Department of the Army
Pamphlet 700–48

Logistics

Handling Procedures for Equipment Contaminated by Radioactive Commodities

Headquarters
Department of the Army
Washington, DC
5 March 2021

UNCLASSIFIED

SUMMARY of CHANGE

DA PAM 700–48
Handling Procedures for Equipment Contaminated by Radioactive Commodities

This major revision, dated 5 March 2021—

- Updates the publication title for clarity (cover).
- Updates references to agencies and teams that can provide on-site assistance with retrograde, surveying, and decontamination of radiological contaminated equipment (para 2–2).
- Updates noncombat radiological contaminated equipment recovery procedures (para 2–3).
- Clarifies radiological advisory medical team structure and deployment information (para 2–4).
- Updates the table guide to retrograde conditions (table 2–1).
- Clarifies radiation safety procedures for specific materials (para B–2).
- Clarifies bioassay procedures (para E–3*b*).
- Updates names, roles, contact information (throughout).
- Adds references to AR 385–10 (throughout).
- Adds technical references TM 5–6635–350–13&P, TM 3–11.91, and TB 43–0197 (throughout).

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Handling Procedures for Equipment Contaminated by Radioactive Commodities

By Order of the Secretary of the Army:

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History. This publication is a major revision.

Summary. This pamphlet prescribes handling procedures for equipment contaminated with depleted uranium 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 the Regular Army, the Army National Guard/Army National Guard of the United States, and the U.S. Army Reserve, unless otherwise stated. It also applies to Department of the Army commands, installations, and activities. This pamphlet remains applicable to Department of the Army 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 pamphlet is the Deputy Chief of Staff, G–4. The proponent has the authority to approve exceptions or waivers to this pamphlet that are consistent with controlling law and regulations. The proponent may delegate this approval authority, in writing, to a division chief within the proponent agency or its direct reporting unit or field operating agency, in the grade of colonel or the civilian equivalent. Activities may request a waiver to this pamphlet by providing justification that includes a full analysis of the expected benefits and must include formal review by the activity's senior legal officer. All waiver requests will be endorsed by the commander or senior leader of the requesting activity and forwarded through their higher headquarters to the policy proponent. Refer to AR 25–30 for specific guidance.

Suggested improvements. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) directly to the Deputy Chief of Staff, G–4 (DALO–SUS), 500 Army Pentagon, Washington, DC 20310–0500.

Distribution. This pamphlet is available in electronic media only and is intended for the Regular Army, the Army National Guard/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 27 September 2002.

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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 material (RAM) as a result of exposure to damaged depleted uranium (DU) munitions or armor or to damaged radioactive commodities.

1–2. References and forms
See appendix A.

1–3. Explanation of abbreviations and terms
See the glossary.

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

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

(1) Each Army Headquarters (HQ) commanding general.

(2) The Superintendent, United States Military Academy.

(3) The Chief, National Guard Bureau (who may delegate deviation authority to the State adjutant generals.)

c. Only personnel listed in paragraph 1–4*b* may approve residual risk levels deemed to be too high or extremely high. Authority to accept residual risk will be per DA Pam 385–30.

d. Grant deviations for one year or less. The proper 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 radiological contaminated equipment (RCE) requiring retrograde will be processed consistent with a commander's assessment of conditions and risks to maximize individual safety and keep radiation exposure as low as reasonably achievable.

1–6. Summary for commanders
a. The commander will assume responsibility for risk management based upon the combatant commander's assessment of the risks posed by the operation and the guidance and policies in this pamphlet.

b. In peacetime, comply with the Nuclear Regulatory Commission (NRC) license requirements and all applicable Federal, State, Army, and host nation (including status of RCEs agreements) laws, regulations, and policies regarding RAM and RCE.

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

d. In general, commanders—

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

(2) Ensure that personnel who handle RAM or come in contact with RCE will receive sufficient training per AR 700–48 and AR 385–10 and be trained in the contents of this pamphlet.

(3) Should make sure that personnel will be monitored per AR 385–10 during and after working with RCE and retrograde operations.

e. Local commanders will establish accident-response teams. Commanders at all levels (including installation) should use the trained chemical, medical, and maintenance personnel that are on their staffs to formulate response plans for radiological incidents and accidents. The unit radiation safety officer (RSO) should be a part of the response team. Follow guidance in DA Pam 385–10 on radiation accidents.

Chapter 2
Essential Concepts

Commanders must appoint an RSO at the appropriate unit level. Personnel handling RCE incur a risk of exposure to and contamination from RAM. 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. Monitoring will minimally include surveys of personnel and equipment used, along with bioassay sampling based upon Army NRC license manager guidance (and in collaboration with a medical advisor) to document any internal exposure by RCE handlers. Consult appendices B, C, D, and E for further information regarding this requirement.

2–1. Risk management

Commanders will follow the risk management process in DA Pam 385–30 and ATP 5–19 throughout the entire retrograde process to balance mission needs, protection of personnel, and proper handling of the RCE. 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 available, and civil considerations.

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 RAM will not, in most cases, hinder the use of vehicles and equipment in combat. If the vehicle or equipment is combat ready, RCE may 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 complete. Additional handling guidance is listed in paragraphs 2–2*a* though 2–2*e* for the various phases 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 RAM and mixed waste.

(1) The commander will include operational exposure guidance into all phases of the RCE handling operations using the appropriate guidance found in JP 3–11, TM 3–11.91, and TB 9–1300–278.

(2) Vehicles radiologically contaminated from RCE that are otherwise mission ready may 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 battlefield damage assessment and repair (BDAR) organizations) to facilitate proper follow-up.

b. Phase II—Recovery. Recovery includes BDAR.

(1) RCE may be recovered separately from noncontaminated material.

(2) Treat all material and work equipment suspected of being radiologically contaminated as RCE until such a time as it is identified as clean. Do not remove work equipment 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. Handle this ordnance, which may or may not be in its normal configuration, 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 or death.

(4) As the equipment is inspected, wear the appropriate protective equipment, especially if the BDAR mission requires entering systems that have been hit by DU rounds. (Appendix J provides a list of suggested supplies and equipment involved with these operations.)

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 is informed of the presence of RCE.

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

(a) Double bag RCE in clear plastic bags, seal the bags, and prominently mark suspected radiologically-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. The higher level maintenance control points 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 RCE for disposition or further evacuation. See figures 2–1 through 2–3 for retrograde process flow diagrams, associated unit or command actions, and functions for RCE.

(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 20th Chemical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Command, 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 the higher HQ to obtain the location of the consolidation point. Consolidate all damaged and contaminated U.S. material at this location.

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

(4) Maintenance personnel, in coordination with the RSO, will remove, decontaminate, and repair repairable RCE and prepare the remaining material for shipment out of the theater to a U.S. Army Materiel Command (AMC) designated location.

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

2–3. Noncombat situations

In noncombat situations, RCE should not be used until decontaminated. Steps to isolate RCE, contain any release, and protect personnel from further radioactive contamination should be secondary only to lifesaving when an incident occurs. Request help if needed. Abbreviated handling guidance is listed in paragraphs 2–3*a* through 2–3*d* 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. Assist incapacitated persons as necessary. If a fire occurs, move upwind at least 100 meters. Prevent unauthorized entry to the area.

(2) Report the incident via the local 911 system, which will generate an emergency response by fire & emergency services (F&ES). Upon arrival, F&ES will establish incident command and initiate emergency, stabilization and mitigation actions. The unit's RSO or the unit's chemical, biological, radiological, and nuclear (CBRN) personnel about will respond to the incident and document all actions.

b. Recovery. Only qualified response personnel will identify and separate RCE. Use protective clothing and equipment as prescribed.

(1) Double bag suspected items in clear plastic bags, seal the bags, and mark with the following information: date, time, location of bagging, suspected isotope, suspected activity of the isotope, and 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 RAM collection point established and operated at the command designated maintenance facility.

(1) Recover separately from noncontaminated material.

(2) Treat all material suspected of being radiologically contaminated as RCE until it is identified as uncontaminated. Consider work material and equipment RCE until properly decontaminated.

d. Retrograde. The RSO will assess items identified as contaminated by RAM to determine if the item can be decontaminated and then released for use, decontaminated and/or used per AR 750–1, or packaged appropriately as

radioactive waste and disposed of per all relevant guidance. Exceptions exist for situations when RCE will be recontaminated during an ongoing mission and when RCE does not pose an immediate health and safety concern. (Consult the RSO for these exceptions.)

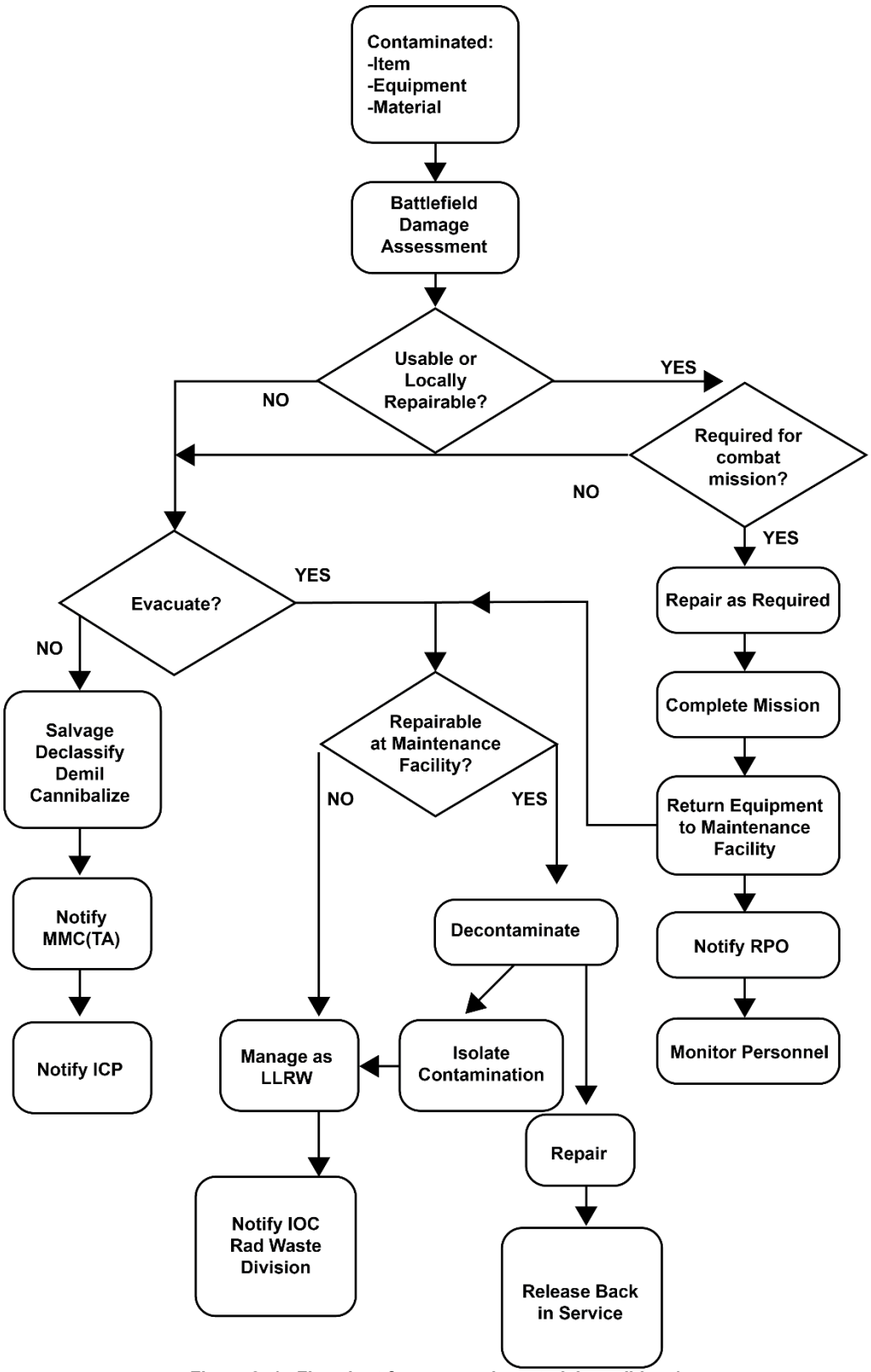

Figure 2–1. Flowchart for retrograde material condition 1

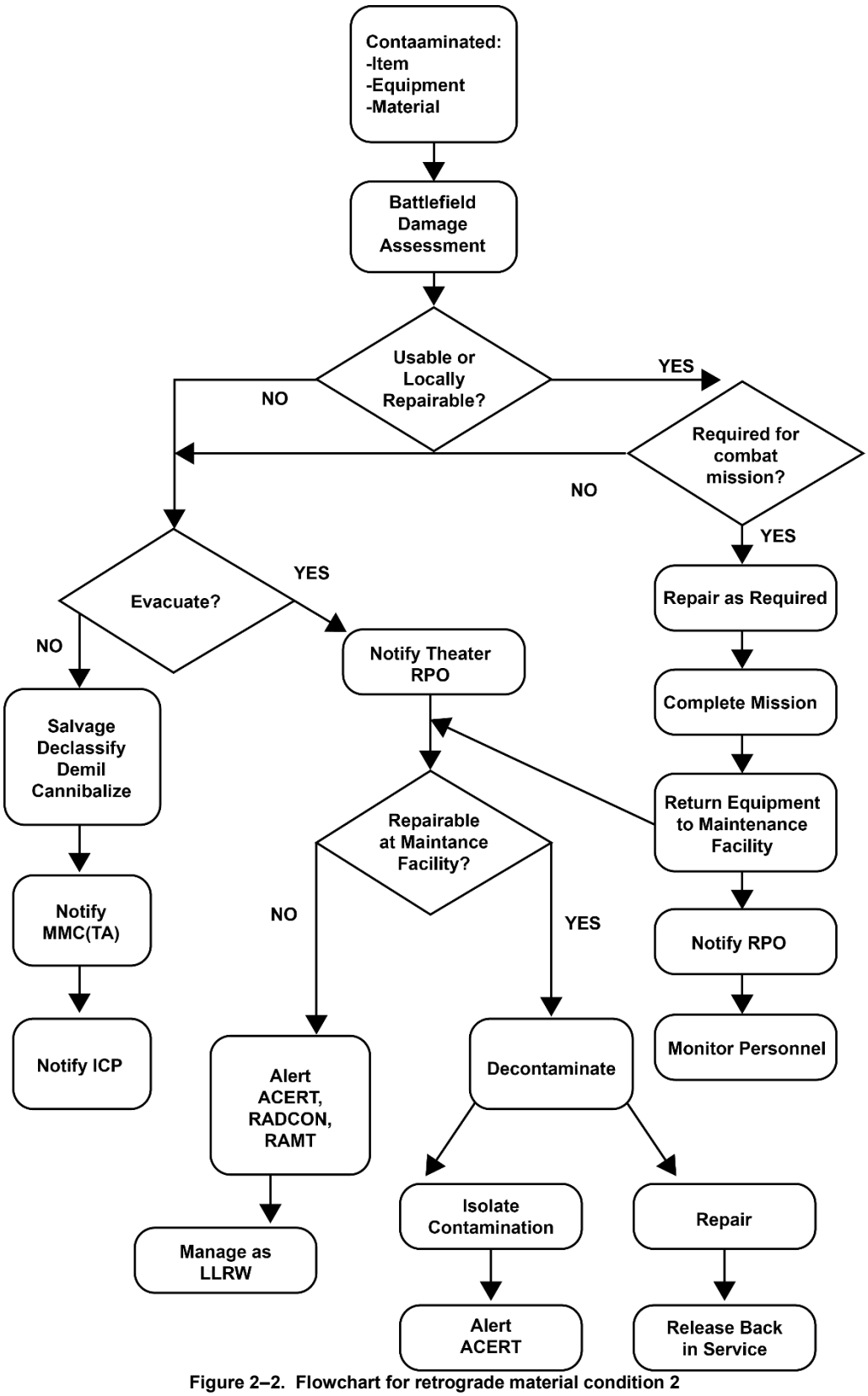

Figure 2–2. Flowchart for retrograde material condition 2

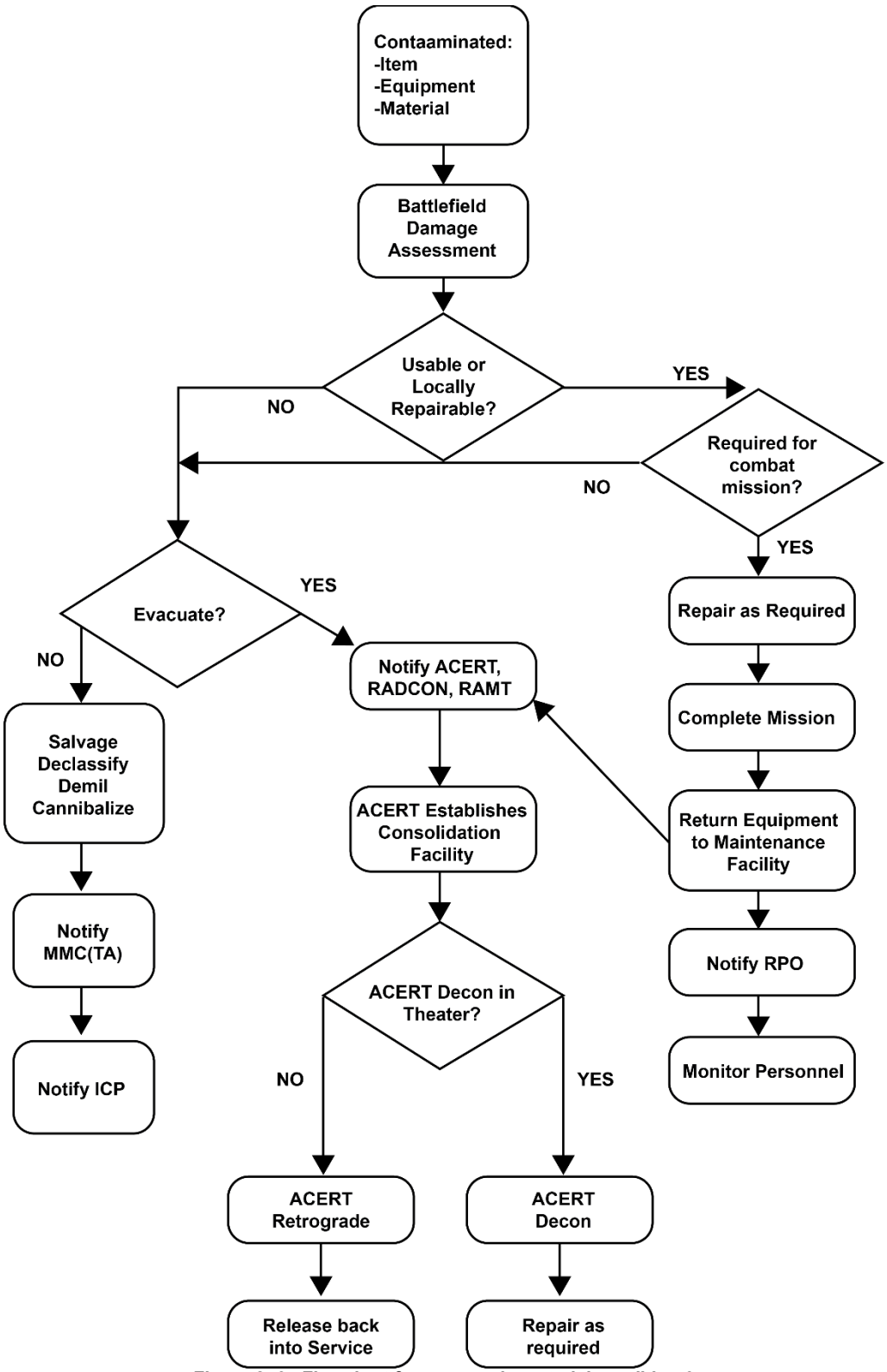

Figure 2–3. Flowchart for retrograde material condition 3

(1) All radioactive commodities described in appendix I will be immediately assessed as radioactive waste. Items that are already properly packaged should not be opened. If necessary for transportation, the item will be overpacked.

(2) Survey all nonradioactive commodities that have been turned in as potentially radiological contaminated materials by the appropriate means (see appendix C). Then, either decontaminate and release them for use or disposal as a normal item, or package them 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, the higher HQ will orchestrate the appropriate response either through command assets or by requesting outside assistance. (See appendices E, F, G, and H for sources of assistance and for more detailed information regarding response capabilities and available assets.) See table 2–1.

Table 2–1
Retrograde conditions

	Conditions	On-site Personnel	Local Radiation Safety Officer (LRSO)	Theater RSO	NRC Licensee	ACERT	20th CBRNE	RAMT
I	Available on site: •Expertise •Equipment •Supplies •Procedures •Capacity	1. Secure site 2. Notify and assist LRSO: •Decon •Package RCE •Ship to collection point	Notify and assist RSO: •Decon •Package RCE •Ship to collection point	1. Notify licensee 2. Provide technical expertise	Notify NRC as appropriate	1. Theatre collection point, as required 2. Provide requested technical assistance 3. Dispose of waste	Alert, if required	Alert, if required
II	Available on site: •Expertise •Equipment •Supplies •Procedures •Capacity	Notify and assist LRSO: •Decon •Package RCE •Ship to collection point	1. Notify RSO 2. Monitor situation	1. Notify licensee 2. Direct actions: •Decon •Package RCE •Ship to collection point	Notify NRC as appropriate	Notify NRC as appropriate	Alert, if required	Alert, if required
III	Beyond theater's ability to manage	1. Secure site 2. Notify LRSO 3. Assist ACERT or 20th CBRNE or RAMT: •Decon •Package RCE •Ship to collection point	1. Notify RSO 2. Monitor situation	1. Notify U.S. Army Joint Munitions Command (JMC) and licensee 2. Request ACERT or 20th CBRNE or RAMT assistance 3. Provide assistance to ACERT or 20th CBRNE or RAMT	Notify NRC as appropriate	1. Direct actions: •Decon •Package RCE •Ship to collection point 2. Operate theater Collection point as required 3. Dispose of waste	1. Direct surveys or risk assessment 2. Work with ACERT or RAMT	1. Direct medical surveys or radiation exposure monitoring 2. Work with ACERT or 20th CBRNE

Table 2–1
Retrograde conditions—Continued

Conditions	On-site Personnel	Local Radiation Safety Officer (LRSO)	Theater RSO	NRC Licensee	ACERT	20th CBRNE	RAMT

Notes:
1. Condition I—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 the combatant commander in chief.
3. Condition III—Vehicle or tank fire, mass casualties involving RAM exposure, contamination in warehouse or RAM collection point because of explosion/fire.

Chapter 3
Specific Guidelines for Radiologically-Contaminated Vehicles

3–1. General

a. This chapter discusses management of RCE that is contaminated with DU. See DA Pam 385–10 for additional guidance.

b. Proper handling of DU RCE consists of the following procedures:

(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 to DU armor and contaminate vehicles and equipment.

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

b. If the decision is made to reuse the contaminated vehicle due to operational necessity, then the vehicle should be decontaminated at the first opportunity. Personnel using the contaminated vehicle will wear respiratory protection and gloves at a minimum and full mission-oriented protective posture (MOPP) gear if practical, and they must be monitored for radiation exposure as soon as practical.

c. If the decision is made to not reuse the contaminated vehicle, shrink wrap or use a tarp or other material to contain the RAM and secure the vehicle; then tag it for removal as RCE. On the shrink wrap, tarp, or other containing material, mark the following information: date, time, location of bagging, suspected isotope. Include the names of personnel involved with the material in documentation with the vehicle. 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.)

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. Telephone: DSN 227–0281, commercial (703) 697–0281. (See appendix E for further information.)

g. When combat operations allow, personnel involved must be monitored for external contamination with DU and may be evaluated by bioassay if internal contamination is suspected.

h. Document the incident as thoroughly as possible for future reference.

3–3. Noncombat situations—general guidelines

a. RCE handling 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 noncombat situations should not be reused until checked and decontaminated as necessary. In the event of an incident—

(1) Leave the vehicle. Assist incapacitated persons as necessary. Remain within sight, or, if there is a fire, move upwind at least 100 meters for vehicles not unloaded and 2,000 meters for uploaded vehicles (see TB 9–1300–278). Do nothing until the RSO and/or responsible authorities arrive. Prevent unauthorized entry to the area.

(2) Report the incident via the local 911 system, followed by contacting the unit's RSO and ensure the chain of command is notified to obtain any required assistance.

(3) Under the guidance and management of the RSO or other authority, assess and contain any spill or release of RAM. Refer to DA Pam 385–10 for the recommended maximum free-release limits and personnel exposure standards for radioactive contamination. Utilize proper protective equipment. (See appendix J 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, and suspected activity of the isotope. Include the names of personnel involved with the material in documentation. (See appendix C for more information on proper record keeping.)

(4) After the incident has been resolved, personnel involved must be monitored for external contamination with DU and may be evaluated by bioassay if internal contamination is suspected.

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

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

Chapter 4
Specific Guidelines for Radiological Contaminated Equipment Other Than Vehicles

Personnel handling of RCE incurs a risk of exposure to and contamination from RAM. 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. Monitoring will include, as a minimum, surveys that collect direct readings of personnel and equipment used, along with bioassays, if appropriate, 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 tank armor

Handle tanks with DU armor that is damaged as radiologically contaminated until a radiation survey indicates that there is no contamination. Address the tank's removable contamination in coordination with the LRSO. The fixed contamination will be addressed in a facility with the licensing (if in the continental United States (CONUS)) and radiation safety requirements and protocols for the situation.

4–3. Depleted uranium munitions or 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 or death. When handling unfired DU ammunition that is in an unknown or damaged condition, follow these procedures:

a. Explosive ordnance disposal (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 the outside of the ammunition and hold wipe (in gloved hand) next to the beta/gamma DT 616 probe (with beta shield open) of the AN/VDR–2 or AN/PDR–77. If the meter reads more than twice the background, contamination may be present. Treat as contaminated per TB 9–1300–278. 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 AR 385–10 for recommended maximum free-release limits for radioactive contamination.) Use an AN/VDR–2 or an AN/PDR–77 radiation detection, indication and computation (RADIAC) calibrator 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 your supporting facility with a qualified laboratory. (See appendix E for addresses.) Potentially contaminated areas should not be used for unrestricted activities until surveyed and cleared by the RSO.

e. Contact the NRC licensee, HQ, JMC, for further information. (See appendix E for address.)

4–4. Tritium commodities

a. Before handling items containing tritium, such as fire control azimuths, level gauges, collimators, and muzzle reference sensors, put on disposable latex or nitrile gloves. Do not eat, drink, smoke, chew, or apply cosmetics when handling the commodities.

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 until proven otherwise.

c. Place contaminated items in double plastic bags (at least four millimeters thick). It is important not to remove the item from the plastic bags until the item reaches its ultimate destination. Ensure that 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 the material to the appropriate level of repair (based on the TI), or turn it in to 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, including the area where the item was damaged. (See AR 385–10 for recommended maximum free limits for radioactive contamination.) Perform a leak test of the item and wipe tests of the storage area and area where the item was damaged (except in an outdoor area) to 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. If located in CONUS, contact the NRC licensee for further information, assistance, and notification. (See appendix E for Tank-Automotive and Armaments Command Life Cycle Management Command (TACOM LCMC) contact information.) The applicable TM, AR 385–10, and DA Pam 385–10 contain further guidance on handling these devices.

4–5. Chemical agent detectors or monitors

If working with M8A1 or M43A1 chemical agent detectors (containing americium-241), the chemical agent monitors containing nickel-63, the improved chemical agent monitor, or the M88 or M22 automatic chemical agent alarms containing nickel-63, follow these procedures:

a. Before handling these items, put on disposable latex or nitrile gloves. Do not eat, drink, smoke, chew, or apply cosmetics when handling the commodities.

b. If the items appear intact and unharmed, the radioactive cell(s) is(are) probably intact also. Normal TI procedures should be followed per TM 3–6665–312–12&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 clear bags (at least four millimeters thick) and seal the bags. It is important not to remove the item from the plastic bags until the item reaches its ultimate destination. Ensure that 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 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, including the area where the item was damaged. Perform a leak test of the item and wipe tests of the storage area and the area where the item was damaged (except in an outdoor area) to rule out contamination. Take wipe samples for liquid scintillation analysis in order to determine if removable contamination with nickel-63 or americium-241 exists. (See AR 385–10 for recommended maximum free-release limits for radioactive contamination.) Wipe tests should be performed to definitively rule out contamination. Send the wipe tests to your supporting facility with a qualified laboratory. (See appendix F for addresses.) Potentially contaminated areas should not be used for unrestricted activities until surveyed and cleared by the RSO.

e. Contact the NRC licensee HQ, TACOM LCMC. (See appendix E for address.)

4–6. Density and moisture tester

The density and moisture tester (DMT)—or moisture-density gauge—contains two radioactive sources: an americium-241 source, and a caesium-137 source, that could emit hazardous radiation levels if damaged with the source area in the open position. americium-241 is an alpha emitter, which by itself poses no external hazard. However, if the americium-241 is combined with beryllium, the americium-241 alphas could cause the mixed beryllium to eject neutrons. So, in addition to containing caesium-137, the DMT is a neutron and gamma emitter and is potentially very dangerous. Prior to handling or retrograding any DMT, obtain a beta and gamma radiation survey instrument, such as a VDR–2 or PDR–77, and a neutron survey meter, if possible. 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 TACOM LCMC for further guidance (see appendix E for address) if this situation occurs. If working with the DMT—

a. Obtain a whole-body radiation dosimeter that covers gamma and neutron radiation. If a dosimeter that covers neutron radiation cannot be issued, the RSO must annotate the types of sources the whole-body dosimeter is exposed to on the dosimeter-issue-listing computer printout. 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 and gamma radiation survey instrument and a neutron survey meter, if available. After verifying proper operation of the survey instrument, approach the DMT with the instrument on and the probe pointed toward the DMT.

c. If the levels are less than twice background at two 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 5–6635–350–13&P.

d. If the radiation levels are above background two 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 RAM storage area. On the package mark the following information: date, time, location of packaging, suspected isotope, and suspected activity of the isotope. Include the names of all personnel involved with the material in the documentation package. The package should be surveyed for radiation levels with a VDR–2 or a PDR–77 to ensure safe radiation levels exist outside the package. See AR 385–10 for recommended maximum free-release limits for radioactive contamination. See TM 5–6635–350–13&P for further information.

e. Once a defective tester has been transported to a proper RAM storage area, the area where the DMT was should be surveyed and cleared by the RSO. Leak test the damaged or defective DMT with the source not exposed for potential contamination. Send the leak test to the U.S. Army Test, Measurement, and Diagnostic Equipment (TMDE) Activity Primary Standards Laboratory, Redstone Arsenal, AL. (See appendix E for address.) See TM 5–6635–350–13&P for leak-test procedures.

f. Contact the NRC licensee, TACOM LCMC, for further information. (See appendix E for address.)

4–7. Radiation detection, indication, and computation calibrators containing strontium (AN/UDM–2) or plutonium (AN/UDM–6)

The AN/UDM–6 RADIAC calibrator contains plutonium-239, a RAM 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, smoke, chew, or apply cosmetics when handling this or any other radioactive item. Wear gloves and overgarment when handling this item. The AN/UDM–2 RADIAC calibrator that contains strontium-90 and RAM that 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/UDM–2 calibrator, obtain a beta and gamma radiation survey instrument and, after verifying proper operation, approach the calibrator with the instrument turned on and the beta or gamma probe pointed toward the calibrator. If the radiation levels are two millirads per hour 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 U.S. Army Communications—Electronics Command (CECOM) through command channels for further guidance. (See appendix E for address.) 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 AR 385–10 for recommended maximum free-release limits for radioactive contamination.) To evaluate the AN/UDM–2, obtain a beta

or 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 two millirads per hour, assume that the levels are safe.

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

d. Perform normal TI procedures and handling per TB 11–6665–227–12 or TM 11–6665–248–10.

e. Calibrators to be turned in for repair or salvage should be double bagged in thick (at least four millimeters) 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 the next level of repair or to the 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 NRC licensee, HQ CECOM, for further information. (See appendix E for address.)

4–8. Night-vision devices containing thorium

To handle night-vision devices containing thorium—

a. 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.

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

c. Likely problems with these items will involve breakage from combat or overpurging. In case of breakage, protection will center on protecting the skin from shards of glass and the respiratory tract from thorium dust.

d. Wear leather gloves when handling the thorium lenses and, if broken, a respirator. Work in a well-ventilated area and allow any damaged items to off-gas before handling.

e. Perform TI procedures according to the applicable TM.

f. 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.)

g. Perform a radiation survey of the area to verify that the area is not contaminated in excess of the release limits listed in AR 385–10.

h. Contact the NRC licensee for further information. (See appendix E for HQ CECOM address.)

4–9. 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 JMC for details on how to remove the materials from the supply system. Also contact the item manager (TACOM LCMC for vehicles and CECOM for communications systems) and the item manager command's RSO for current direction on removal and required surveys of systems.

c. Obtain a whole-body dosimeter prior to surveying if possible. (See AR 385–10 for recommended maximum free-release limits for radioactive contamination.)

d. The survey instrument detectors will pick up significant levels of activity. The commodity should be double bagged in clear bags and tagged as soon as possible. On the bag, mark the following information: date, time, location of bagging, suspected isotope, and suspected activity of isotope. Include the names of personnel involved with the material in the documentation with the item. Prominently label the packaging. Survey the item and area where the item was located using a beta or gamma probe to see if there was any significant contamination and for disposition of the item through JMC. Perform wipe tests of the interior of vehicles (instrument panel, occupant flooring, and door) to determine if there is any contamination.

Chapter 5
Foreign or Captured Items Containing Radioactive Material

5–1. General

a. RAMs 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 United States will be found in foreign-made material, both of U.S. allies and its adversaries.

b. Use extreme caution for unknown items. Some unique foreign items could contain an explosive component. Involve the local EOD team early in the process for determination and verification. The following organizations can provide further assistance with item identification:

(1) ACERT. (See appendix F for contact information.)

(2) National Ground Intelligence Center. (See appendix E for contact information.)

(3) Naval Surface Warfare Center. (See appendix E for contact information.)

c. 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 RAM in foreign or captured equipment is subject to the same kinds of contamination potential as the U.S. equipment. Therefore, any captured or damaged foreign equipment should be handled in the same manner as similar U.S. equipment, the following guidelines apply:

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, follow all U.S. source guidelines. (See appendix D.)

b. Follow all appropriate guidelines established in earlier chapters.

c. The specific RAM (for example, radium, tritium, americium) may or may not be the same activity as the U.S, counterpart.

d. The precautions in handling foreign RCE should be based on the specific RAM 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 sources have 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. Be alert for gauges with damaged radioactive dial indicators as they are probably contaminated.

5–3. War trophies

All equipment shipped back to an authorized collection point will be inspected by the U.S. Customs Service prior to embarkation at port. Equipment must comply with U.S. Federal regulations (NRC, Environmental Protection Agency, Department of Agriculture) prior to acceptance at the port of entry in the United States. Contact the NRC licensee for further information. Units claiming this equipment must ensure the equipment has been cleared of—

a. Security considerations.

b. RAM contamination considerations, as discussed throughout this pamphlet.

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

d. Agricultural contamination.

5–4. Other radiological sources

U.S. Army Public Health Command (Provisional) Technical Guide 238 summarizes sources of potential radiological exposures or contamination to military personnel from both civilian and military origin. There is an emphasis on sources that deployed Soldiers may encounter. The document is a good source of information on radiation exposure and contamination that may be linked to a specific mission, task or project to include guidance on general safety precautions to take specific to the type of radioactive item.

Appendix A

References

Section I

Required Publications

Unless otherwise indicated, all Army publications are available on the Army Publishing Directorate website at https://armypubs.army.mil.

AR 385–10
The Army Safety Program (Cited in para 1–6*d*(2).)

AR 700–48
Management of Radiologically Contaminated Equipment Outside the United States (Cited in title page.)

AR 750–1
Army Materiel Maintenance Policy (Cited in para 2–3*d*.)

ATP 5–19
Risk Management (Cited in para 2–1.)

DA Pam 385–30
Risk Management (Cited in para 1–4*c*.)

JP 3–11
Operations in Chemical, Biological, Radiological, and Nuclear Environments (Cited in para 2–2*a*(1).) (Available at: https://www.jcs.mil/.)

NFPA 472
Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents (Cited in para C–3d.) (Available at https://www.nfpa.org.)

TB 3–6665–321–30
Direct Support Requirement, Procedures, and Handling of the Radiation Wipe Test for the M88 Chemical Agent Detector Unit (Cited in para 4–5*b*.)

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 2–2*a*(1).)

TB 11–6665–227–12
Safe Handling, Storage, and Transportation of Calibrator Set, RADIAC, AN/UDM–2 (Cited in para 4–7*d*.)

TC 4–02.3
Field Hygiene and Sanitation (Cited in para C–4*c*.)

TM 3–11.91
Chemical, Biological, Radiological, and Nuclear Threats and Hazards (Cited in para 2–2*a*(1).)

TM 3–6665–321–12&P
Operator's and Unit Maintenance Manual (Including Repair Parts and Special Tools List) for Alarm, Chemical Agent, Automatic: M22 (NSN 6665-01-438-6963) (EIC: 5AC) and Auxiliary Equipment Power Supply, Chemical Agent Automatic alarm: M28 (6130-01-438-6960) (EIC: Y40) Mounting Kit, Chemical Agent Automatic Alarm: M281(6665-01-438-6959) (EIC: Y38) Alarm Unit, Chemical Agent Automatic Alarm: ABCA-M42 (6665-00-859-2215) (EIC: 399) {TO11H2-23-1; MC 10434A-12&P; EE168-DB-OMP-10} (Cited in para 4–5*b*.)

TM 3–6665–331–10
Operator's Manual for Chemical Agent Monitor (CAM) (Cited in para 4–5*b*.)

TM 3–6665–331–23&P
Unit and Direct Support Maintenance Manual (Including Repair Parts and Special Tools List) for Chemical Agent Monitor (CAM) (NSN 6665-01-199-4153) (EIC:555) {To 11H2-20-2} (Cited in para 4–5*b*.)

TM 3–6665–343–10
Operator's Manual for Improved Chemical Agent Monitor (ICAM) (NSN 6665-01-357-8502) (EIC: 5AB) (Cited in para 4–5*b*.)

TM 5–6635–350–13&P
Operator and Field Maintenance Manual (Including Repair Parts and Special Tools List) for Density Moisture Tester NSN 6635–01–604–1875 (Cited in para 4–6*c*.)

TM 11–6665–248–10
Operator's Manual for Calibrator, RADIAC, AN/UDM–6 (NSN 6665-00-767-7497) (Cited in para 4–7*d*.)

Section II

Related Publications

A related publication is a source of additional information. The user does not have to read it to understand this publication. Unless otherwise indicated, all Army publications are available on the Army Publishing Directorate website at https://armypubs.army.mil.

AR 40–13
Radiological Advisory Medical Teams

DA Pam 385–10
Army Safety Program

TB 43–0197
Instructions for Safe Handling, Maintenance, Storage and Transportation of Radioactive Items Under License 12–00722–06

Technical Guide 238
Radiological Sources of Potential Exposure and/or Contamination (Available at https://phc.amedd.army.mil/.)

Title 10, Code of Federal Regulations
Energy (Available at: https://www.ecfr.gov/.)

Title 40, Code of Federal Regulations
Environmental Protection Agency Regulations (Available at: https://www.ecfr.gov/.)

Title 49, Code of Federal Regulations
Transportation Regulations (Available at: https://www.ecfr.gov/.)

Section III

Prescribed Forms

Unless otherwise indicated, find prescribed forms on https://armypubs.army.mil/.

DA Form 7399
Survey/Decontamination Record (Cited in para C–4*d*.)

DA Form 7400
Record of Area/Equipment Survey (Cited in para C–5*n*.)

DA Form 7401
Radioactive Commodity Incident Report (Cited in para C–5*n*.)

Section IV

Referenced Forms

Unless otherwise indicated, find referenced forms at https://armypubs.army.mil/.

DA Form 2028
Recommended Changes to Publications and Blank Forms

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; 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. 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 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 denser than lead, it is very useful for armor plating and armor piercing ammunition. DU has a low external dose rate; as such, Soldiers can work in proximity to intact solid DU for extended periods without receiving high external doses to the whole body and with minimal risks from this external radiation. Direct contact beta dose rates are higher but still not excessive. The wearing of sturdy leather gloves with nitrile liners will drastically decrease the beta skin dose from DU, and wearing these gloves is needed for direct handling of DU plate, penetrators, or fragments. Primarily, avoid ingesting and inhaling significant quantities of DU particles, which can lead to toxicity—most notably to the kidneys, lungs, and air pathways. 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. Much like lead, DU is a heavy metal and can cause heavy-metal poisoning if taken into the body. For this reason, the Army prevents and cautions Soldiers against inhaling or swallowing DU. 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 or balaclava over the nose may be sufficient. But in heavy contamination, the CBRN protective mask may be necessary. After leaving a DU contaminated area, Soldiers must get the dust out of their clothing and wash contaminated skin or hair.

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 ionizing 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. Tritium is a low-energy beta emitter. The energy of this beta is so low, in fact, that it poses no external radiation hazard, as this low-energy beta cannot even penetrate the skin. The primary concern with tritium is that large quantities could enter inside the body where it would then irradiate body organs and tissues from the inside. This could happen if tritium compounds or vapors were ingested or inhaled, as from a broken or leaking glass tube, or if tritiated liquids or tritium water vapor were deposited onto the skin, as rapid absorption through the skin membrane could then occur just as with regular water. 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. As a precaution, all detector cells should be considered contaminated when the item is damaged, unless the cell outlet port has recently been wipe tested and reports negative for contamination. Leakage of americium is 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 ingestion. Thorough hand washing after handling will prevent ingestion.

B–3. Other radioactive elements

Uranium, tritium, and nickel are, by far, the most commonly used nuclear radiation emitters. However, other RAMs are used for various purposes in other military equipment. They require similar precautions and pose similar hazards. All items of equipment emitting ionizing radiation are required to bear the standard radiation trefoil warning marker or have wording identifying it as radioactive. All personnel working with equipment marked with trefoil markings or with warning verbiage must be informed of the precautions and hazards. In all cases, the TMs 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 the unit's RSO.

b. Consult TMs for radioactive commodities involved. (See appendix A for a list of TMs.)

c. Consult Army common task training.

d. Contact the nearest AMC logistics assistance representative for the item involved.

e. Contact the nearest U.S. Army medical department activity or medical center (Preventive Medicine Department).

f. Contact the U.S. Army CBRN School, Ft. Leonard Wood, MO 65473. Telephone: commercial 573–563–6224, DSN 676–6224.

g. Contact the U.S. Army Public Health Center (Medical Health Physics Program). (See appendix E for the address.)

h. Contact the commodity specific NRC license RSO listed in AR 385–10.

Appendix C

General Survey or Decontamination Tips and Techniques

Section I

General Survey Tips and Techniques

C–1. Identifying contaminated material

Clearly mark any piece of equipment that has been identified as potentially contaminated 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 as "Radiologically Contaminated" with the isotope listed.

C–2. Touching contaminated equipment

Avoid touching equipment that might be contaminated. Wear a good grade of leather gloves at 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 vinyl or rubber gloves under the leather gloves. (See appendix J for more information.) The use of respiratory protection may be required. All personnel should remain upwind, if possible, from potentially RCE 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 or laundry facilities. The objective is to limit the spread of contamination while determining logistical requirements.

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

c. Assemble equipment that will be needed ahead of time. Survey equipment should all be together for ease of usage. (See appendix J for suggested supplies and equipment involved with these operations.)

d. Separate contaminated items from noncontaminated items. Establish hot, warm, and cold control zones around the contaminated equipment work area or vehicle. (See NFPA 472.) Contact chemical personnel or RSO for assistance in setting up a hotline. Do not exit the contaminated area without surveying hands, face, shoes, and clothes for contamination with an AN/PDR–77 with attached DT–695 pancake probe or other similar radiation detection equipment.

e. Establish access control and a contamination corridor, with applicable control points, to limit the spread of contamination.

f. Establish a decontamination area in the warm zone. Ensure travel from hot zone (contaminated area) to the warm zone is into the wind.

C–4. Avoid personnel accidents and unwanted radiation exposures

a. Do not eat, drink, smoke, chew, or apply cosmetics when around potentially RCE. 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 RCE, especially in hot climates, may require protective clothing such as MOPP. Extra nutrition and hydration will be needed under those circumstances.

c. Pay conscious attention to 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 TC 4–02.3 for suggested work-rest cycles during different heat categories.)

d. If an accident happens (for example, a cut or scrape) report it immediately and seek medical help. Document the circumstances and actions taken on DA Form 7399 (Survey/Decontamination Record).

e. The long, exhaustive nature of recovery and retrograde work demands that sleep and 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. Washing machines must be dedicated for washing contaminated clothing and marked or labeled as such. A contamination survey of the washing machine must be performed before using it for uncontaminated 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. Hold contaminated water 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. Always perform decontamination under the direction of radiation safety personnel.

b. Control access to contaminated areas.

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

d. Evaluate what is to be decontaminated.

e. Obtain necessary equipment and materials. (See appendix J.)

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, unless specifically directed by radiation safety personnel.

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

j. Minimize the use of contaminated liquids during decontamination. Packaging contaminated waste or materials with freestanding liquids is prohibited and will need to be contained within absorbent material, as necessary.

k. Minimize all dust-producing activities that may generate airborne radioactive particles. Do not use high-energy grinders or wire brushes without approval by radiation safety personnel as respirators and/or ventilation may become necessary.

l. Survey between major steps in the decontamination process (that is, between successive applications of each technique and between different techniques). If contamination levels do not decrease by more than 50 percent after three decontamination attempts, secure the area or materials and contact radiation safety personnel and/or the NRC commodity license holder for further guidance.

m. Continue decontamination until contamination levels are reduced to appropriate levels, per AR 385–10.

n. Document the completion of decontamination, including the name of the individual performing the final survey, the date, and the survey results. Use DA Form 7399, DA Form 7400 (Record of Area/Equipment Survey), and DA Form 7401 (Radioactive Commodity Incident Report).

C–6. Personnel decontamination

Before external decontamination of an individual commences, take the following steps to help establish priorities for decontamination and follow-up effort:

a. Establish hot, warm, and cold control zones.

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

c. Assess the extent of any injuries. Medical stabilization takes priority over decontamination.

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

e. Document survey results on DA Form 7399.

f. Perform all removal of contaminated clothing in the warm zone. Place contaminated clothing in a plastic bag, and hold it for further disposition. Seal and mark the bag as "Contaminated" with the isotope listed.

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

h. Decontaminate personnel as quickly as possible using the least drastic means necessary.

i. Begin decontamination with mild methods, which should be continued as long as they are effective; progress to harsher methods only as required. Do not break the skin in decontamination efforts.

j. Take extreme care to prevent the spread of contamination to any skin or body opening.

k. Collect all liquids generated and materials used during decontamination and treat them as contaminated waste.

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

m. Use cool or lukewarm water 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. Conduct all personnel decontamination in the warm zone. 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 RAM penetrating through the pores of the skin. Pat special attention 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. Do not open the mouth during any part of the washing and rinsing process.

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, refer the individual to the local medical officer for application of the more drastic chemical decontamination.

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

(1) Place the individual in a lukewarm shower.

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

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

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

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

(6) The individual should then return to shower and rinse soap off by starting at the top and working his or her way down.

Note. It will be necessary for the individual to rub body surfaces with his or her 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. Pay particular attention to hairy portions of the body.

(7) When the individual has rinsed to the point that she or he no longer feels slimy and while still in the shower, she or 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, the individual should leave the shower and dry.

(9) After the individual is dry, monitor her or him. If still contaminated, repeat paragraph C–7*c* procedures. If there is localized residual contamination, limit repeat procedures to those areas still showing contamination.

d. In all cases of personnel contamination, consult the RSO. If ingestion or inhalation of RAM is suspected, perform bioassays on contaminated personnel. (See appendix E for bioassay contact information.)

C–8. Equipment and material decontamination

Conduct all equipment and material decontamination in the warm zone. 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 methods are available, including abrasive, chemical, and electrochemical methods. Listed in paragraphs C–8*a* through C–8*d* are a few of the simpler and least costly methods. Repeat these methods unless surveys indicate the need for a harsher method. Under no circumstances is dry sweeping of radioactive contamination allowed. Appropriate personal protective equipment 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 methods in paragraphs C–8a through C–8c do not completely decontaminate the exterior of the tank, consider contamination affixed and transport the tank to an Army facility before harsher methods are used.

d. Scrap up and containerize contaminated soil around accident and water runoff for removal as radioactive waste.

Section III

Survey or Decontamination Records

C–9. Instructions to complete DA Form 7399

Use the instructions in figure C–1 to complete 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. Include 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. Flowchart instructions to complete DA Form 7399

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. Flowchart instructions to complete DA Form 7399—continued

C–10. Instructions to complete DA Form 7400

Use the instructions in figure C–2 to complete DA Form 7400.

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 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, 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 NSW 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. Flowchart instructions to complete DA Form 7400

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 expiration 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. Flowchart instructions to complete DA Form 7400—continued

C–11. Instructions to complete DA Form 7401

Use the instructions in figure C–3 to complete DA Form 7401.

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 or 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 givers 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 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

Figure C–3. Flowchart instructions to complete DA Form 7401

or accident took place, the weather, temperature, and wind conditions. List any 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 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. Flowchart instructions to complete DA Form 7401—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 follow the proper procedures to minimize exposure:

a. Wear protective clothing, MOPP gear, 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 inhaling DU particles. If these masks are unable to be used, improvise substitutes, such as a handkerchief, t-shirt, towel, or other item. If urgent, ordinary substitutes are better than no protection at all.

c. If a protective mask is not worn, wear eye protection. (The American National Standards Institute approves of standard safety goggles equivalent to standard Z87, ordered through the Federal supply system.)

d. Wear appropriate boots that are in good repair. Standard troop issue leather boots are sufficient.

e. When in the vehicle, do not 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. Use the two-person (or more) rule 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 and assessing equipment, survey personnel should—

a. Before beginning, ensure that the survey instrument is operative, that it is calibrated, 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 half an 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 for guidance.)

D–4. Decontamination

When decontaminating equipment, the following will apply:

a. Loose radioactive contamination can be brushed off, scooped up, vacuumed up with a vacuum modified to include a HEPA filter, washed off, or removed with tape or other sticky material. Decontaminate equipment to the levels specified in AR 385–10.

b. Fixed contamination can be covered (for example, encapsulated) with any available material that provides shielding and consequently reduces radiological exposure rates. Cardboard, plastic, cloth, or paint provides acceptable shielding for alpha and beta contamination. Use a RADIAC calibrator 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 AR 385–10 if possible, until decontamination can be completed per commander's guidance.

c. Double bag in clear bags, mark, and turn into the supply system small pieces of equipment or material that cannot be decontaminated and that are not needed for mission completion for proper disposal as radioactive waste. Documentation with the bagged items will indicate the contaminated nature of the items; place it outside the bags.

D–5. Wrap-Up

When the work session is finished, the following procedures apply:

a. Survey personnel, personal protective equipment, and boots for contamination.

b. Clean any contaminated items, if possible.

c. Store clothing for reuse or place it 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 RCE.

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 matter experts may be available under her or his command locally. This appendix 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. Report radiological incidents immediately through the chain of command to the higher HQ. Most problems experienced in the management of contamination incidents occur because of a delay in reporting the incident. Delayed notification can result in notices of violation and penalties. After an incident, a clock begins ticking that involves—

(1) Potential exposure of personnel to radiation or RAM.

(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 RAM. Because of this, personnel in different military occupational specialties (MOSs) have received varying levels of training in radiation and its effects. Some of these specialties are—

(1) Nuclear medical science officer, for example, 72A67.

(2) LRSO (MOS or Army occupation code (AOC) immaterial).

(3) DA Civilian health physicists (CP–12 GS–1306).

(4) CBRN specialist (74 series), for example, 74D.

(5) CBRN officer, for example, 74A.

(6) EOD specialist, for example, 55D.

(7) Certain engineer personnel (users of the DMT).

(8) RADIAC calibrator or custodian personnel, school trained, MOS or AOC immaterial.

(9) Theater TMDE activity personnel.

(10) Certain medical (91 series), for example, 91SN4, 91P.

(11) Environmental science officer (industrial hygiene), for example, 72D.

(12) Preventive medicine officer, for example, 60C.

(13) Occupational medicine officer, for example, 60D.

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

(15) AMC logistics assistance representatives and logistics assistance officers, 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 paragraph E–2*c* 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 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 paragraph E–2*c* MOS and/or AOC at HQ 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 or gamma radiation levels. In addition, the AN/PDR–77 can detect both alpha radiation levels and low-energy x-rays.

E–3. How local assistance can help

a. Chemical personnel.

(1) Advise commander on damage assessment, repair, recovery, and retrograde operations of CBRN-contaminated materiel.

(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 RCE requiring retrograde.

(6) Supervise segregation of known or suspected low-level radioactive waste 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.

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

(2) Medical treatment facilities will do the following:

(a) Assess and treat Soldiers exposed to radioactive and mixed-waste materials.

(b) Perform bioassays of Soldiers for radiological exposure in coordination with the license RSO and per Office of the Surgeon General guidance.

(c) Record radiation doses in Soldiers' medical records (when bioassays are processed) during surgical procedures or medical treatment per unit standing operating procedures. Assure bioassay results are sent to the U.S. Army Dosimetry Center to include 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 support.

(1) Process suspected ordnance to support equipment recovery and/or evacuation efforts.

(2) Supervise separation of contaminated from uncontaminated 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 will do the following:

(a) Complete BDAR, recovery, and retrograde operations per TB 9–1300–278, AR 700–48, and this pamphlet.

(b) Establish and operate a collection point for RCE awaiting repair or evacuation. Separate RCE from uncontaminated equipment.

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

(2) Direct-support or general-support level maintenance organizations will do the following:

(a) Establish and operate a collection point for contaminated materiel awaiting repair or evacuation. Separate RCE from uncontaminated equipment.

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

(3) Depot-level support personnel will decontaminate (if mission dictates), complete repair of decontaminated damaged materiel, returning materiel to normal supply channels, if possible. Otherwise, the materiel will be turned in as radioactive waste per the item manager's disposition.

E–4. Outside assistance

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

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

(2) Through channels, the ACERT in appendix F, the 20th CBRNE Command Team in appendix G, and the Army RAMT in appendix H.

b. Wipe and leak tests. A wipe test, or assay of a piece of filter paper or acceptable media, is the primary method of confirming or ruling out the presence of removable contamination of storage and incident areas and transportation packages. A leak test, or assay of a piece of filter paper or acceptable media, is a test of items containing RAM to

determine if they are contaminated. The test is a necessary complement to radiation surveys performed with instruments such as the AN/VDR–2 or the AN/PDR–77. Send wipe tests to the laboratory location directed by the Army commodity licensee or Army command. Send leak tests to qualified laboratory locations as authorized by the Army commodity licensee. The RSO can advise on how to take wipe tests. Qualified Army laboratories are listed in paragraphs E–4*b*(1) through E–4*b*(3). Before sending wipes, call ahead to the laboratory and alert the staff that wipes will be forthcoming.

(1) Outside the continental United States, send wipe tests to—

(a) Germany/Europe Theater (Pirmasens)—Director, U.S. Army Test, Measurement, and Diagnostic Equipment Region—Europe (AMSAM–TMDE–GE–PN), (CMR 434), APO AE 09138. Telephone: DSN 495–6486, commercial 011–49–6331–6486.

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

(2) CONUS, send wipes to (only one)—

(a) Director, U.S. Army TMDE Activity (AMSAM–TMD–SR–C), Redstone Arsenal AL 35898–5400. Telephone: DSN 746–0472, commercial 205–876–0472, fax, DSN 746–3816, commercial 205–876–3816.

(b) Commander, U.S. Army Combat Capabilities Development Command, Chemical Biological Center (AMSRD–ECB–PI–BP–CP), 8198 Blackhawk Road, Aberdeen Proving Ground, MD 21010–5400. Telephone: DSN 584–2342, commercial 410–436–7118, fax 410–436–6529, email: usarmy.apg.ccdc-cbc.mbx.communications-office@mail.mil.

(c) U.S. Army Communications—Electronics Command (AMSEL–SFR), 3200 Raritan Ave, Aberdeen Proving Ground, MD 21005. Comm (443) 395–3790.Commander, U.S. APHC (MCHB–ML–RICD), Aberdeen Proving Ground, MD 21010–5422. Telephone DSN 584–2619/4375, commercial 410–671–2619/4375.

(3) Wipes should be sent inside an envelope that is inside a second envelope with the wipes inside a sealed plastic bag. Include a memo in the envelope indicating who performed the wipe and leak tests with contact information, the isotope, whether it is an area wipe or item-leak test, the item wipe or leak tested, whether an incident or not, and when it was performed. Ensure that the words "mail room, do not open," and "wipe/leak tests" are written on one of the envelopes. Acceptable radioactive contamination levels for areas and equipment are listed in AR 385–10.

c. Radioactive commodity assistance. For technical assistance with radioactive commodity incidents and contamination from AMC commodities after the logistics assistance representative and/or logistics assistance officer notification, contact the following, through channels, as applicable:

(1) Aviation and Missile Command—Commander, AMCOM (AMSAM–SF–R), Redstone Arsenal, AL 35898–5000. Telephone: DSN 897–2114, commercial 205–813–2114.

(2) TACOM LCMC Chemical Agent Alarms [M8A1/M43A1], Chemical Agent Monitors and Improved Chemical Agent Monitor, M88/M22 Automatic Chemical Agent Detector, Tritium Fire Control Devices, Abrams Tank DU Armor, Vehicle Radium Dials & Gauges, Abrams Tank Combustor Thorium Liner, DMT—Commander, U.S. Army TACOM LCMC (AMSTA–MSP–Z), MS 485, 6501 E. Eleven Mile Road, Warren, MI 48397–5000. Telephone: DSN 786–7635/3676/6194, commercial 586–282–7635/3676/6194.

d. Captured materiel. For technical assistance with foreign or captured items containing RAM, the following organizations can provide further assistance with item identification:

(1) National Ground Intelligence Center (HQ), Charlottesville, VA 22911, (434) 980–7000; or National Ground Intelligence Center, Aberdeen Proving Ground, MD. Telephone: commercial 410–278–4618 (RSO).

(2) Naval Surface Warfare Center, Indian Head Joint Service Explosive Ordnance Disposal Technology, Division, Indian Head, MD 20640. Telephone: commercial 301–744–4282 (Safety Office).

e. U.S. Army Communications—Electronics Command (AMSEL–SFR), 3200 Raritan Ave, Aberdeen Proving Ground, MD 21005. Telephone: commercial (443) 395–3790. DU Ammunition, Light Antitank Weapon:—Commander, U.S. Army JMC (AMSIO–SF), Rock Island, IL 61299–6000. Telephone: DSN 793–1514, commercial 309–782–1514.

f. Depleted Uranium Ammunition/Radioactive Waste Disposal. Commander, U.S. Army JMC (AMSIO–SF), Rock Island, IL 61299–6000. Telephone: DSN 793–1514, commercial 309–782–1514.

g. Radiation Bioassay and other Radiation Consultations —U.S. APHC—Commander, APHC (MCHB–OIC–HI), Aberdeen Proving Ground, MD 21010–5422. Telephone: DSN 584–3502/3548, commercial 410–671–3502/3548, nights or weekends, DSN 584–4375, commercial 410–671–4375.

h. Radiation Accident/Incident Investigation —U.S. Army Combat Readiness Center, Fort Rucker, AL 36362. Telephone: DSN 558–2539, commercial 334–255–2539.

i. Radiation Accident Reporting —Army Operations Center—Headquarters, Department of the Army, the Pentagon, Washington, DC 20310. Telephone: DSN 227–0218, commercial 703–697–0218.

j. Radiation Dosimetry —Director, U.S. Army Dosimitry Center (AMSAM–TMDE–SR–D), Bldg. 5417, Redstone Arsenal, AL 35898–5400. Telephone: commercial 877–863–1461, fax: DSN 746–3816, commercial 205–876–3816, email: adc@redstone.army.mil.

Appendix F

Army Contaminated Equipment Retrograde Team

F–1. Mission

The ACERT is a standby team of individuals formed and operating under the direction of the Chief, Safety and Radioactive Waste Team, U.S. Army JMC. They may be contacted by mail at: Army Contaminated Equipment Retrograde Team, Joint Munitions Command (HQ), Safety and Risk Management Directorate, Rock Island Arsenal, Rock Island, IL 61299. They may also be contacted by phone at 309–782–0338, 309–782–8423, or 309–782–1046; they can be contacted by email at usarmy.ria.jmc.mbx.amsjm-sfr@mail.mil. The Chief, Safety and Radioactive Waste Team or its designate will direct the team during training or deployment. The team's mission is to—

a. Provide a combat and/or noncombat team capable of worldwide response for accidents and incidents involving the retrograde of RCE.

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

c. Act as the primary point of contact (when deployed) for retrograde of contaminated material and low-level radioactive waste disposal.

d. Respond to requests for assistance from major commands with RCE and no means for disposition.

e. Provide on-site assistance to commanders and RSOs with RCE upon request.

f. Operate a central RCE storage and control area supporting theater operations under the direction of the theater commander.

g. Take possession of RCE waiting retrograde from theater of operations.

h. Provide technical assistance on the use, storage, and disposal of radioactive and mixed-waste materials as related to RCE.

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

F–2. Composition

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

a. Team chief and dedicated personnel from the Safety and Radioactive Waste Team, HQ, JMC (AMSIO–SF), providing both health physics and radioactive and mixed waste planning expertise.

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

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

d. Other personnel as designated by HQ, AMC, or HQ DA.

F–3. Operation

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

b. The ACERT will use 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. ACERT members will remain ready to deploy on short notice to incidents involving RAM and mixed-waste contamination after notification from higher HQ (AMC). These incidents include, but are not limited to—

(1) Combat situations involving wheeled or tracked vehicles and accidents or incidents involving DU contamination (from DU ammunition and tank DU armor) and radioactive commodities.

(2) Noncombat.

(a) Fires from incidents or accidents involving wheeled or tracked vehicles, where the presence of RAM or mixed waste has been confirmed.

(b) Accidents involving fire control devices, chemical agent detectors or monitors, and DMTs 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 DU or tank DU armor has been involved.

(d) Structural incidents (such as buildings or warehouses) in which RAM 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 will be trained to handle contamination of all types of Army equipment. They will receive initial and periodic refresher radiation safety and response training.

d. The ACERT chief (upon deployment) will assume control of the teams. Upon arrival at the deployment site, the ACERT chief will—

(1) Report to the commander of the unit requesting the team's services for a situation briefing and to brief her or him on the team's capabilities. After assessment of the situation, the ACERT 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 HQ (AMC) and ensure that an open line of communication continues to exist throughout the mission.

(4) Request and supervise other accident-response assets (RAMT, or 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.

Appendix G

20th Chemical, Biological, Radiological, Nuclear, and Explosives Command Team

G–1. 20th Chemical, Biological, Radiological, Nuclear, and Explosives Command Team

The 20th CBRNE Command Team provides technical assistance and advice to the OSC and/or site RSO on radiological identification as a part of the response to accidents or incidents involving RAMs.

G–2. Team consistency

The team consists of members trained to survey radiological accident or incident sites. The support of the team includes, but is not limited to, the performance of radiological surveys for alpha, x-ray, beta, and gamma radiation to identify 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. The 20th CBRNE Team services may be obtained through the Army Operations Center. (See appendix E for contact information.)

Appendix H

U.S. Army Radiological Advisory Medical Team

H–1. Radiological advisory medical team

The RAMT provides direct comprehensive radiological health, medical guidance, and specialized services to the combatant commander, the OSC, and local medical officials responding to a radiological or nuclear event. The RAMT will normally be activated and deployed at the direction of the National Military Command Center, the Office of the Joint Director of Military Support, the Joint Nuclear Accident Coordinating Center, the combatant commands, or the Army Operations Center.

H–2. Functions of the radiological advisory medical team

a. The RAMT provides guidance to the OSC regarding the following technical matters:

(1) Potential health hazards to personnel from radiological contamination or exposure by ionizing radiation.

(2) Decontamination procedures.

(3) Medical treatment.

(4) Medical surveillance procedures (such as initial and follow-up bioassay).

(5) Radiation exposure control.

b. The RAMT provides the following services to the military treatment facility receiving casualties:

(1) Advice on initial and follow-up bioassay procedures.

(2) Guidance concerning potential health hazards to personnel from radiological contamination resulting from the incident.

H–3. Composition of radiological advisory medical team

The RAMT is staffed by military individuals qualified to evaluate radiological health hazards and to manage radiation casualties. Civilian experts may be added to the team at the discretion of the RAMT leader. The RAMT is composed of—

a. A minimum of one O–5 or O–6 nuclear medical science officer with the AOC 72A, who serves as the RAMT lead for the CONUS team.

b. An O–4 or the most senior 72A available, who will serve as the RAMT lead for outside the continental United States teams located in Europe or the Pacific.

c. Designated RAMT physicians qualified in one of the following clinical specialties or areas of concentration: nuclear medicine officer (AOC 60B), medical oncologist or hematologist (AOC 61B), therapeutic radiologist (AOC 61Q), diagnostic radiologist (AOC 61R), or emergency physician (AOC 62A). When a physician is designated as a team member, she or he will receive training in radiation casualty and mass casualty management. It may be necessary to have more than one physician trained and prepared to deploy based on projected mission requirements and availability of regional clinical staff.

d. A minimum of one health physics specialist (MOS 68SN4).

e. Additional personnel with other training and experience as determined by the RAMT leader.

Note. The team leader is responsible for providing recommendations on team composition; including civilian participation in training events and deployments.

H–4. Deployment

The RAMT will normally be activated and deployed at the direction of the National Military Command Center, the Office of the Joint Director of Military Support, the Joint Nuclear Accident Coordinating Center, the combatant commands, or the Army Operations Center. Authority for redeployment of the RAMT rests with the OSC.

H–5. Further information

Additional information can be obtained from the Army Public Health Center (MCHB–PH–HHA),8252 Blackhawk Road, Aberdeen Proving Ground, MD 21010–5403; email: usarmy.apg.medcom-aphc.list.org-ohs-ohs@mail.mil. Telephone: commercial 410–436–3502, DSN 584–3502. Or refer to AR 40–13. Request RAMT services through the Army Operations Center. Telephone: DSN 584–8396, commercial 410–436–7301.

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 commodities in clear bags and tag as soon as possible. Handle with appropriate licensed care. In enclosed areas, it is a more significant problem. Risk is essentially internal (that is, body) only, due to absorption and inhalation via release of tritium or indoor contamination.

I–3. Contamination from depleted uranium munitions
Contamination from DU munitions and DU armor (that is, combat vehicles damaged by DU fire or combat vehicles containing DU armor that have been damaged in any way) is always a problem. Risk is primarily from internal (that is, body) exposure and surface contamination (fixed and removable).

I–4. M43A1, M8A1, chemical agent monitor, improved chemical agent monitor, automatic chemical agent (americium-241, nickel-63)
Physical damage involving sources is a problem. Risk is primarily from internal (body) exposure.

I–5. Troxler density moisture tester (caesium-137 and americium-beryllium)
Any form of physical damage where the device shielding is damaged 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 (strontium-90 or yttrium-90) and AN/UDM–6 (Polyurethane)
Any form of physical damage, it is a problem. Risk is primarily from internal exposure.

I–7. Night-vision devices (thorium-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

Suggested Supplies

J–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.

J–2. Equipment

Item national stock number notes—

a. RADIAC calibrator AN VDR2 6665–01–222–1425.
b. RADIAC calibrator AN PDR 77 with RSO kit 6665–01–347–6100.
c. Vacuum with HEPA 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. Screwdrivers 5120–00–357–7175 or 5120–00–103–9743.
k. Wrench set, Metric 5120–00–176–1819.
l. Wrench set, Society of American Engineers 5120–00–148–7917.
m. Socket set, metric Socket Set 5120–00–935–7315.
n. Socket set, Society of American Engineers socket set 5120–00–322–6231.
o. Hammer, sledge 5120–00–224–4139.
p. Hammer, carpenters 5120–00–892–5485.
q. Hammer, 5-pound hammer 5120–00–900–6095.
r. Hammer, 100-pound 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.

J–3. Supplies

a. Protective clothing.
(1) Coveralls, anti-c, local procurement.
(2) Gloves, leather 8415–01–134–8233.
(3) Gloves, CBRN 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 table of organization and equipment 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 or marking.
(1) Rope 4020–00–960–1356.
(2) CBRN marking set 9905–01–346–4716.
(3) Radiation labels 9905–12–132–2579.
(4) Unexploded ordnance signs, local procurement.
d. Radiobioassay.
(1) Swabs, cotton, local procurement.

(2) Bottle, plastic, local procurement.
(3) Polyethylene bags, plastic, Zip-lock 8105–00–837–7757.
(4) Swipes, local procurement.
(5) Envelopes 8105–00–290–0330.
(6) Tweezers 5120–00–542–2348.
(7) 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 gallon 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 or 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) Masking tape 7510–00–266–6710.
(3) Tape, duct 5640–00–103–2254.
(4) Pencils, graphite 7510–00–286–5755.
(5) Pencils, grease 7510–00–240–1525 or -1526.
(6) Pens, marking, local procurement.
(7) Pens, writing 7520–01–357–6841.
(8) Log books 7530–00–222–3525 and 7520–00–286–8363.
(9) Camera with film local purchase.
(10) Tarpaulin, canvas 8340–00–205–3325.
(11) Tarpaulin, plastic (griffolyn) local procurement.

Glossary

Section I

Abbreviations

ACERT
Army contaminated equipment retrograde team

AMC
U.S. Army Materiel Command

AOC
Army occupation code

AR
Army regulation

ATP
Army Techniques Publication

BDAR
battlefield damage, assessment, and repair

CBRN
chemical, biological, radiological, and nuclear

CBRNE
chemical, biological, radiological, nuclear, and explosives

CECOM
Communications—Electronics Command

CONUS
continental United States

DA
Department of the Army

DMT
density and moisture tester

DSN
defense switched network

DU
depleted uranium

EOD
explosive ordnance disposal

F&ES
fire & emergency services

HEPA
high efficiency particulate air

HQ
headquarters

JMC
Joint Munitions Command

JP
joint publication

LRSO
local radiation safety officer

MOPP
mission-oriented protective posture

MOS
military occupational specialty

NFPA
National Fire Protection Association

NRC
Nuclear Regulatory Commission

OSC
on-scene commander

Pam
pamphlet

RADIAC
radiation detection, indication, and computation

RAM
radioactive material

RAMT
radiological advisory medical team

RCE
radiological contaminated equipment

RSO
radiation safety officer

TACOM LCMC
Tank-Automotive and Armaments Command Life Cycle Management Command

TB
technical bulletin

TI
technical inspection

TM
technical manual

TMDE
test, measurement, and diagnostic equipment

Section II

Terms

As low as reasonably achievable
The principle of making every reasonable effort to maintain exposure to radiation as far below the dose limits in Part 20 of Title 10 of the Code of Federal Regulations as is 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, 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 byproduct of the uranium fuel enrichment process. This byproduct or waste stream contains lower concentrations (that is, depleted) of the uranium-234 or uranium-235 radioisotopes than was contained in the original natural uranium ore.

Double bagging
The process of taking the necessary steps to contain the RAM 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, that is, 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, that falls below the threshold for activity and quantity listed in 10 Code of Federal Regulations 62.2 and that 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 a CBRN-contaminated combat environment.

Mixed waste
Hazardous waste as defined by the Environmental Protection Agency in combination with low-level radioactive waste.

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 operational exposure guidance will be determined in consultation with the command surgeon.

Radiation control officer, radiation protection officer, radiation protection staff officer, or radiation safety officer
The individual designated by the commander as chief advisor and responsible party for all matters related to RAM within an individual command.

Radiation safety
For the purposes of this pamphlet, a scientific discipline whose objective is to protect 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.

Radioactive commodities
Commodities that contain RAM.

Radiologically-contaminated equipment
U.S. or foreign modified table(s) of organization and equipment, common table of allowances, tables of distribution allowance, or prescribed load list items that were contaminated by DU or radioactive commodities as a result of combat action, maintenance activities or accidents.

Retrograde
Overseas commands return (for example, retrograde) materiel to CONUS. Retrograde cargo normally consists of unserviceable, economically repairable items, and weapon systems destined for depot repair. The Materiel Management Center 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.

Risk decision
The decision to accept or not accept the risk 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 integration
The method of firmly fixing the risk management process as a principle for individuals and organizations.

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.

Spall
Spall, according to Merriam-Webster Unabridged, is a chip or flake, especially a small fragment broken from the face or edge of a material, such as stone, metal, concrete, glass, or a ceramic product, and having at least one featheredge.

Tagging
The process of identifying that a material is radiologically contaminated. To properly tag a material the following information is necessary. 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.
a. Name and signature of personnel that suspected or determined the material was radiologically contaminated.
b. The location where the material was surveyed.
c. Date and time.
d. Type of isotope if known.
e. Activity or level of contamination found.

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

Unwanted radioactive material
RAMs 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.