

PROCEDURES FOR REMOVING RADIUM 226 GAUGES FROM TRUCK/CARGO VEHICLES

Background

TACOM LCMC is the item manager for various military vehicles, to include the M-35 Truck. Some fielded vehicles had dials and gauges with luminescent paint. Sometimes the luminescent paint contained radium-226 (Ra226), a low level radioactive material. The Defense Reutilization and Marketing Offices (DRMO) cannot accept radioactive material.

Vehicles that have radioactive dials and gauges (or simply 'gauges' from this point on) must go through a process before they can be turned-in to DRMO. Also, if vehicles are discovered at DRMOs with radium gauges, the same process must be performed at the DRMO sites. The process must comply with procedures within this document and support TM 9-2320-361-24-1, dated August 2006; TB 43-0216, Safety and Hazardous Warnings for Operation and Maintenance of TACOM Equipment; the mission and the respective installation regulations.

A. Responsibilities

1. Installation Commander

- a. Reasonably support this demilitarization (DEMIL) process.
- b. Maintain a copy of the appointed (designated in writing) Radiation Safety Officer, supervising or performing the DEMIL process.

2. Mission Radiation Safety Officer (RSO)

Based on the available support, either the Installation or Mission RSO may have to perform the survey and remove involved gauges as necessary or supervise the project. In either case:

- a. Notify the Commander and next higher RSO (if applicable) of the installation or garrison where the project is at, before proceeding.
- b. Perform the DEMIL procedures contained within this document or ensure the personnel who perform the work are properly trained.
- c. Provide radiation awareness training to all personnel who are involved in removing radium gauges from vehicles.
- d. Supervise and provide direction on the removal of Ra226 gauges from vehicles.
- e. Follow procedures for removing involved gauges IAW TM 9-2320-361-24-1, dated August 2006. Maintenance and handling of Ra226 gauges must be performed in accordance with TB 43-0216, Safety and Hazardous Warnings for Operation and Maintenance of TACOM Equipment, Chapter 6-8.
- f. Minimize exposure to ionizing radiation exposure to personnel by implementing safe and simple procedures for removing gauges.

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- g. Ensure survey meters (AN/PDR-77 or equivalent) with DT 616 beta/gamma or equivalent probe are used to determine the presence of Ra226 in gauges. Also, ensure the above meters with a DT 669 alpha or equivalent probe is used for swipe contamination analyses. The survey meter must be in good working condition and actively calibrated in accordance with TB 43-0180.
- h. Secure Ra226 gauges and store them in a designated, secured, and posted low level radioactive waste storage area, until final disposal.
- i. Maintain a running inventory of Ra226 gauges to include NSN, P/N, quantity, and activity in microcuries.
- j. Immediately notify next higher RSO or the TACOM LCMC RSO of any incident or accident involving a gauge to include:
 - (1) Loss of a gauge that contains Ra226.
 - (2) Personnel exposure as a result of ingestion of Ra226.
 - (3) Contamination of personnel or equipment.
 - (4) Fires that involve a Ra226 gauge.
- k. Provide the next higher RSO or the TACOM LCMC RSO a copy of the radiological certification document and any documentation on radiation surveys that were performed. Contact information for the TACOM LCMC RSO is:

US Army TACOM, Life Cycle Management Command
ATTN: AMSTA-CSC-Z (Mail Stop 485)
6501 East Eleven Mile Road, Warren, MI 48397-5000

DSN 786-7635 or Comm. 586-282-7635 | Fax DSN 786-5277 or Comm. 586-282-5277
E-mail: Karen.lapa.Mcguire@us.army.mil or Thomas.Gizicki@us.army.mil

3. Personnel Who Remove Ra226 Gauges

- a. Review these procedures with their mission RSO to determine the necessary safety equipment needed to perform the mission (e.g., type and size of gloves, bags, drums, labels, marking, and forms) required for properly disposing of this radioactive material in accordance with TB 43-0216, paragraph 6-8.
- b. Immediately notify the Installation or Mission RSO of any incident or accident (to include broken or defective dials/gauges) involving the dials/gauges, as indicated above.

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B. SAFETY

1. Radium-226 is an internal radiation hazard and external concern. The amount of radioactive Ra226 in any gauge is very small, typically in the microcurie range. So, a gauge does not present a radiation hazard to personnel unless it is mishandled, such as handling broken pieces of a gauge with bare hands. Take precautions to avoid this. When the Ra226 paint is no longer sealed due a structural defect, Ra226 paint flakes might be released and released flakes can be accidentally ingested or inhaled. Moreover, an external exposure hazard is negligible for the gauge removal, but can exist if the quantities of the removed gauges become large in one place.
2. Maintenance, disassembly, and repair of radioactive gauges is not authorized and should never be attempted.
3. Personnel will not carry Ra226 gauges in their pockets.
4. Do not tamper with radioactive gauges or deliberately expose the Ra 226 in any way.
5. Removal of gauges that contain Ra226 must be done as a whole unit. If gauges cannot be removed as a whole unit, notify the Mission RSO.
6. Immediately report damaged/defective radioactive gauges to the TACOM LCMC RSO as indicated in paragraph A.2.k. Do not proceed with the project, until direction is provided by the TACOM LCMC RSO.

C. REQUIRED EQUIPMENT/SUPPLIES

1. Gloves.
2. Shoe Covers.
3. AN/PDR-77 or Equivalent with DT 616 beta/gamma probe and DT 669 alpha probe or equivalent.
4. Nucon Smears.
5. Ziploc Bags.
6. UN 2911 label or marker to mark UN 2911.
7. Cardboard Box's for Dials/Gauges.
8. TB 43-0216 and TM 9-2320-361-24-1.

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CAUTION

Immediately report any damaged/defective radioactive gauge to the next higher RSO or the TACOM LCMC RSO as identified in paragraph A.2.k. above. DO NOT PROCEED with the following procedures until direction is provided by the TACOM LCMC RSO.

D. PROCEDURES These procedures must be followed when surveying and/or removing radioactive dials/gauges from the vehicles:

1. The mission RSO will instruct personnel performing the project's work on proper use of the survey meter.
2. Ensure to use a properly calibrated survey meter (AN/PDR-77 or equivalent), with a DT616, beta/gamma probe or equivalent.
3. Conduct an operational check of the survey meter prior to use. If the meter is not functioning as required, do not use it. Find another equivalent meter and probe.
4. Ensure the beta window of the DT616 probe is open when performing the survey.
5. Conduct an initial survey to identify a gauge that contains Ra226:
 - a. Survey each dial/gauge in the vehicle panel to determine the presence of Ra-226.
 - b. Any sustained reading above background will indicate the gauge contains Ra226.
 - c. Mark all gauges that contain R226 with a RED permanent marker as, "Ra226."
6. Use precautions and Personal Protective Equipment (PPE), as required [i.e. securing the site, don gloves, shoe covers, etc.] for the removal of the Ra226 gauges.
7. Remove the intact Ra226 Gauges IAW TM 9-2320- 361-24-1, Aug 06, Chapter 3.
DO NOT REMOVE BROKEN RADIUM GAUGES.
8. Immediately tag and bag each gauge being removed from the vehicle to identify them as radioactive material. The tag must state "Radioactive – Ra226" and be placed in a clear Ziploc plastic bag, and the Ziploc bag sealed.
9. Once a Ra226 gauge has been removed, tagged and bagged, notify the Mission RSO in order to secure the collected device(s) and to attach a "Dec 2009 TACOM LCMC Rad Certificate" onto the dashboard area of ALL inspected vehicles (i.e., surveyed).
10. Perform a contamination survey on all removed, intact Ra225 gauges and the panel where if gauge was removed from:

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- a. Use two Nucon smears moistened with water to perform the contamination survey. One swipe being performed on the panel display and one swipe being performed directly below the panel display on the floor of the vehicle.
- b. Place the two Nucon smears on a flat plastic covered surface. Count the samples LAW Appendix "A", Sample Analysis Worksheet.
- c. Perform a 'direct reading' survey of the Nucon smears using the survey meter.
- d. If survey readings are above 20 dpm/100 cm², fold the swipes and then mark the swipes with a #1 for the panel swipe and a #2 for the floor swipe. Then, place the swipes into a zip lock bag, and submit it to the Mission RSO for mailing to a NRC licensed lab for analysis. Identify the vehicle serial number or other identifier on the sample bag and mark "Potentially Contaminated with Ra226".

NOTE: Contamination surveys of vehicles with broken Ra226 gauges will only be performed under direction of the TACOM LCMC RSO.

11. Secure vehicles with the potential Ra226 contamination until lab sample results are returned and further directions given by the TACOM LCMC RSO.
12. Complete and attach a Dec 2009 TACOM LCMC Rad Certificate to the vehicle. These certification forms are only available from the TACOM LCMC RSO.
13. Place the removed Ra226 gauges, now in clear plastic bags, into a cardboard box or an appropriate shipment container for transport to a low-level radioactive waste storage area. This step is still completed by the person working the project or Mission RSO:
 - a. Ensure the container is transported in a secure nonoccupied area of a GSA vehicle. The transport will be by ground only.
 - b. Affix an UN 2911 DOT Label onto the shipping container or mark the container "UN 2911" in a ½ inch lettering with a black marker. Although this is a military shipment, the UN label/marking must be performed along with a radiation survey on the outside of a package that contains Ra226 gauges:
 - (1) Survey readings must be taken on all six sides of the package and all readings must be less than 0.5 mr/hr.
 - (2) If any reading is greater higher than 0.5 mr/hr, the package must be modified (i.e., placed in multiple boxes or one larger box) to reduce the reading until it is below 0.5 mr/hr is achieved.
 - (3) The vehicle in use will carry a transport letter that identifies the Ra226 gauge(s), who the transporter is, the destination, and emergency contact information.

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E. DRMO Turn-in Procedures

1. Demilitarization (DEMIL) of "non-radioactive" items is not a RSO responsibility.
2. Each vehicle processed for DEMIL must have a certificate to indicate, that the vehicle complies with DEMIL requirements, and a Dec 2009 TACOM LCMC Rad Certificate.
 - a. The Dec 2009 TACOM LCMC Rad Certificate indicates the vehicle had an interior radiologic survey and no removable contamination was detected, whether or not a Ra226 gauge was removed.
 - b. The Dec 2009 TACOM LCMC Rad Certificate must have a dated signature of one authorized person, who inspected the vehicle.
3. When all steps above in paragraph E.2 are completed, the vehicle may be turned-in to DRMO and processed as a DEMIL Coded Q item.
4. Non radioactive items requiring DEMIL will be processed in accordance with the applicable item manager guidance.

F. After DRMO Turn-in

1. Radioactive items will be disposed of by the Mission RSO.
2. Appendix A, Sample Analysis Worksheet, and Information Worksheet will be provided to the TACOM LCMC RSO.

APPENDIX A

Sample Analysis Worksheet

Instructions

Block 1. Enter your name

Block 2. Enter date that sample was counted

Block 3. Enter Instrument Model

Block 4. Enter Instrument Serial Number

Block 5. Enter Detector Model Number

Block 6. Enter Detector Serial Number. Note that the Detector must be calibrated with instrument; refer to the Instrument Calibration Data Sheet.

Block 7. Enter the instrument calibration due date listed on the calibration label.

Block 8. Perform a response test IAW Instrument response test Procedure. Circle SAT or UNSAT. Note if UNSAT the Instrument cannot be used and must be returned for repair.

Block 9. The sample count time will be 10 minutes. Ensure the Instrument is setup to integrate for 10 minute. Refer to the instrument manual for proper setup.

Note:

At the time of calibration the efficiency is determined and stored in the RADIAC. The AN/PDR-77 connected to the DT669 Alpha probe is set to display CPM which is the true 2 pie emission rate of the sample being counted. Due to the release limit being dpm, a 4 pie emission rate, the reported efficiency is 50%.

Block 10. The efficiency for the calibrated AN/PDR-77 is 50%. If an equivalent meter is used contact the TACOM RSO.

Block 11. The background count time will be 10 minutes. Ensure the Instrument is setup to integrate for 10 minute. Refer to the instrument manual for proper setup.

Block 12. Enter the 10 minute background count. Note: To ensure the release criteria can be met the 10 minute background must be 100 or less.

Block 13. Enter Sample #.

Block 14. Enter Sample Description (e.g. M35 Series Truck, Serial Number, Panel)

Block 15. Enter the results of the 10 minute sample count.

Block 16. Subtract the sample count (block 15) from the background count (block 12). Divide by 10 and enter the result in block 16. (Block 12 – Block 15)/10

APPENDIX B

Suggested Supply List

Base items needed on sound judgment and as the task at hand or the mission dictates:

- Equipment used for contamination beyond the scope of the project may be considered
- Adequate supplies should be on hand to assist all personnel expected to participate
- The area of the project should be known to the Installation RSO in case of an emergency
- Survey and monitoring equipment and radiation signs should be inspected for current use

Category	Supplies
Clothing	<p>Suggested protective clothing for each member of the project, to be worn over service uniforms:</p> <ul style="list-style-type: none"> • Gloves • Shoe coverings
Detection equipment	<ul style="list-style-type: none"> • No personnel dosimeter monitoring is needed • Survey meter (1) – Functional and calibrated with: <ul style="list-style-type: none"> ○ alpha probe ○ Beta/gama probe • NUCON smear filter wipes • Clear ziploc plastic bags for samples
General equipment	<ul style="list-style-type: none"> • Copy of SOP/check lists, to include actions for accidents • Large plastic bags (collection of dials or gauges) • Adhesive tape and labels • Large towel • Radiation warning signs • Radiation lables <ul style="list-style-type: none"> ○ UN 2911 DOT label ○ For Storage Only (Isotope and Activity) • Assorted pens • Storage containers for collected decon waste and dials or gauges • Clean-up items (broom, dust pan, trash bags for normal waste) • Rope (consider 25 feet to rope off if necessary) • Duct tape to pick up Ra 226 particles off surfaces
References	<ul style="list-style-type: none"> • Emergency Points of Contact • Ra 226 Removal Procedures, Appendix A, Sample Analysis Worksheet • Radioactive Material Movement Form (RMMF) • Publications <ul style="list-style-type: none"> ○ TB 43-0216 ○ Technical and Operating Manuals • Other Documents <ul style="list-style-type: none"> ○ Training Manuals ○ NRC Form 3 (Available on NRC web page) ○ 10 CFR parts 19, 20, and 21 ○ Section 206 of the Energy Reorganization Act of 1974

Calibrated and functional Survey Instruments

Calibrated IAW TB 43-0180

AN/PDR-77 (or equivalent)

DT 616 beta/gamma or equivalent probe are used to determine the presence of Ra-226

DT 669 alpha or equivalent probe are used for determining Ra-226 contamination

APPENDIX C

RSO REPORT CHECKLIST

A. THE PROJECT OR MISSION

- 1. Name and Phone # of Person Reporting
- 2. Date of project
- 3. Item(s) involved (e.g., M-35 Trucks, etc.)
- 4. Isotope and quantity involved
- 5. Location of project
- 6. Number of personnel involved

B. NOTIFICATIONS

- 1. Installation Commander
- 2. Installation Radiation Safety Officer (RSO)
- 3. TACOM LCMC Radiation Safety Staff Officer (aka TACOM-W RSO)

C. PERSONNEL STATUS

- 1. Were personnel involved properly trained?
- 2. Did personnel involved have dosimetry?

D. ACTIONS TAKEN

- 1. Is the area isolated?
- 2. Is item controlled? (e.g., bagged/placed in hood, etc.)
- 3. Have wipes of item been taken?
- 4. Has area been wiped? (including adjacent areas)
- 5. What is the decon status?

E. INFORMATION ABOUT ITEM(S)

- 1. History of item (where it came from)
- 2. Condition of item upon receipt
- 3. What was done to the item after receipt?
- 4. Where was item stored?
- 5. Where was item worked?
- 6. What precautions were taken?
- 7. Was/is item illuminated?
- 8. How many people handled the item?
- 9. Was there a problem? If so, what were corrective actions?

F. SUBMIT WRITTEN REPORT TO TACOM-W RSO

- 1. Submitted within 10 DAYS?
- 2. Copy furnish to Installation RSO?

US Army TACOM, Life Cycle Management Command

ATTN: AMSTA-CSC-Z (Mail Stop 485)

6501 East Eleven Mile Road, Warren, MI 48397-5000

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E-mail: Karen.lapa.Mcguire@us.army.mil or Thomas.Gizicki@us.army.mil

APPENDIX D

Dec 2009 TACOM LCMC Rad Certificate

Title:	Property Clearance Certificate for Radioactive Items
Reference:	DLAI 4145.8 MAR 04 Radioactive Commodities in the Department of Defense Supply System
Description:	Radioactive items or materials are not to be turned into the DRMO unless the generator provides a statement, signed by their Radiation Safety Officer (RSO) or by his/her designee certifying that the item/material has had a radiation survey and the radioactive dials and gauges have been removed.
CERTIFICATION STATEMENT	
<p>I CERTIFY THAT VEHICLE _____ serial# _____</p> <p>NSN _____ HAD A RADIOLOGICAL SURVEY ON THE INTERIOR OF THIS VEHICLE AND ALL RADIOACTIVE DIALS AND GAUGES HAVE BEEN REMOVED.</p> <p>DTID # _____</p> <p>Signature: _____ Date Inspected: _____</p> <p>Print Name: _____ Title: _____</p> <p>Phone # _____ Organization _____</p>	
<p>TACOM LCMC (DEC 2009) USE only an ink ball point pen or ultra fine point Sharpie permanent marker when completing this form.</p>	

Information Worksheet

(To be completed by TACOM RSO)	
Installation:	
Installation Commander:	Phone #:
Installation RSO:	Phone #:
Mission RSO:	Phone #:
Permanent Storage POC:	Phone #:

To be completed by Mission RSO:

Date:

Survey Number (start at 001):

DOCUMENTATION

Documents submitted to the US Army TACOM Life Cycle Management Command, ATTN: AMSTA-CSC-Z (Mail Stop 485), 6501 East Eleven Mile Road, Warren, MI 48397-5000:

_____ Appendix A, Sample Analysis Worksheet

_____ Appendix B, Information Worksheet (this form)

Total number of Ra226 gauges removed during this mission: _____

Total number of broken gauges: _____

Survey Performed By: _____

Date: _____

EMERGENCY CONTACTS

Mrs. Karen McGuire at DSN 786-7635 or Comm 586-282-7635

Mr. Thomas Gizicki at DSN 793-2965 or Comm 309-782-2965