance in setting up a "hot line."

e. Utilize the two-person rule when performing equipment decontamination and retrograde. Ensure that communications are present and functioning prior to the start of the work, especially in remote areas.

C–4. Avoid personnel accidents and unwanted radiation exposures.

a. Do NOT eat, drink, smoke, chew tobacco, or apply cosmetics when around potentially contaminated equipment. Through hand or glove contact, radioactive contamination may attach itself to substances ingested and cause internal contamination.

b. Pay attention to nutrition and hydration requirements. Eat three meals a day. Drink fluids, preferably approved water, to maintain hydration. Handling of contaminated equipment, especially in hot climates, may require protective

clothing such as Mission Oriented Protective Posture (MOPP). Extra nutrition and hydration will be needed under those circumstances.

c. Pay conscious attention for heat and cold injuries. The use of protective clothing will insulate the body and prevent the efficient transmission of heat and moisture away from the skin surface. See FM 21-10 for suggested work rest cycles during different heat categories.

d. If an accident happens (cut, scrape, etc.) report it immediately and seek medical help. Document the circumstances and actions taken on DA Form 7399, found at the end of this appendix.

e. The long, exhaustive nature of recovery and retrograde work demands that sleep/rest cycles be enforced.

f. Clothes should be changed frequently and kept clean. Dirt and perspiration will impair the ventilatory aspects of the clothing. Washing clothes may be a problem due to potential contamination. Ensure that potentially contaminated clothes are washed separately from other troop clothing. Water should be tested, if possible, to ensure that it is not contaminated above release limits before it is released to the sewer system or placed on the ground. Contaminated water will be held as radioactive waste.

g. Keep fingernails cut closely to avoid getting contamination under the nails.

h. Cut hair to about one-quarter inch from the scalp or cover it.

i. Pay attention to bodily function requirements. Due to the nature of constantly being in protective clothing, opportunities to use latrines may be limited. If possible, plan ahead.

Section II
General Decontamination Tips and Techniques

C–5. General Decontamination Procedure

The specific decontamination methods and procedures selected for use in particular circumstances depend on the type, extent, and location of the contamination; however, the general approach to decontamination outlined below applies to most situations:

a. Decontamination should always be performed under the direction of radiation safety personnel.

b. Access to contaminated areas must be controlled.

c. Provide personnel protection, including appropriate clothing, for workers.

d. Evaluate what is to be decontaminated.

e. Obtain necessary equipment and materials (App K).

f. Survey all items to be released to an unrestricted area.

g. Begin with the mildest decontamination method and progress to harsher, more abrasive, or caustic methods as required.

h. Work from the outside of the contaminated area to the inside.

i. Isolate all clean areas from contaminated areas. Clean areas adjacent to those being decontaminated should be covered with taped down paper, plastic, or other disposable material to prevent recontamination.

j. Minimize the generation of contaminated liquids and airborne radioactivity during the work, and collect and treat as contaminated waste all liquids generated and materials used during decontamination operations.

k. Survey between major steps in the decontamination process (i.e., between successive applications of each technique and between different techniques).

l. Continue decontamination until contamination levels are reduced to appropriate levels, as given in Appendix J.

m. Document the completion of decontamination, including the name of the individual performing the final survey, the date, and the survey results. Utilize DA Forms 7399-R, 7400, and 7401, These forms are available on the Army Electronic Library CD Rom and the USAPA website.

C–6. Personnel Decontamination

Before external decontamination of an individual is begun, the following steps should be taken to help establish priorities for decontamination and follow-up effort:

a. Observe any physical effects on the contaminated person, such as bleeding, irregular breathing rate, burns, or shock.

b. Assess the extent of any injuries. Medical treatment of injuries takes priority over decontamination.

c. Determine the extent and magnitude of contamination using personnel survey techniques.

d. Document survey results on DA Form 7399.

e. Remove contaminated clothing, place it in a plastic bag, and hold it for further disposition.

f. Obtain assistance from medical personnel if decontamination of eyes, ears, nose, or mouth is necessary.

g. Personnel should be decontaminated as quickly as possible using the least drastic means necessary.

h. Decontamination methods should begin with mild methods, which should be continued as long as they are effective, and progress to harsher methods only as required.

i. Extreme care should be taken to prevent the spread of contamination to any skin or body opening.

j. All liquids generated and materials used during decontamination should be collected and treated as contaminated waste.

k. Personnel performing the decontamination should take all necessary precautions to protect themselves.

l. Cool or lukewarm water should be used for all washing and rinsing. Hot water causes the skin pores to open, driving contamination deeper into the skin. Cold water closes the pores, trapping contamination in the skin.

C–7. Specific Personnel Decontamination Methods

a. Thorough washing with nonabrasive soap and lukewarm water is the best general method of decontamination of the hands and other parts of the body. If the contaminant is localized, it is often more practical to mask off the affected area, and cleanse with swabs, rather than risk the danger of spreading the contaminant by general washing. Organic solvents must be avoided as decontaminating agents, because they may increase the probability of the radioactive materials penetrating through the pores of the skin. Special attention must be given to the areas between the fingers and around the nails. The outer edges of the hands are readily contaminated, and must not be neglected in the washing.

b. After repeated washings, the skin may tend to chap. To avoid this, apply lanolin or hand cream and then continue to wash. If repeated washing with soap and water is unsuccessful in the personnel decontamination, the individual should be referred to the local medical officer for application of the more drastic chemical decontamination.

c. In the event several individuals have become contaminated or the contamination on an individual is not localized to a small portion of the body, the following decontamination procedure is recommended:

(1) Place individual in a lukewarm shower.

(2) Using a mild soap, individual should cover entire body with lather.

(3) While still covered with lather, individual should step out of shower.

(4) Sprinkle a heavy coat of mild soap flakes all over lathered individual (purpose of lather is to cause soap flakes to adhere to person).

(5) Using his hands, the contaminated individual should rub the soap flakes on his body into a paste.

(6) Individual should then return to shower and rinse soap off his person by starting at the top and working his way down. NOTE: It will be necessary for individual to rub body surfaces with his hands while rinsing in order to remove soap paste. Soap paste will remain on those areas that have not been thoroughly washed. Although a soft cloth may be used, a brush may not. Particular attention should be given to hairy portions of the body.

(7) When the individual has rinsed to the point that he no longer feels slimy, and while still under shower, he should be examined by an assistant for traces of soap. The presence of soap will indicate which areas of the body have not been decontaminated.

(8) After removing all traces of soap, individual should leave the shower and dry.

(9) After drying off, individual must be monitored. If still contaminated, above procedures should be repeated. In the event residual contamination is localized, repeat procedures should be limited to those areas still showing contamination.

d. In all cases of personnel contamination, the RPO must be consulted. If ingestion or inhalation of radioactive material is suspected, bioassays should be performed.

C–8. Equipment and Material Decontamination

Materials that cannot be easily or cost-effectively decontaminated should be evaluated for possible disposal as radioactive waste. Porous items (such as wood, paper, and cloth), intricately designed equipment, and items of low replacement cost tend to fall in this category. If decontamination of equipment and/or materials is required, many cleaning, abrasive, chemical, and electrochemical methods are available. Listed here are a few of the simpler and least costly methods. These methods should be repeated until surveys indicate the need for harsher method. Under no circumstances will dry sweeping of radioactive contamination be allowed. Appropriate PPE must be worn.

a. Use masking, adhesive, friction, or duct tape; place over the contaminated area; remove; and discard as radioactive waste.

b. Use vacuum-cleaning techniques with a conventional wet or dry vacuum cleaner modified to include a High-Efficiency Particulate Air (HEPA) filter on the exhaust. Dispose of bag or collection container as radioactive waste. Respiratory protection must be used. If a HEPA filter is not available, do not vacuum.

c. Wipe or wet mop, using a decontaminating agent or detergents and hot water. NOTE: For tank fires: If the above methods do not completely decontaminate the exterior of the tank, contamination should be considered fixed and the tank should be transported to a Army facility before harsher methods are used.

d. Contaminated soil around accident and water runoff should be scraped up and containerized for removal as radioactive waste.

Section III
Survey/Decontamination Records

C–9. Instructions for completing DA Form 7399, Survey/Decontamination Record

Use the following instructions for completing DA Form 7399.

SECTION I, Personnel Contamination Record

1. Patient Name. Write in the name of the person who was contaminated or suspected of being contaminated. Included their date of birth and sex. If possible try to locate their radiation safety training records. Please fill out separate sheets for each individual involved in the incident or accident.

2. SSN. Write in the social security number of the person who was contaminated or suspected of being contaminated. The social security number applies only to US Soldiers. If foreign soldiers are involved in the incident or accident, try to locate personnel identification tags and write the pertinent information down. (See Privacy Act Statement on DA Form 7399).

3. Date of Incident. This is the date of when the incident or accident occurred.

4. Time of Occurrence. This is the time when the incident or accident occurred.

5. Location of Incident. This is the location of where the incident or accident took place so that samples and area monitoring can be performed to better assess the situation.

6. Grid Coordinates, if known. Write in the location of the accident or incident grid coordinates in degrees of latitude and longitude.

7. Cause of Contamination. List all appropriate information as to how the incident or accident occurred. List the radioactive materials involved (specific isotopes, i.e. Tritium (H-3), Americium (Am-241)), and their activities (Activity in Becquerels (Bq), Curies (Ci) or dpm), physical characteristics, such as liquid, gas or solid and the total amount of material that was involved. Describe the location where the incident or accident took place, the weather, temperature and wind conditions. List any other information that is pertinent to the incident or accident. List the initial actions that were taken and then the subsequent actions that will be taken to prevent a reoccurrence.

8. When was the Contamination Discovered? List the date and time that the contamination was discovered. Record the person(s) name(s) that discovered the contamination and a phone, fax, or e-mail address where the person(s) can be reached.

Figure C–1. Flow Instructions for completing DA FORM 7399, Survey/Decontamination Record

SECTION II, Survey Results

9. Survey Performed by. List the name of the person who performed the radiological survey of the suspected contaminated area.

10. Unit. The unit to which the soldier belongs; for civilian employees, the name of the organization to which they belong; for contractors working for the government, the name of their company.

11. Survey Instrument Manufacturer. List the name of manufacture of the survey instrument being used.

12. Serial Number. List the serial number of the survey instrument used. If applicable, list the serial numbers of any probes that were used with the survey meter.

13. Probe Type. List the type of probe used to detect the radioactive contamination, i.e. scintillation, gas proportional, Geiger-Mueller (GM) counter, and if possible the type of radiation that was detected, i.e. alpha, beta, gamma, neutron or x-ray.

14. Calibration Expiration Date. Write the calibration expiration date of the survey meter. If it is a US Army RADIAC Meter, this will be on the TMDE DA Label 80 (US Army Calibrated Instrument). Always remember to use probes that were calibrated with the survey meter to assure accurate results. Include the type of radioactive check sources used to calibrate the detector and probe.

15. Indicate, type, extent, and magnitude of contamination below on a sketch of a human figure. Clearly and descriptively indicate the type, extent, and magnitude of the contamination. Make sure to use the appropriate radioactive material activities (cpm, dpm, Bq/min…). Use a sketch of a human figure to indicate where the contamination was found on the patient. Use the space below, the back of this form or separate sheets of paper to detail all of the information known about the accident or incident using pictures and narratives. Attach the separate sheets of paper to DA Form 7399.

Figure C–1. Flow Instructions for completing DA FORM 7399, Survey/Decontamination Record—Continued

C–10. Flow Instructions for completing DA FORM 7400, Record of Area/Equipment Survey

SECTION I Essential Information.

1. Date of Incident. This is the date of when the incident or accident occurred.

2. Time of Occurrence. This is the time when the incident or accident occurred.

3. Location of Incident. This is the location of where the incident or accident took place so that samples and area monitoring can be performed to better assess the situation.

4. Grid Coordinates, if known. Write in the location of the accident or incident grid coordinates in degrees of latitude and longitude.

5. Cause of Contamination. List all appropriate information as to how the incident or accident occurred. List the radioactive materials involved (specific isotopes, i.e. Tritium (H-3), Americium (Am-241)), and their activities (Activity in Becquerels (Bq), Curies (Ci) or dpm), physical characteristics, such as liquid, gas or solid and the total amount of material that was involved. Describe the location where the incident or accident took place, the weather, temperature and wind conditions. List any other information pertinent to the incident or accident. List the initial actions that were taken and the subsequent actions that will be taken to prevent a reoccurrence.

6. When was Contamination Discovered? List the date and time that the contamination was discovered. Record the person(s) name(s) of who discovered the contamination and a phone, fax, or e-mail address were the person(s) can be reached.

7. Equipment Nomenclature NSN ICRIS? Write the proper equipment nomenclature to include the National Stock Number (NSN). The NSN and a brief description can be found in the reference TB 43-0116, "Identification of Radioactive Items in the Army."

SECTION II Survey Results

8. Survey Performed By. List the name of the person who performed the radiological survey of the contaminated area.

9. Unit. The unit to which the soldier belongs, for civilians the name of the organization to which they belong, or to contractors working for the government the name of their company.

Figure C–2. Flow Instructions for completing DA FORM 7400, Record of Area/Equipment Survey

10. Survey Instrument Manufacturer and Serial Number. List the name of manufacture of the survey instrument being used. List the serial number of the survey instrument used and if applicable the serial number of the probe used with the survey meter.

11. Probe Type. List the type of probe used to detect the radioactive contamination, i.e. scintillation, gas proportional, Geiger-Mueller (GM) counter, and if possible the type of radiation to be detected, i.e. alpha, beta, gamma, neutron or x-ray.

12. Calibration. Write the calibration expiation date of the survey meter, if it is a US Army radiac meter this will be the TMDE DA Label 80. Always remember to use probes that were calibrated with the survey meter to assure accurate results. Include also the type of radioactive check sources used to calibrate the detector and probe.

13. Date. Write the date when the survey took place.

14. Results within release limits? (See App J). Once the data has been collected and compiled it must be determined if the results of the survey are within the release limits that are given in Appendix J of DA PAM 700-48. If the levels are within acceptable limits then the information needs to be written in a report for the unit commander to be sent up the chain of command and a copy needs to be given to the US Nuclear Regulatory Commission (NRC) license holder. If the levels are above the release limits then the licensee must be notified immediately and the unit RSO so that the matter can be dealt with.

Figure C–2. Flow Instructions for completing DA FORM 7400, Record of Area/Equipment Survey—Continued

C–11. Instructions for completing DA FORM 7401, Radioactive Commodity Report

1. Unit. The name of the unit that has the radioactive commodity on their MTOE (the owning Unit).

2. Station. The address of the unit's duty station. Include the Unit Identification Code (UIC).

3. Unit. The name of the unit conducting the survey.

4. APO. Army Post Office address of the owning unit.

5. Incident Location. This is the location of where the incident of accident specifically took place.

6. Date. Date of when the incident or accident occurred.

7. Time. Time of when the incident occurred.

8. Commodities Involved. Follow the table that is given below and fill in the necessary information on the commodities involved in the incident.

a. Item. This is the name of the item, i.e. Chemical Agent Detector, or the model number, i.e. M43A1, of the item that was involved in the incident.

b. NSN (National Stock Number). This is the number that is assigned to the specific item that was listed in 9. The NSN can be found in TB 43-0116 "Identification of Radioactive Items in the Army."

c. Serial and Cell Numbers. List the serial number of the commodity that was involved in the incident. In the case of the chemical agent detection equipment there is both a detector serial number and a number associated with the sealed radioactive material, either a cell assembly serial number or a draft tube module serial number.

d. Quantity. List the total number of the items that were involved in the incident.

e. Physical Condition. This is a brief description of the condition of the items that were involved in the incident, i.e. the material is intact and sealed, the material is badly burned and the loss of radioactive material, source breach causing loss of radioactive material, etc…

9. Description of Incident (List of all persons involved on page 2 of this form). (List of all appropriate information as to how the incident or accident occurred. List the radioactive materials involved (specific isotopes, i.e. Tritium (H-3), Americium (Am-241)), and their activities (Activity in Bequerels (bq), Curies (Ci) or dpm), physical characteristics, such as liquid, gas or solid and the total amount of material that was involved. Describe the location where the incident or accident took place, the weather,

Figure C–3. Instructions for completing DA FORM 7401, Radioactive Commodity Report

temperature, and wind conditions. List and other information that is pertinent to the incident or accident.

10. Actions Taken and Planned (include type of investigation planned). Based on the incident, detail the actions that have taken place up to the time if writing this report, and include what are the current and future plans of actions will be to prevent a reoccurrence. Be as detailed as necessary so that the actions and plans can be efficiently undertaken.

11. Specify Assistance Currently Required. Write in the specific assistance that is required. This should include the notification of the US Nuclear Regulatory Commission (NRC) license holder. Request manpower or resources that will be necessary to clean up the contaminated area.

12. Points of Contact. Write the name if the Unit Commander that was responsible for the incident or initially responded to the incident.

a. Unit Commander. Write the name of the Unit Commander that was responsible for the incident or initially responded to the incident.

b. Telephone Number. Write the phone number of the Unit Commander.

c. Unit LRPO. Write the name of the Local Radiation Protection Officer (LRPO) of the unit involved of initially responded to the incident.

d. Telephone Number. Write the phone number of the Local Radiation Protection Officer (LRPO).

e. Printed Name (individual completing form). Write the name of the individual writing the form.

f. Telephone Number. Write the telephone number of the individual writing the form.

g. Signature. The person who was responsible for completing the form must sign the form at its completion.

h. Date. The person who was responsible for completing the form must date the form at its completion

Figure C–3. Instructions for completing DA FORM 7401, Radioactive Commodity Report—Continued

Appendix D
Information Specific to Depleted Uranium Contaminated Vehicles

D–1. Appearance

a. The DU residue from equipment that is impacted will appear as a heavy black residue, with particle sizes ranging from that of cigarette ash to that of marbles.

b. Spalling at or near holes in equipment made by DU appears as fragments melted into reheated solder. Spalling will also be present inside the equipment. They originate from the impact of DU into equipment.

D–2. Resuspension

When entering a vehicle potentially contaminated with DU, expect that there will be resuspension of particles that have settled to the floor. A dust may be created. Therefore:

a. Wear protective clothing, MOPP, or clothing that will provide a barrier between the body and the contamination.

b. Wear respiratory protection. The M17/40 series masks are preferred. This mask is very effective in protecting the soldier from the inhalation of DU particles. If these masks are unable to be used, use ordinary substitutes, such as a handkerchief, t-shirt, towel, or other item. In an urgent situation, ordinary substitutes are better than no protection at all.

c. If a protective mask is not worn, wear eye protection. (Standard safety goggles equivalent to ANSI standard Z87.1 will do. Safety glasses ordered through the federal supply system are ANSI approved).

d. Wear a good grade of leather boot. Standard troop issue leather boots are sufficient.

e. When in the vehicle, don't lean or sit on the equipment surface if possible. If this is done, clothing may be contaminated. Radiation surveys will detect contamination after exit from the equipment.

f. Utilize the two-person rule (or more) when performing decontamination and retrograde operations. With vehicles, one person should be stationed on top of the vehicle to watch others who are inside.

D–3. Actions of Survey Personnel

When surveying/assessing equipment, survey personnel should:

a. Before beginning, ensure that the survey instrument is operative, in calibration, and that the proper probe is used (AN/PDR-77 and the alpha probe). NOTE: DU armor will trigger the survey meter.

b. Hold the survey instrument approximately 1/2 inch away from the surface to be surveyed and keep the probe at the same distance throughout the survey.

c. Take a background reading from an area known NOT to be contaminated.

d. Make a conscious effort not to contaminate the probe during the survey. If the probe is contaminated, then it must be cleaned or the instrument replaced prior to continuing the survey. Instruments are calibrated with probes as a set. Therefore, probes cannot be switched to a different instrument without affecting the calibration.

e. Record readings on a sheet with all the essential information. See Appendix C Section III for guidance.

D–4. Decontamination

When decontaminating equipment:

a. Loose radioactive contamination can be brushed off, scooped up, vacuumed up with a vacuum modified to include a High-Efficiency Particulate Air Filter (HEPA), washed off, or removed with tape or other sticky material. Decontaminate equipment to the levels specified in Appendix J.

b. Fixed contamination can be covered over (encapsulated) with any available materiel that provides shielding and consequently reduces radiological exposure rates. Cardboard, plastic, cloth, or paint provides acceptable shielding for alpha and beta contamination. A RADIAC meter will be used to determine and record dose rates before and after encapsulation. The objective is to reduce fixed contamination radiological exposure rates to the levels specified in Appendix J if possible until decontamination can be completed per commander's guidance.

c. Small pieces of equipment/materiel that can not be decontaminated and that are not needed for mission completion will be double-bagged and turned in to the supply system for proper disposal.

D–5. Wrap-Up

When the work session is finished:

a. Survey personnel, Personnel Protective Equipment (PPE), and Boots for contamination.

b. Clean off any contaminated items, if possible.

c. Store clothing for reuse, or place in an area or container reserved for contaminated material. Dispose of rags and other trash as radioactive waste.

d. Prepare a written after action report. Such information is vital for reconstructing after-the-fact who was where and did what.

e. See Appendix C for more techniques on personnel decontamination.

Appendix E
Suggestions for Commanders
Assistance with Radiological Incidents or Contaminated Equipment

E–1. General
When a radiological incident occurs, there is sometimes confusion as to who should be called to help resolve the concerns. The commander may not be aware of the various personnel and staff sections available to assist in the management of a radiation incident. The subject experts may be available under his/her command locally. This annex should help increase the commander's awareness and allow for more expeditious assistance to be brought in at the time of an incident.

E–2. Local Assistance
a. Radiological incidents should be reported immediately through the chain of command to higher headquarters. Most problems experienced in the management of contamination incidents occur because of a delay in reporting the incident. After an incident, a clock begins ticking that involves:

(1) Potential exposure of personnel to radiation or radioactive materials.

(2) Damage to equipment that may get worse with time.

(3) Potential contamination of the environment that, if present, may get worse with time.

b. It is very important that radiation incidents are handled and reported as expeditiously as possible.

c. The Army uses many different items of equipment that contain radiation sources or radioactive materials. Because of this, personnel in different Military Occupational Specialties and Areas of Concentration have received varying levels of training in radiation and it's effects. Some of these specialties are:

(1) Nuclear Medical Science Officer, e.g. 72A67.

(2) Local Radiation Safety Officer (MOS/AOC immaterial).

(3) DA Civilian Health Physicists.

(4) Chemical (54 series), e.g. 54B, E.

(5) Chemical officer, e.g. 74A.

(6) Explosive Ordnance Disposal Specialist (e.g. 55D).

(7) Certain Engineer Personnel (users of the MC-1 or Troxler Soil Gauges).

(8) RADIAC Calibrator/Custodian Personnel, School Trained, MOS/AOC immaterial.

(9) Theater Test, Measurement, and Diagnostic Equipment Activity Personnel.

(10) Certain Medical (91 series), e.g. 91SN4, 91P.

(11) Environmental Science Officer (Industrial Hygiene), e.g. 72D.

(12) Preventive Medicine Officer, e.g. 60C.

(13) Occupational Medicine Officer, e.g. 60D.

(14) Ammunition Handlers (trained in handling DU ammunition).

(15) Army Materiel Command Logistics Assistance Representatives/Officers (LAR/LAO), who are trained on the radiation characteristics of their particular commodity.

d. At first report of a radiation incident, commanders should not hesitate to draw on the above resources until outside assistance arrives. Much can be done to prevent a small incident from growing into a difficult situation, if action is taken quickly.

e. The Radiation Safety Officer (RSO) should search out these personnel and coordinate with them ahead of time to preclude an information gap with subsequent time loss in the event of an incident.

f. In the event that the incident or contamination event must be elevated beyond the immediate command, personnel with the above MOS/AOC at headquarters level can provide support, or help commanders obtain proper support.

g. The Army RADIAC equipment, both the AN/VDR-2 and the AN/PDR-77, are able to detect beta-gamma radiation levels. In addition, the AN/PDR-77 can detect alpha radiation levels and low energy x-rays.

E–3. How Local Assistance Can Help
a. Chemical personnel.

(1) Advise commander on nuclear, chemical, and biological aspects/hazards of contaminated materiel damage assessment repair, recovery, and retrograde operations.

(2) Supervise completion of initial and follow up radiological surveys with tactical RADIAC instruments.

(3) Plan and supervise decontamination of equipment. Individuals selected for decontamination operations will be properly trained and made aware of the hazards associated with the radiation sources involved.

(4) Ensure that all contaminated materiel requiring retrograde has the appropriate marking and/or designation.

(5) Provide assistance to vehicle recovery and BDAR personnel in processing contaminated equipment requiring retrograde.

(6) Supervise segregation of known or suspected Low Level Radioactive Waste (LLRW) and mixed waste from uncontaminated items during retrograde operations.

b. Medical Support.

(1) Medical Personnel will do the following:

(a) Perform initial assessment of soldiers potentially exposed to radiological or mixed waste hazards.

(b) Assist with extrication of wounded soldiers from suspected or confirmed contaminated and damaged materiel.

(c) Supervise radiological patient decontamination as an integral part of medical operations (FM 3-5).

(d) Report the names of personnel (casualties and workers) exposed to DU and other radioactive and mixed waste to higher headquarters.

(2) Medical treatment facilities.

(a) Perform assessment and treatment of soldiers exposed to radioactive and mixed waste materials.

(b) Perform bioassays of soldiers for radiological exposure IAW OTSG guidance.

(c) Record radiation doses in soldiers' medical records (when bioassays are processed) during surgical procedures or medical treatment IAW unit SOP. Assure bioassay results are sent to the U.S. Army Ionizing Radiation Dosimetry Center (AIRDC) for inclusion in the dosimetry records.

(d) Explain hazards and treatment protocols to all exposed or contaminated soldiers.

(e) Establish, operate, and maintain radiological patient decontamination stations.

(3) Preventive Medicine personnel will do the following:

(a) Provide advice and assistance to commanders and staffs on radiological and mixed waste hazards.

(b) Provide advice to unit commanders and staffs on protective measures to be employed while processing contaminated materiel.

(c) Provide or obtain interpretation of bioassay results.

(d) Assist radiological survey teams, if needed.

(e) Ensure that uncontaminated water is available for consumption and hygiene.

c. Explosive Ordinance Disposal (EOD) Support.

(1) Process suspected ordnance in support of equipment recovery/evacuation efforts.

(2) Supervise separation of contaminated from non-contaminated munitions during storage and retrograde operations.

(3) Provide awareness training on recognition of munitions hazards and handling procedures to soldiers involved in the recovery and retrograde of contaminated materiel that may contain unexploded, damaged, or spent ordnance.

d. Maintenance Support.

(1) Unit Level Maintenance Support.

(a) Complete BDAR, recovery and retrograde operations IAW FM 9-43-2, TB 9-1300-278, AR 700-48 and this pamphlet.

(b) Establish and operate a collection point for contaminated equipment awaiting repair or evacuation. Contaminated equipment should be separated from uncontaminated equipment.

(c) Coordinate the movement of contaminated equipment requiring evacuation for retrograde with transportation personnel.

(2) Direct Support/General Support (DS/GS) level maintenance organizations:

(a) Establish and operate a collection point for contaminated materiel awaiting repair or evacuation. Contaminated equipment should be separated from that uncontaminated equipment.

(b) Coordinate the movement of contaminated materiel requiring evacuation with transportation personnel.

(3) Depot Level Maintenance Support. Depot level support personnel will complete repair of decontaminated damaged materiel and return materiel to normal supply channels.

E–4. Outside Assistance.

a. Radiation Surveys. If the problem is beyond the scope of the local assets,contact:

(1) Higher headquarters RSO. The RSO will arrange for other staff support, as needed.

(2) Through channels, the Army Contaminated Equipment Retrograde Team in appendix F, the Army Radiation Control (RADCON) Team in appendix G and the Army Radiological Advisory Medical Team (RAMT) in appendix H.

b. Wipe Tests. A 'wipe test,' or assay of a piece of filter paper or other acceptable media, is a primary method of confirming the presence of removable contamination or ruling it out. The test is a necessary complement to radiation surveys performed with instruments such as the AN/VDR-2 or the AN/PDR-77. Wipe tests should be taken and sent to the laboratory location directed by the Army commodity licensee. The RSO can advise on how to take wipe tests.

Qualified Army laboratories are listed below. Before sending wipes, call ahead to the laboratory and alert the staff that wipes will be forthcoming.

(1) OCONUS, send wipe tests to:

(a) Germany/Europe Theater (Pirmasens)—Director, US Army TMDE Region-Europe, ATTN: AMSAM-TMDE-GE-PN, (CMR 434), APO AE 09138. Telephone DSN 495-6486, Comm 011-49-6331-6486.

(b) Korea Theater (Camp Carroll)—Commander, 2nd Maintenance Company (TMDE)—ATTN: AMSAM-TMDE-GP-KR (Unit 15376), APO AP 96260-0276. Telephone DSN 315-765-7698, Comm 011-82-545-9707698.

(2) CONUS, send wipes to (only one):

(a) Director, US Army TMDE Activity, ATTN: AMSAM-TMD-SR-C, Redstone Arsenal AL 35898-5400. Telephone DSN 746-0472, Comm (205) 876-0472 FAX: DSN 746-3816, COMM: (205) 876-3816 EMAIL: howard@redstone.army.mil.

(b) Commander, U.S. Army Soldier and Biological Chemical Command, ATTN: AMSSB–RCB–RS, 5183 Blackhawk Road, Aberdeen Proving Ground, MD 21010–5400, telephone DSN 584–2342, comm (410) 436–2342, FAX DSN 584–6268, comm (410) 436–6268, E-mail: sbccom.apgea.army.mil.

(c) Commander, U.S. Army Communications-Electronics Command, ATTN: AMSEL-SF-RE (Evans), Fort Monmouth, NJ 07703-5036. Telephone DSN 987-5370, Comm (908) 427-5370.

(d) Commander, Rock Island Arsenal Independent Lab, ATTN: SIORI-SEM-L, Rock Island, IL 61299-5000. Telephone 793-7889, Comm (309) 782-7889.

(e) Commander, U.S. Army Center for Health Promotion and Preventive Medicine, ATTN: MCHB-ML-RICD, Aberdeen Proving Ground, MD 21010-5422. Telephone DSN 584-2619/4375, Comm (410) 671-2619/4375.

(3) Wipes should be sent inside an envelope that is inside of a second envelope. Ensure that the words 'mail room, do not open' and 'wipe tests' are written on one of the envelopes.

(4) Acceptable radioactive contamination levels for areas and equipment are described in appendix J.

c. Radioactive Commodity Assistance. For technical assistance with radioactive commodity incidents and contamination from AMC commodities after the LAR/LAO notification, contact the following, through channels, as applicable:

(1) Aviation and Missile Command (Compasses, Watches, Aviation Parts)—Commander, AMCOM, ATTN: AMSAM-SF-R, Redstone Arsenal, AL 35898-5000, Telephone DSN 897-2114, Comm (205) 813-2114.

(2) Tank –Automotive and Armaments Command-Rock Island (Chemical Agent Alarms, Chemical Agent Monitors, Tritium Fire Control Devices)—Director, TACOM-RI, ATTN: AMSTA-AC-SF, Rock Island, IL 61299-6000. Telephone DSN 793-2962/65. Comm (309) 782-2962/65.

(3) Communications-Electronics Command (RADIAC Calibrators, RADIAC Meters)—Commander, CECOM, ATTN: AMSEL-SF, Fort Monmouth, NJ 07703-5000. Telephone DSN 987-3112, press '0.' Comm (908) 427-3112, press '0.'

(4) Industrial Operations Command (DU Ammunition, Light Antitank Weapon)—Commander, IOC, ATTN: AMSIO-DMW, Rock Island, IL 61299-6000. Telephone DSN 793-2933, Comm (309) 782-2933.

(5) Tank-Automotive and Armaments Command (Abrams Tank DU Armor, Vehicle Radium Dials/Gauges, Abrams Tank Combustor Thorium Liner, MC-1 Soil Density Moisture Gauges)—Commander, TACOM, ATTN: AMSTA-CS-CZ, Warren, MI 48397-5000. Telephone DSN 786-6121/7635 (Duty Hours) and DSN 786-5511 (Off Duty Hours), Commercial (810) 574-6121/7635 (Duty Hours) and (810) 574-5511 (Off Duty Hours).

(6) Soldier and Biological Chemical Command (M8A1/M43A1 Chemical Agent Detector, Chemical Agent Monitor, Improved Chemical Agent Monitor CAM/ICAM) and M88/M22 Automatic Chemical Agent Detector (ACADA), Commander, SBCCOM, ATTN: AMSSB–RCB–RS, 5283 Blackhawk Road, Aberdeen Proving Ground, MD 21010–5400. Telephone DSN 584–7118/2287.

d. Radioactive Waste Disposal. Industrial Operations Command, Low Level Radioactive Waste Disposal Office, home base for the ACERT—Commander, IOC, ATTN: AMSIO-DMW (ACERT), Rock Island, IL 61299-6000. Telephone 793-2933, Comm (309) 782-2933. Nights/Weekends call DSN 793-6001, Comm (309) 782-6001.

e. Radiation Bioassay and other Radiation Consultations- U.S. Army Center for Health Promotion and Preventive Medicine—Commander, CHPPM, ATTN: MCHB-OIC-HI, Aberdeen Proving Ground, MD 21010-5422. Telephone DSN 584-3502/3548, Comm (410) 671-3502/3548, Nights/Weekends DSN 584-4375, Comm (410) 671-4375.

f. Radiation Accident/Incident Investigation—U.S. Army Safety Center, Fort Rucker, AL 36362. Telephone. DSN 558-2539. Comm (334) 255-2539.

g. Radiation Accident Reporting—Army Operations Center, HQDA—Headquarters, Department of the Army, The Pentagon, Washington, DC 20310. Telephone DSN 227-0218, Comm (703) 697-0218.

h. Radiation Dosimetry—Director, U.S. Army TMDE Activity, ATTN: AMSAM-TMDE-SR-D, Bldg 5471, Redstone Arsenal, AL 35898-5400. DSN 746-1858, Comm (205) 876-1858 Fax: DSN 746-3816, Comm. (205) 876-3816, email: IRBD@redstone.army.mil.

Appendix F
Army Contaminated Equipment Retrograde Team

F–1. Mission

The Army Contaminated Equipment Retrograde Team (ACERT) is a standby team of individuals formed and operating under the direction of the Chief, Safety/Radioactive Waste Team, U.S. Army Industrial Operations Command. They may be contacted by mail at: Commander, U.S. Army Industrial Operations Command, ATTN: AMSIO-SF, Rock Island, IL 61299-6000. They may be contacted by phone, fax, or email at: DSN 793-4815, Comm (309) 782-4815, Facsimile DSN 793-2988 Comm Facsimile (309) 782-2988, email amsio-sf@ioc.army.mil. The Chief, Safety/Radioactive Waste Team or designate will direct the team during training or deployment. The team's mission is:

a. Provide a combat/non-combat team capable of worldwide response for accidents/incidents involving the retrograde of RCE.

b. Develop and provide plans for the retrograde of contaminated equipment as required to support Army operations.

c. When deployed, act as the primary point of contact for retrograde of contaminated material and low level radioactive waste disposal.

d. Respond to requests for assistance from major commands with contaminated equipment, and no means for disposition.

e. When requested, provide on-site assistance to commanders and Radiation Safety Officers with contaminated equipment.

f. Operate a central contaminated equipment storage and control area supporting theater operations under the direction of the Theater Commander.

g. Take possession of contaminated equipment waiting retrograde from theater of operations.

h. As necessary, provide technical assistance on the use, storage, and disposal of radioactive and mixed waste materials as related to contaminated equipment.

i. Provide technical assistance on maintaining the health and safety of personnel handling contaminated equipment.

F–2. Composition

The composition of the team will include but is not limited to:

a. Team Chief and dedicated personnel from the Safety/Radioactive Waste Team, HQ IOC (AMSIO-SF), providing both health physics and radioactive/mixed waste planning expertise.

b. Contractual staffs as needed to accomplish missions, based on existing contractual agreements set up by HQ, IOC.

c. Individuals, civilian and military, as designated by the commander of the unit(s) requiring assistance.

d. Other personnel as designated by HQ, AMC or Headquarters, Department of the Army.

F–3. Operation

a. Upon deployment, the ACERT will report to the on-scene commander or senior officer in charge at the designated site.

b. The ACERT will utilize other Army assets when needed.

c. The ACERT will coordinate response planning with other Army assets to ensure effective operations and use of Army resources.

F–4. Procedures

a. Members of the ACERT will remain ready to deploy on short notice to incidents involving radioactive material and mixed waste contamination after notification from higher headquarters. These include but are not limited to:

(1) Combat situations involving wheel or tracked vehicles and accidents/incidents involving depleted uranium contamination and radioactive commodities.

(2) Non-combat:

(a) Fires/incidents/accidents involving wheel or tracked vehicles, where the presence of radioactive materials or mixed waste has been confirmed.

(b) Accidents involving fire control devices, chemical agent detectors/monitors, and soil moisture density testers or other radioactive commodities where the likelihood of radioactive contamination has been confirmed.

(c) Any storage or transportation incident or accident in which ammunition containing deplete uranium has been involved.

(d) Structural incidents (buildings, warehouses, etc) in which radioactive materials or mixed waste are involved.

b. The ACERT will maintain adequate equipment and supplies through prepositioned storage to sustain operations until additional materials are deployed to the site.

c. The ACERT members will be trained to handle contamination of all types of Army equipment. Team members will receive initial and periodic refresher radiation safety and response training.

d. Upon deployment, the ACERT Team Chief will assume control of the teams. Upon arrival at the deployment site, the Team Chief will:

(1) Report to the commander of the unit requesting the team's services for a situation briefing and to brief him or her on the team's capabilities. After assessment of the situation, the Team Chief will augment the team with unit personnel and equipment, as available.

(2) Provide assistance according to the team's established procedures.

(3) Set up coordination and communication with higher headquarters (HQ, AMC) and ensure that an open line of communication continues to exist throughout the mission.

(4) Request and supervise other accident response assets (RADCON Team, RAMT, other available assets) as needed to accomplish the retrograde mission.

(5) Communicate as needed with federal, state, or host nation officials as the mission progresses.

F–5. ACERT Services

The ACERT services may be obtained through the Army Operations Center (DSN 227-0218 or Commercial (703) 697-0218).

Appendix G
U.S. Army Radiological Control (RADCON) Team

G–1. RADCON

U. S. Army Radiological Control Team. The U.S. Army Radiological Control (RADCON) Team provides technical assistance and advice to the On-Scene-Commander and/or site Radiation Safety Officer (RSO) on radiological identification as a part of the response to accidents or incidents involving radioactive materials.

G–2. Team consistency

The team consists of members trained to survey radiological accident or incident sites. The support of the team provides, includes, but is not limited to the performance of radiological surveys for alpha, x-ray, beta, and gamma radiation for the identification of radioisotopes and the control and containment of radiological contaminants.

G–3. Team training

Team members are trained in techniques for radiation monitoring and air sampling. The team maintains an inventory of radiological survey equipment for radiation monitoring and air sampling. RADCON team tervices may be obtained through the Army Operations Center.

Appendix H
U.S. Army Radiological Advisory Medical Team (RAMT)

H–1. RAMT

The U.S. Army Radiological Advisory Medical Teams (RAMT) assists and furnishes radiological health hazard guidance to the On-Scene Commander (OSC) or other responsible officials at an accident site, and the Installation Medical Authority (IMA). The Commanding General, Walter Reed Army Medical Center (CG, WRAMC), establishes the RAMT with primary responsibility in the Continental United States (CONUS). The CG, 7th Medical Command, establishes the RAMT with primary responsibility throughout Europe. Either RAMT may be deployed to other areas of the world as required or to assist the other team upon request.

H–2. The RAMT provides the following functions:

a. Guidance relative to the potential health hazards to personnel from radiological contamination, or exposure to ionizing radiation.

b. Evaluation of survey data to provide technical guidance to the responsible officials utilizing radiologically contaminated areas.

c. Monitoring medical facilities and equipment where contaminated patients have been evacuated.

d. Advising the commander regarding the potential health hazards from exposure to sources of ionizing radiation and the decontamination of personnel, medical treatment facilities, and medical equipment.

e. Advising on early, and follow-up, laboratory and clinical procedures.

f. Assisting the OSC with the bioassay program.

H–3. Composition of RAMT

Each RAMT is comprised of a team leader, who is a nuclear medical science officer (AOC 72A) with training in monitoring and dose evaluation, one medical corps officer, nuclear medicine officer (60B), occupational medicine officer (60D), preventive medicine officer, medical oncologist (61B), therapeutic radiologist (61Q), or diagnostic radiologist (61R). A minimum of two health physics technologists with military occupational specialty (MOS 91SN430 or 91S40) with appropriate health physics training. Additional personnel or personnel with other training or experience may be utilized as determined by the RAMT leader.

H–4. Further Information

Additional information can be obtained from the Commander, Walter Reed Army Medical Center (WRAMC) Health Physics Office, Building 41 Room 38, 6825 16th Street NW, Washington, D.C., 20307-5001 (phone (202) 356-0058 or fax (202) 356-0086) or by referring to AR 40-13, reference (ai). RAMT services should be requested through the Army Operations Center (DSN 227-0218 or Commercial (703) 697-0218).

Appendix I
Radioactive Commodities Contamination Concerns

I–1. General

Source rupture is bad—typical of total destruction of the item or if the item is on fire.

I–2. Tritium Commodities

Outdoors, continue with the mission but double-bag & tag (handle with appropriate licensed care) ASAP. In enclosed areas, it is a problem. Risk is essentially internal (body) only.

I–3. Contamination from DU munitions

(Combat vehicles damaged by DU fire or combat vehicles containing DU armor that have been damaged in any way) Always a problem. Risk is primarily from internal (body) exposure.

I–4. M43A1/CAM/TACADA (Am-241/Ni-63)

Any form of physical damage is a problem. Risk is primarily from internal (body) exposure.

I–5. MC1 Soil Moisture Density Tester (Cs-137 & Am/Be)

Any form of physical damage is a problem. Risk is primarily from an external exposure but if the integrity of the source has been breached (from total destruction or burning, not from minimal physical damage), then a significant internal problem in addition to an external exposure problem.

I–6. AN/UDM-2 (Sr/Y-90) and AN/UDM-6 (Pu)

Any form of physical damage, it is a problem. Risk is primarily from internal exposure.

I–7. Night Vision Devices (Th-232)

Any evidence of ’flaking’ from the coated glass or physical damage to the glass is a problem. Risk is primarily from internal exposure.

I–8. Foreign Equipment.

See Chapter 5 for specific details.

Appendix J
Recommended Maximum Free Release Limits for Radioactive Contamination

This appendix provides the recommended maximum free release limits for radioactive contamination.

Table J–1
SURFACE RADIOACTIVITY VALUES1,2 IN DPM/100 CM^2

Nuclide	Removable2,3	Total (Fixed + Removable)2
U-238 Depleted Uranium	1,000	5,000
Ra-226	20	500
Th-232, Sr-90	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above4	1,000	5,000
Tritium organic compound; surface contaminated by HT, HTO, and metal tritide aerosols	10,000	10,000

Notes:

[1] From 10 CFR 835, appendix D. The values in this table apply to radioactive contamination deposited on, but not incorporated into the interior of, the contaminated item. Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, apply the limits established for alpha- and beta-gamma-emitting nuclides independently.

[2] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[3] The amount of removable radioactive material per 100 cm2 of surface area should be determined by swiping the area with a dry filter or soft absorbent paper, applying moderate pressure, and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. (Note: The use of dry material may not be appropriate for tritium.) When removable contamination on objects of surface area less than 100 cm2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. Except for transuranics and Ra-228, Ac-227, Th-228, Pa-231 and alpha emitters, it is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

[4] This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 that has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

Appendix K
Suggested Supplies

K–1. Purpose

The annex identifies supplies to have on hand in order to manage items contaminated with RCE. These items are not all-inclusive and may be substituted for as supply levels and conditions allow. Where available, National Stock Numbers are listed to assist with ordering.

K–2. Equipment

ITEM NSN NOTES

a. Radiac meter AN VDR2 6665-01-222-1425
b. Radiac meter AN PDR 77 with RPO kit 6665-01-347-6100
c. Vacuum with High-Efficiency Particulate filter Local procurement
d. Spade shovels 5120-00-293-2516
e. Scoop shovels 5120-00-188-8446
f. Pick 5120-00-194-9458
g. Shears 5130-00-595-9734
h. Scissors 5110-00-162-2202
i. Tongs 7330-00-616-0997
j. Screw drivers 5120-00-357-7175 or 5120-00-103-9743
k. Wrench Set, Metric 5120-00-176-1819
l. Wrench Set, SAE 5120-00-148-7917
m. Socket Set, Metric Socket Set 5120-00-935-7315
n. Socket Set, SAE Socket Set 5120-00-322-6231

o. Hammer, Sledge 5120-00-224-4139
p. Hammer, Carpenters 5120-00-892-5485
q. Hammer, 5 lb. hammer 5120-00-900-6095
r. 100 lb. hammer 5120-00-900-6097
s. Knife, Pocket 5110-00-240-5943
t. Knife, Survival 5110-01-321-8805
u. Pry bar 5120-00-224-1389
v. Milvan 5120-00-224-1384

K–3. Supplies

a. Protective Clothing.
(1) Coveralls, Anti-c Local Procurement.
(2) Gloves, Leather 8415-01-134-8233.
(3) Gloves, NBC protective 8415-01-033-3517 to 3520.
(4) Gloves, Surgical Local Procurement.
(5) Covers, Helmet, CP 8415-01-111-9026.
(6) Covers, Footwear, CP 8430-01-021-5978.
(7) Goggles 7240-00-052-8776.
(8) Mask, Protective, (M17 or M40 series M17 4240-00-542-4452 Check Unit TO&E or equivalent) M40 4240-01-255-0063.
(9) Overgarment, Battle Dress 8415-01-327-5346 to 5353.
(10) Boots, Leather Local Procurement.
(11) Face Shield 4240-00-542-2048.
b. First Aid. 91B medical aid bag or equivalent Local Procurement.
c. Posting/Marking.
(1) Rope 4020-00-960-1356.
(2) NBC marking set 9905-01-346-4716.
(3) Radiation labels 9905-12-132-2579.
(4) UXO signs Local Procurement.
d. Radiobioassay.
(1) Swabs, Cotton Local Procurement.
(2) Bottle, Polyethylene Bags, Plastic, Zip-lock 8105-00-837-7757.
(3) Swipes Local Procurement.
(4) Envelopes 8105-00-290-0330.
(5) Tweezers 5120-00-542-2348.
(6) Forceps 5120-00-012-4013.
e. Decontamination.
(1) Soap, Hand 8520-00-228-0598.
(2) Cleanser 7930-01-346-4289.
(3) Gauze Local procurement.
(4) Towel, Paper 8540-01-169-9010.
(5) Cotton balls Local procurement.
(6) Hand cream Local procurement.
(7) Pail, Metal, 14 qt 7240-00-160-0455.
(8) Can, Galvanized, 32 gal 7240-00-160-0440.
(9) Brush, Long Handle 7920-00-141-5452.
(10) Sponge, Heavy duty 7920-00-884-1116.
(11) Buckets Local procurement.
f. Radioactive Waste Disposal.
(1) Drum, 30 gallon / 55 gallon drums with lids 8110-00-030-7780.
(2) Bag, Plastic, 55 gallon, 4 mil 8105-00-655-8286.
(3) Bottles, Plastic Local Procurement.
g. Miscellaneous.
(1) Paper tablet 7510-00-823-8072.
(2) 100 mile/ hr tape 7510-00-823-8072.
(3) Masking tape 7510-00-266-6710.
(4) Tape, Duct 5640-00-103-2254.

(5) Pencils, Graphite 7510-00-286-5755.
(6) Pencils, Grease 7510-00-240-1525 or -1526.
(7) Pens, Marking Local Procurement.
(8) Pens, Writing 7520-01-357-6841.
(9) Log books 7530-00-222-3525 and 7520-00-286-8363.
(10) Camera with film Local Purchase.
(11) Tarpaulin, Canvas 8340-00-205-3325.
(12) Tarpaulin, Plastic (griffolyn) Local Procurement.

Glossary

Section I
Abbreviations

AIRDC
U.S. Army Ionizing Dosimetry Center

ALARA
As Low As Is Reasonably Achievable

ACERT
Army Contaminated Equipment Retrograde Team

BDAR
Battlefield Damage Assessment and Repair

CONUS
Continental United States

CTT
Common Task Training

DB
Double Bagging

DS/GS
Direct Support/General Support

DU
Depleted Uranium

EOD
Explosive Ordnance Disposal

FSTC
Foreign Science and Technology Center

FORSCOM
U.S. Army Forces Command

CG
Commanding General

IAW
In Accordance With

IOC
Industrial Operations Command

IHO
Industrial Hygiene Officer

IMA
Installation Medical Authority

JTF
Joint Task Force

LAR/LAO
Logistics Assistance Representative/Logistics Assistance Officer

LLRW
Low-Level Radioactive Waste (Radioactive Waste)

LRPO
Local Radiation Protection Officer

MACOM
Major Army Command

METT-T
Mission, Enemy, Terrain, Troops, Time

MOPP
Mission-Oriented Protective Posture

NBC
Nuclear, Biological, and Chemical

NRC
Nuclear Regulatory Commission.

OEG
Operational Exposure Guidance

OSC
On-Scene Commander

OOTW
Operations Other Than War

PPE
Personnel Protective Equipment

QASAS
Quality Assurance Specialist Ammunition Surveillance

RADCON
Army Radiological Control Team

RADIAC
Radiation Detection, Indication and Computation

RAMT
Army Radiological Advisory Medical Team

RCE
Radiologically Contaminated Equipment

RCO
Radiation Control Officer

RPO
Radiation Protection Officer

RPSO
Radiation Protection Staff Officer

RSO
Radiation Safety Officer/

SITREP
Situation Report

SOP
Standing Operating Procedures

TI
Technical Inspection

TMDE
Test, Measurement, and Diagnostic Equipment Activity

USAMC
U.S. Army Materiel Command

WRAMC
Walter Reed Army Medical Center

Section II
Terms

As Low As Is Reasonably Achievable
The principle of making every reasonable effort to maintain exposures to radiation as far below the dose limits in Part 20 of Title 10 of the Code of Federal Regulations as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to the benefits to the public health and safety, and other societal, socioeconomic considerations and in relation to utilization of nuclear energy and licensed materials in the public interest.

Decontamination
The process by which radioactive and/or mixed waste materials are removed from materiel.

Depleted Uranium
A by-product of the uranium fuel enrichment process. As a result, this by-product or waste stream contains lower concentrations (depleted) of the U-234/U-235 radioisotopes than was contained in the original natural uranium ore.

Double Bagging
The process of taking the necessary steps to contain the radioactive material to decrease the chance of radiological contamination spreading. On the bag mark the following information: date, time, location of bagging, suspected isotope, suspected activity of the isotope, and the names of all personnel involved with the material. Small materials that are radiologically contaminated may require the materials be placed into a plastic bag, or similar type container, and then that plastic bag be placed into another plastic bag with proper tagging. Larger radiological contaminated materials, i.e. vehicles, tanks, will need to be contained by wrapping the entire vehicle. Plastic wrap, traps, shrink wrap or any other material that will encompass the entire vehicle so that the spread of contamination is minimized to the fullest extent possible.

Foreign items
Materiel manufactured by other countries.

Free release
Decontaminated materiel released for unrestricted use by the general public.

Health physics
The science of determining, evaluating, and controlling the health effects of exposure to ionizing radiation.

Host nation
A nation in which representatives or organizations of another state are present because of government invitation and/or international agreement.

Host Nation Support
Civil and/or military assistance rendered by a nation for foreign forces within its territory during peacetime, crises or emergencies, or war based on agreements mutually concluded between nations.

Industrial Hygiene Officer
The individual designated by the commander as chief advisor and responsible party for all matters related to mixed waste within an individual command.

Low-Level Radioactive Waste (Radioactive Waste)
Unwanted solid, liquid, or gaseous material that contains radionuclides regulated under the Atomic Energy Act, as amended, and falls below the threshold for activity and quantity listed in 10 CFR 62.2, and is of negligible economic value considering the cost of recovery.

Material
Equipment, vehicles, and other commodities to include supply items.

Mission-Oriented Protective Posture
Protective clothing and equipment used to operate in an NBC contaminated combat environment.

Mixed waste
Hazardous waste as defined by the U.S. Environmental Protection Agency in combination with LLRW.

Operational Exposure Guidance
Instructions from the Commander as to the allowable radiation exposures for soldiers in a certain operation or situation, with respect to radiation dose levels and/or radioactive contamination. The OEG will be determined in consultation with the Command Surgeon.

Radiation safety
For the purposes of this regulation, a scientific discipline whose objective is the protection of people and the environment from unnecessary exposure to radiation. Radiation safety is concerned with understanding, evaluating, and controlling the risks from radiation exposure relative to the benefits derived. Same as 'health physics' and 'radiation protection.'

Radiation Control Officer/Radiation Protection Officer/Radiation Protection Staff Officer/Radiation Safety Officer
The individual designated by the commander as chief advisor and responsible party for all matters related to radioactive materials within an individual command.

Radioactive commodities
Commodities that contain radioactive materials.

Radiologically Contaminated Equipment
U.S. or foreign Modified Table(s) of Organization and Equipment (MTOE), Common Table(s) of Allowances (CTA), Table(s) of Distribution Allowance (TDA), or Prescribed Load List (PLL) items that were contaminated by depleted uranium or radioactive commodities as a result of combat action, maintenance activities or accidents.

Retrograde
Overseas commands return (retrograde) materiel to CONUS. Retrograde cargo normally consists of unserviceable, economically repairable items and weapon systems destined for depot repair. MMC has responsibility for the coordination and direction of all shipments. The extraction of an abandoned, disabled, or immobilized vehicle and if necessary, its removal to a maintenance point.

Risk assessment
The first two steps of the risk management process. The formal or informal process used to determine the total impact of a single or several risks present on a given population for the purpose of determining appropriate actions of preserving personnel health and safety. Assessment of risk must consider the resulting effects on environmental damage. There are Health Risk Assessments and Safety Risk Assessments (FM 101-5).

Risk decision
The decision to accept or not accept the risk(s) associated with an action made by the individual responsible for performing that action.

Risk management
The process of weighing identifying and controlling hazards to protect the force.

Risk management process
The process of identifying and controlling hazards to protect the force. It includes five steps that represent a logical thought process from which users develop tools, techniques, and procedures for applying risk management in their areas of responsibility. It is a closed-loop process applicable to any situation and environment. Its five steps are:

a. Identify hazards: Identify hazards to the force. Consider all aspects of the current and future situations, environment, and known historical problem areas.

b. Assess hazards: Assess hazards to determine risks. Assess the impact of each hazard in terms of potential loss and cost.

c. Develop controls and make risk decisions: Develop control measures that eliminate the hazard or reduce its risk. As control measures are developed, reevaluate risks until all risks are reduced to a level where benefits outweigh potential costs.

d. Implement controls: Put controls in place that reduces the risk.

e. Supervise and evaluate: Enforce standards and controls. Evaluate the effectiveness of the controls and adjust/update as necessary.

Risk management integration
The method of firmly fixing the risk management process as a principle for individuals and organizations.

Tagging
The process of identifying that a material is radiologically contaminated. To properly tag a material the following information is necessary:

a. Name and signature of Personnel that determined the material was radiologically contaminated or suspected to be.
b. The location were the material was surveyed.
c. Date and Time.
d. Type of isotope if known.
e. Activity or level of contamination found.

The information should be placed onto a card that can be attached with wire strand, adhesive back tape, or taped on to the material so that others dealing with the material know what they are working with.

Transportation Standards
U.S. Department of Transportation requirements established under Title 49 of the Code of Federal Regulations.

Unrestricted use
Same as Free Release.

Unwanted radioactive material
Radioactive materials that have been damaged or have reached the end of their useful life and have been determined to no longer serve the purpose for which they were intended.

Section III
Special Abbreviations and Terms
There are no entries in this section