

CHAPTER 11

Transportation

11-1. Introduction. Transportation of hazardous materials is regulated by the US Department of Transportation (DOT). The regulations applicable to transportation of Class 7 (radioactive) materials can be found in Subpart I of [49 CFR 173](#). Under the [AEA of 1954](#), the NRC has responsibility for safety in the possession, use, and transfer (including transport) of byproduct, source, and special nuclear material. Because of this overlap in statutory authorities of NRC and DOT, the two Federal agencies signed a MOU in 1979 with regard to regulation of the transport of radioactive material (44 FR 38690). DOT (in consultation with the NRC) is responsible for developing safety standards for the classification of radioactive materials; for design specifications and performance requirements of packages for quantities of radioactive materials (other than fissile) not exceeding Type A limits and for low specific activity materials; and for other transportation requirements. The NRC is responsible for greater than Type A quantities of radioactive materials and fissile materials. DOT acts as the US representative to the IAEA (International Atomic Energy Agency) and other internal governmental matters and the NRC provides DOT technical support and advice.

a. The NRC has promulgated in [10 CFR 71](#) requirements that must be met by licensees for packaging used to deliver certain types of licensed material to a carrier for transport if fissile material or quantities exceeding Type A quantities are involved. NRC also assists and advises DOT in establishing both national and international safety standards and in reviewing and evaluating packaging designs. Persons offering radioactive materials for transportation are responsible for ensuring that the package is in good physical condition and meets DOT specifications, the package is appropriate to the contents, all closures are in working order, all radiation and contamination levels are checked, and all labeling, marking, manifesting, and placarding requirements are met.

b. Only personnel trained in transporting hazardous materials will prepare, package mark, label, manifest, or offer for shipment any radioactive materials for USACE. Only USACE members formally designated and authorized by a MSC or District Commander or Deputy Commander shall be allowed to execute hazardous waste manifests and related documents for a site. The authorization letter should recognize that the individual is within his or her scope of employment when executing manifests and related documents. To document appropriate training and the scope of an individual's signature authority, a nomination and authorization procedure must be put into practice. All persons nominated to be manifest certifying officials must have completed the required training and obtained certification. The nomination package should contain a one-page summary of the person's training and experience in HTRW and manifesting. The nomination package should also have the authorization letter (to be coordinated with the local counsel) ready for signature. The authorization letter must clearly state that the execution of manifests and related

documents are within the scope of the individual's official duties. (See [EP 415-1-266, Resident Engineer Management Guide for HTRW Projects.](#))

c. It is USACE policy, if requested by its customers, to execute hazardous waste manifests and related documents on behalf of those customers when it is not precluded by state statutes or regulations. Currently, USACE is signing manifest forms and related documents on behalf of EPA, FEMA, and FSA. USACE personnel executing hazardous waste manifests and related documents must ensure that the USACE is authorized by its customers to execute hazardous waste manifests and related documents on their behalf prior to such documents being executed.

11-2. Determining if Packages are Radioactive for Shipping.

a. Currently, a material is considered Class 7 (radioactive) for shipping purposes if the material contents of the package have a specific activity greater than 70 becquerel per gram (Bq/g, which is approximately 2000 pCi/g). If more than one radionuclide is present in the package, such as when shipping radionuclides that decay to radioactive daughters, the sum of all the specific activities must not exceed 70 Bq/g.

b. On 26 January 2003, DOT published a final rule that will change the regulatory definition of Class 7 (radioactive) material by harmonizing the regulations with international standards. Under the system that will become effective 1 October 2004, the exempt material activity concentrations vary depending on the individual radionuclide. The exempt concentrations are published in 40 CFR 173.436. There is also an activity limit for an exempt consignment of material that, if exceeded, would require the consignment to be shipped as Class 7 even though each individual package may be exempt.

c. Materials, soils, and debris containing radioactive materials greater than natural background but exempt from DOT requirements, will be shipped and handled in such a way as to be protective of worker health and safety, the public, and the environment. Most truck and rail transporters require that these materials be packaged. Bulk shipments may use liners (i.e. 'burrito bags') inside rail gondolas, or intermodal containers. Smaller shipments may be made in strong, tight containers.

d. DOT radioactive materials are also classified by their containment, quantity, and exceptions.

(1) Containment. Radioactive materials may be considered as normal form or special form. Special form materials are those defined in accordance with DOT regulations ([49 CFR 173.403](#)). Special form materials must be a single, solid piece or be contained in a sealed capsule with one dimension greater than 5 millimeters and must pass tests to demonstrate its

resistance to breach or destruction. All other radioactive materials are considered normal form. Most USACE radioactive wastes are normal form.

(2) Quantity. The A_2 quantity (normal form) is the maximum activity of normal form material allowed in one Type A package. An A_1 quantity (special form) is the activity that will produce an external radiation level of 1 R/hr at 3 meters, up to a maximum of 1080 curies, and it is the maximum activity of special form material allowed in a Type A package. There are some radioisotopes currently assigned an unlimited A_2 value. This value is used in determining other quantity limits. The recently amended regulations also revised the A values for many radionuclide, therefore each on-going transportation program should assess the impact of the changes prior to 1 October 2004. A Type B quantity is one that exceeds the Type A quantity. A highway-route-controlled quantity means a quantity within a single package that exceeds:

- 3000 times the A_1 or A_2 quantity
- Any quantity exceeding 1000 TBq (27,000 Ci), whichever is the least

(3) Exceptions. Radioactive materials that qualify as exceptions may be shipped using less stringent requirements for packaging, marking, labeling, and manifesting. These exceptions are spelled out in [49 CFR 173.421](#) through 427: limited quantities of class 7 materials, instruments and articles, manufactured articles containing natural uranium or thorium, low specific activity Class 7 materials, and objects with contaminated surfaces.

(a) A Limited Quantity is not greater than one one-thousandth of the Type A quantity for solids, or not greater than one ten-thousandth of a Type A quantity for liquids.

(b) Instruments and articles are manufactured items containing radioactive material that would require destruction of the item to remove the material. The activity cannot exceed one one-hundredth of the type A quantity for solid material, one one-thousandth of a Type A quantity for gases, or one ten-thousandth of a Type A quantity for liquids. The radiation level at any point on the external surface of the package shall not exceed 0.005 mSv/hr (0.5 mrem/hr).

(c) Low Specific Activity material are uranium or thorium ores and their physical and chemical concentrates, or un-irradiated natural or depleted uranium or thorium, or mill tailings, contaminated earth, concrete, rubble, or other debris in which the Class 7 material is uniformly distributed and the average specific activity meets specified concentration limits determined by their A_2 values.

(d) Depending upon their total activity, some remediation wastes may not meet the definition of a Class 7 (radioactive) material but they are DOT hazardous material because they contain a reportable quantity (RQ) of a hazardous substance in a single package or bulk

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container under [49 CFR 172.101](#) Appendix A Table 2. Should any of these radioactive materials contain a hazardous substance, they may be subject to additional regulations on transport, depending on the hazardous substance involved.

11-3. Packaging. Radioactive soils and debris from site remediation that are DOT regulated normally contain low specific activities of radioactive contaminants and have a low external dose rate. These packages may be shipped under 49 CFR 173.427 Transportation Requirements For Low Specific Activity (LSA) Class 7 (radioactive) Materials and Surface Contaminated Objects (SCO). LSA materials have several options for packaging but, typically, strong, tight containers will suffice for domestic shipments of most soils and debris. These packages must meet the DOT requirements for LSA and must be shipped as exclusive use.

a. Small quantities, such as field samples may be shipped under [49 CFR 173.421](#) Excepted Packages, Limited Quantity of Class 7 Materials. Small quantities of higher activities may be shipped in Type A containers. Radioactive materials with high activities may require Type B packaging. Each successively greater packaging has additional requirements and is proportionately more expensive. A trained and certified hazardous materials shipper must be consulted for packaging and shipping radioactive materials or waste.

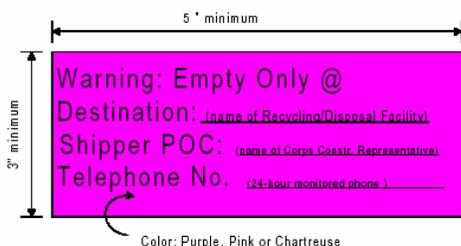
b. The outside of each container must meet DOT's specified contamination control limits. This is usually accomplished through smear or wipe testing the outside of the package, and assaying the smear to assure there is no removable contamination from the package.

11-4. Marking. Non-bulk packages will be marked with the proper shipping name, the UN identification number, and the consigner or consignee's name and address. The gross weight, RQ, package type and weight, and orientation markings, if applicable, will also be included on the package. Bulk packages must be marked with the UN identification number, and conditions may require that it be displayed on an orange panel or white square-on-point if certain conditions exist. Markings must be in English, meet specified size requirements, must be durably marked with a contrasting color background, and be isolated on the package and un-obscured.

11-5. Labeling.

a. Radioactive packages will be labeled with a White I, Yellow II or Yellow III radioactive label unless excepted by DOT from labeling. The label will include the Transport Index, the radionuclides in the shipment, and their activities. A subsidiary hazard labels may be necessary if required by regulation. The labels will be placed on opposite sides of the package. Empty packages may be shipped but must include the Empty label.

b. All packages of radioactive waste will also be labeled with a non-DOT USACE marking sticker adjacent to the specified DOT labels and placards to ensure the materials are properly disposed. Containers (bulk and non-bulk) of wastes or materials that are not DOT, EPA, or NRC regulated, but are being sent off-site for disposal shall also have the marking sticker even though there are no specification markings, labels or placards required.



11-6. **Manifesting.** If the material to be disposed of is NRC licensed material, an NRC Uniform Low-Level Radioactive Waste Manifest (forms 540 and 541) must be used. This manifest will fulfill the DOT shipping paper requirements as well as the NRC requirements. If the material to be disposed of is a hazardous waste, a state or uniform EPA Hazardous Waste Manifest must be used. If the material is a RCRA regulated waste and is also NRC regulated, the NRC manifest must accompany the EPA manifest. If the material is not a hazardous waste or NRC licensed, but is still regulated by DOT (e.g., RQ of radionuclides) then a DOT straight bill of lading may be used.

a. The manifest or shipping papers will be filled out completely. If the material is a hazardous waste, the appropriate hazardous waste manifest (see 40 CFR 262.21 for hierarchy) and land disposal notifications will be completed. The manifest must include the name, address, and phone numbers for the consignor and the consignee. DOT regulations require hazardous materials be listed first on the shipping paper or marked with a contrasting color or marked with an "X" in the hazardous materials column.

b. The proper shipping name, UN number, and hazard class will be filled out for each material. The physical and chemical form, the activity, the TI and Labeling applied to the package will be listed, and Highway Route Controlled Quantity (HRCQ) or RQ, if applicable, will be included in the description.

c. A 24-hour emergency telephone number must be listed on the manifest when transporting DOT hazardous materials. The emergency phone must be monitored at all times the hazardous material is in transportation (including storage incidental to transportation) by personnel knowledgeable of the shipment, its hazards, and proper emergency response and incident mitigation information in case of accident ([49 CFR 172.604](#)). Pagers and call backs are unacceptable to meet this requirement.

11-7. Placarding. Exclusive use shipments of LSA or SCO and packages labeled with Radioactive Yellow III labels will require vehicle placarding. The consignor is responsible for providing the shipper with the appropriate placards. Most commercial shippers will have their own placards available but the shipper should have the necessary placards on hand. HRCQ shipments of radioactive materials must have a radioactive placard placed on a square white background in accordance with DOT regulations.

11-8. Mixed or Co-Mingled Waste.

a. Except for Class 7 limited quantity packages, as defined in [49 CFR 173.421](#), radioactive materials that also meet the classification of more than one hazard class will be classified primarily as Class 7. Limited quantity packages will be classed as the additional hazard and prepared for transportation according to the other hazard class.

b. Mixed waste may have subsidiary hazard labeling, requirements under [49 CFR 172.402](#). Excepted packages under [49 CFR 173.421, 424 or 426](#) do not need to have a subsidiary "Radioactive" label.

11-9. DOT Required Security Plans. Security of hazardous materials in the transportation environment poses unique challenges. To address this DOT requires shippers and carriers to have security plans in place and provide training for personnel involved in shipments of certain hazardous materials. Radioactive materials and radioactive waste shipments of a HRCQ, a shipment that requires a placard, or shipments of hazardous materials in bulk or non-bulk packaging when specified limits (e.g., 468 cubic feet for solids for bulk, 5000 pounds gross weight or more of one hazard class in non-bulk packaging) are exceeded will require a security plan. Most exclusive use shipments of radioactive materials will require placards, and so will require a security plan. These new DOT security requirements are imposed industry-wide on transporters. USACE contracts require the contractor to provide site security, and contractors and transport companies are required to follow applicable Federal regulations. USACE duties for compliance with the DOT security plan requirements include the following:

- Ensuring that the contractor and transporter know that under their contracts they must comply with all Federal laws, including this new DOT requirement.
- Ensuring that the contractor is aware of the security clauses in his or her basic contract that requires they provide site security.
- Determine whether USACE needs to prepare a security plan to address the security of the hazmat during pre-transportation phases when the hazmat is on-site.

To demonstrate compliance with these regulations, the following procedure will be followed for all USACE shipments of DOT regulated hazmat by contractors when security plans are required by 49 CFR 172, Subpart I. Guidance on the new DOT security planning and

training requirements for hazardous material shipments is forthcoming from HQ USACE in an Engineering Technical Letter. A [fact sheet](#) has been prepared by the HTRW-CX, which addresses the new DOT security requirements.

a. The contract will clearly require full compliance with DOT regulations, 49 CFR, Subchapter C.

b. The contract will clearly indicate, through the appropriate Federal Acquisition Regulations clauses, that the prime contractor is responsible for on-site security.

c. With each shipment of hazmat required to have a security plan, the USACE representative, responsible for signing the shipping documents, will require the initial transporter to sign a certification statement. Subsequent shipments of the same hazard class of materials transported by the same transporter need not provide additional certifications.

d. The certification will be typed on a separate page and read as follows:

I hereby certify that (name of transportation company) has a Security Plan in place which meets the requirements of 49 CFR 172 Subpart I for the hazardous materials described in the attached shipping papers.

This certification will be signed by the initial transporter and dated.

e. The certification will be placed in the project files with the shipping documents, and retained for at least the period required for the shipping papers.

f. It is not USACE responsibility to review, accept, approve or even have copies of shipper's and transporters security plans.