



NUCLEAR METALS, INC.

**GUIDELINES FOR TRANSFERRING SOLID DEPLETED URANIUM PRODUCT**

**OCTOBER 1993**

**GUIDELINES FOR TRANSFERRING SOLID DEPLETED URANIUM PRODUCT**

**PAGE ONE**

- Shipping Papers:** Shipping papers are required for each transport of radioactive materials. The shipping papers must include the proper shipping name, the net hazardous weight, the total activity and the transport index.
- Proper Shipping Name:** "Radioactive material, low specific activity, n.o.s., 7, UN2912."
- Net Hazardous Wt:** The total net weight of the material in pounds (lbs).
- Total Activity:** Dividing the depleted uranium net weight (in lbs) by 6118 will equal the activity in Curies (Ci). Export shipments must be listed in Becquerels (Bq).  $Ci \times 37 = Bq$   $E9 = GBq$ . For example, 7500 lbs of DU = 1.23 Ci = 45.5 GBq.
- Transport Index:** Radiation level at one meter (3.3 ft) from the package. Our experience has shown these levels to be between 0.2 and 0.3 mr/hr for solid depleted uranium product.
- Packaging:** All packages must meet U.S. Department of Transportation regulations listed in 49 CFR 173.465. This section covers test requirements for transportation packages which will contain solid depleted uranium.
- Package Marking:** Each package must be properly marked in accordance with 49 CFR 172.300-310. Markings include shipper's name and address, the material's proper shipping name and ID (UN) number, package type (usually Type A) and gross weight (if over 110 pounds). See Appendices.
- Package Labels:** Each package must be properly labeled, in accordance with 49 CFR 172.403, with the appropriate category of label. Our experience has shown that, without significant shielding, solid depleted uranium will be shipped with Category Yellow II Labels. These labels must also be properly completed. See Appendices.

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- Radiation Levels:** In accordance with 49 CFR 173.441, readings should be taken at the surface of each container. The highest reading should be noted. Levels can be expected between 5-10 mr/hr.
- Removable Contamination:** The level of non-fixed radioactive contamination may be determined by wiping a 100 square centimeter area of the surface with an absorbent material using a moderate pressure. The sample is then analyzed for alpha and beta radiation. In accordance with 49 CFR 173.443, the alpha and beta results should not exceed 22 and 220 dpm/100cm<sup>2</sup>, respectively.
- Appendices:**
1. References From Title 49 CFR - USDOT Regulations.
  2. Radioactive "Yellow II" Label.
  3. Proper Use And Placement Of Labels.
  4. Example Of Package Markings And Labels.
- Disclaimer:** Although we have attempted to provide current and accurate information concerning the shipment of solid depleted uranium, we make no representations regarding the accuracy or completeness of the information listed herein and assume no liability for any loss, damage or injury of any kind which may result from or arise out of the use of or reliance on the information listed herein by any person. It is the responsibility of the user to determine the best precautions necessary for safe handling and use of this product for his own unique application.
- Questions:** Questions regarding the material contained within this information package directed to the Regulatory Compliance Auditing Department or the Health Physics Department will receive a timely response.

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**GUIDELINES FOR TRANSFERRING SOLID DEPLETED URANIUM PRODUCT - APPENDIX 1**  
**REGULATORY REFERENCES FROM 49 CFR FOR SHIPPERS OF RADIOACTIVE MATERIALS**

- 171.8 General Definitions and Terms (For All Hazardous Materials).
- 172.101 The Hazardous Materials Table of Proper Shipping Names & Rules of Use.
- 172.200+ Shipping Paper Requirements.
- 172.300+ Specification Marking Requirements.
- 172.304 Marking Requirements.
- 172.310 Specification Marking Requirements for Radioactive Materials.
- 172.400 Specification Labeling Requirements.
- 172.403 Specification Labeling Requirements for Radioactive Materials.
- 172.406 Placement of Labels.
- 172.500+ Placarding Requirements (Applicable to Exclusive-Use Shipments Only).
- 172.600+ Emergency Response Information.
- 173.2 Classification of Hazards.
- 173.22 Shipper's Responsibility.
- 173.24 Standard Requirements for All Packages.
- 173.28 Reuse of Packagings.
- 173.403 Definitions - Radioactive Materials.
- 173.411 General Design Requirements.
- 173.412 Additional Design Requirements for Type A Packages.
- 173.415 Authorized Type A Packages.
- 173.421 Limited Quantities of Radioactive Materials.
- 173.421-1 Additional Requirements for Excepted Radioactive Materials.
- 173.423 Table of Activity Limits - Excepted Quantities and Articles.
- 173.425 Transport Requirements for Low Specific Activity Radioactive Material.
- 173.431+ Activity Limits for Type A Packages.
- 173.441 Radiation Level Limitations.
- 173.443 Contamination Control.
- 173.461 Demonstration of Compliance with Tests.
- 173.465 Type A Packaging Tests.
- 173.474+ Quality Control Requirements.

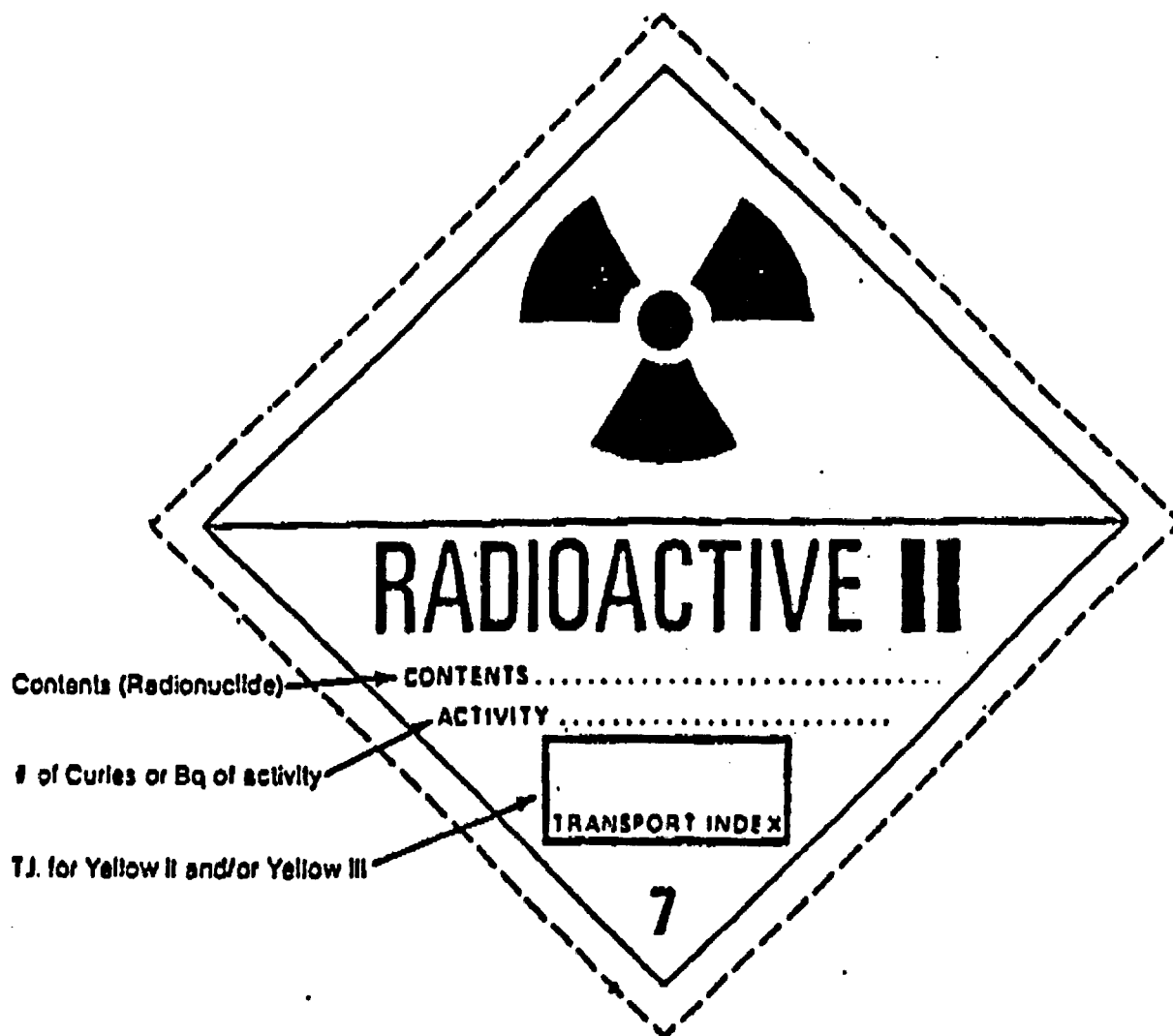
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**GUIDELINES FOR TRANSFERRING SOLID DEPLETED URANIUM PRODUCT - APPENDIX 2**

**RADIOACTIVE "YELLOW II" LABEL**

RAM labels must be applied to opposite sides of the package.  
Ensure the appropriate information appears on both labels.



**The Contents (Radionuclide) will be Depleted Uranium.**

**To calculate the Activity, divide the new weight  
in pounds by 6118, which equals curies of material.**

**Transport Index (T.I.) equals the amount of radiation  
the package emits at one meter in mr/hr.**

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**GUIDELINES FOR TRANSFERRING SOLID DEPLETED URANIUM PRODUCT - APPENDIX 3**

**PROPER USE AND PLACEMENT OF LABELS**

1. Labels must be placed near the Proper Shipping Name.
2. Different labels must be next to (not opposite) each other.
3. There must be no overlapping into the border of a label.
4. Labels must be affixed to one face of the package.  
Labels must not be folded.
5. Radioactive material requires dual labeling on opposite sides.
6. Labels must be unobscured by markings, strapping, etcetera.

**Category Of Labels For Radioactive Material Packages**

<u>Label(s)</u>	<u>Package Surface Limit</u>	<u>Maximum Transport Index</u>
WHITE I	0.5 mr/hr	0 mr/hr
YELLOW II	50 mr/hr	1 mr/hr
YELLOW III	200 mr/hr	10 mr/hr

Do not relate curies to the Transport Index (T.I.).

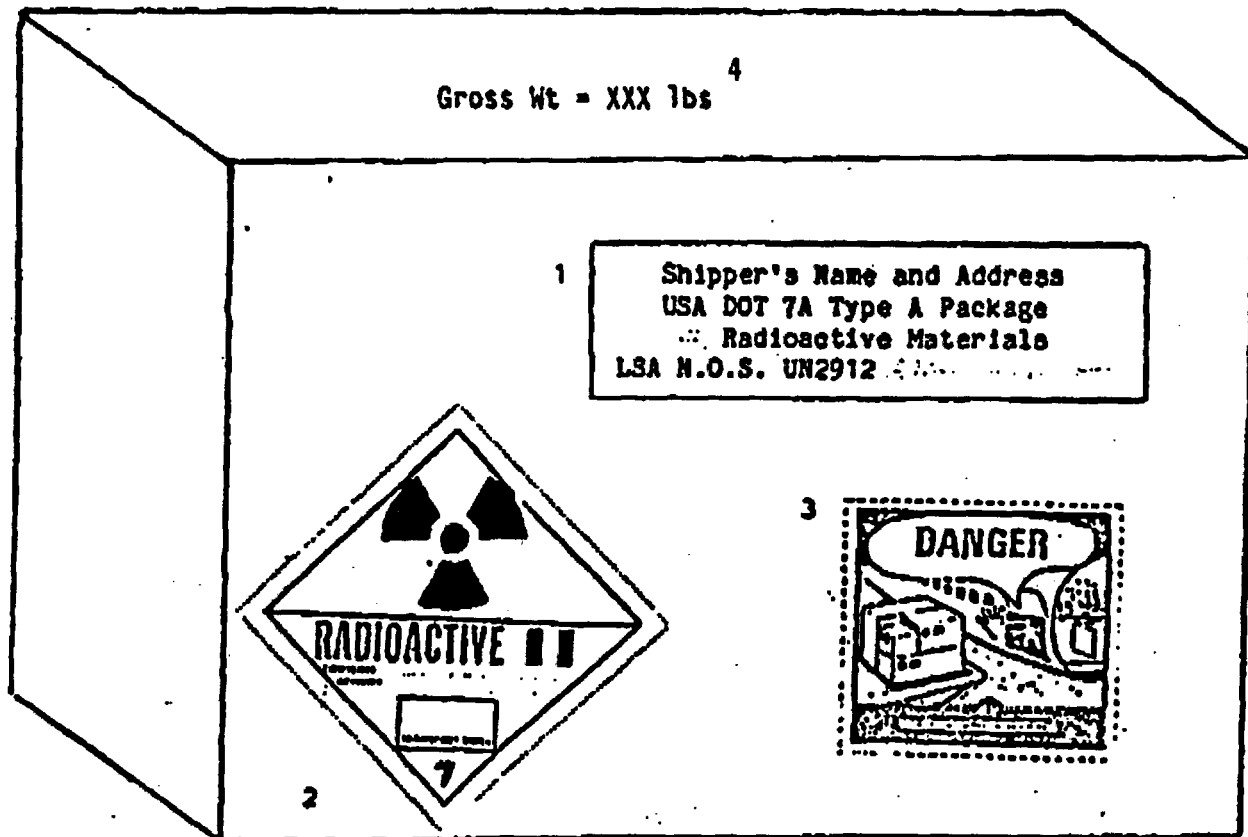
$\text{Ci}$ ,  $\text{mCi}$  and  $\text{uCi}$  = the quantity of RAM being shipped.  
 $\text{T.I.s}$  = the radiation the package emits at one meter.

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**GUIDELINES FOR TRANSFERRING SOLID DEPLETED URANIUM PRODUCT - APPENDIX 4**

**EXAMPLE OF PACKAGE MARKINGS AND LABELS**



1. The Proper Shipping Name must be on both sides.
2. Yellow II Labels must be on both sides.
3. Danger Labels (air transport only) must be on both sides.
4. The Gross Weight must appear on the surface (if over 110 pounds).  
The top of the container is recommended.

A seal that is not readily breakable and that provides evidence that the package has not been opened is required.  
Metal banding is recommended.

