RADIOACTIVE MATERIAL SHIPMENT

D.O.T. READY REFERENCE

Packages prepared for shipment that contain radioactive materials are viewed as hazardous materials shipments. 10 CFR 30.34(c) states that preparation for shipment and transport of byproduct materials will be in accordance with Part 71 of the Federal Code. Part 71.5(a) states that no licensee shall transport licensed material unless he complies with the regulations of the Department of Transportation in 49 CFR Parts 170-189. This relates to packaging of radioactive materials, marking and labeling of packages, loading and storage of packages, placarding of the transportation vehicle, monitoring requirements and accident reporting.

Department of Transportation regulations deal only with Interstate Commerce. Regardless, paragraph 10 CFR 71.5(b) states that even if the transportation is not interstate, licensees will conform to the standards and requirements of the Department of Transportation to the same extent as if the shipment was an interstate shipment.

Consequently, when packages are prepared for shipment, there are a number of items to which the employee should be aware:

1. Packages containing radioactive materials are designated as either Normal Form or limited Quantity shipments. The difference is in the amount of activity that is being shipped and the package exposure rate. limited Quantity shipments are those whose activity is less than the limited Quantity activity for the radionuclide and when the surface exposure rate is not greater than 0.5 mrem/hr. The limited Quantity activity is a function of the radionuclide and its physical form (solid, liquid or gas). A sample limited Quantity statement is enclosed. If these limits are exceeded, the package is a Normal Form shipment.

2. Normal Form packages require a security seal. The security seal can be a nylon tie, paper tape or other device that would show when the integrity of the package has been breached. It would not be advisable to use a padlock, for example, since the lock could be opened and reclosed.
without any telltale evidence. Limited Quantity packages do not require a security seal.

3. Normal Form shipments require the use of a 'Type A' package. The containers must be certified as having passed tests that check a number of things: a free drop test; a water spray test; a compression test; and a penetration test. Documentation of the certification must be available. Type A containers are not necessary for limited Quantity shipments. The package need only be strong, tight and in good condition.

4. Placards and labels may be needed when shipping normal form packages. The three bladed symbol and words "Caution Radioactive Materials" may need to be on the inside of the package. UN2982 (Normal form) or UN2910 (Limited Quantity) designations may need to be used as well. DOT White I, Yellow II or Yellow III diamond shaped labels may be required. Transport Index values may need to be entered.

5. Surveys and wipe tests must be conducted.

5. If the contamination or exposure limits are exceeded, the Radiation Safety Officer should be contacted. Time, distance and shielding should always be considered.

6. The Transport Index may need to be used. This is the survey measurement taken at one meter from the surface of the container and entered onto the Yellow II or III label (only) in the appropriate box. It is the exposure rate in mrem/hr but is entered as a dimensionless number, always rounded up to the nearest tenth.

7. Paperwork must be completed. Shipping papers, or Bill of Lading and Shipper's Certificate are part of these. Bill of Lading is needed to identify all the necessary information about the contents of the shipment. The Shipper's Certificate is a signed statement that all has been prepared in accordance with DOT regulations.

Often, the necessary instructions and paperwork for shipments are provided by a radioactive materials supplier or local nuclear pharmacy. Regardless, knowledge of the types of shipments that can be used is still necessary.

Several scenarios are presented below that may be examples of the types of shipments you perform.
1. RETURN OF PACKAGE CONTAINING NO RADIOACTIVE MATERIAL.  
A package may be returned to a supplier, such as a nuclear pharmacy, without any additional survey requirements or labeling if there is no radioactive materials in the package. (This does not constitute a hazardous material shipment but addresses what should be done with the shipping cases that nuclear pharmacies use when delivering doses to local hospitals.) No radioactive material labels should be on the package. The package should be surveyed prior to shipment to assure there is no residual contamination.

2. RETURN OF "LIMITED QUANTITY" PACKAGE.  
Package contains no more than Limited Quantities (see enclosed table).

   a. Wipe test external surface of package, must not exceed 22 dpm/cm² wipe tested over 300 cm². That is, action limit of 6600 dpm per 300 cm² cannot be exceeded.

   b. Survey at surface (exposure not greater than 0.5 mrem/hr).

   c. Remove exterior placards or other labeling from package.

   d. Inside of package must contain "radioactive materials" sign (on syringe shields or Mo-99/Tc-99m generators) and Limited Quantity declaration.

   e. Package must be adequate and in good condition, a strong, tight package, but need not be a Type A container. However, the Type A nuclear pharmacy cases may be used for this purpose.

3. RETURN OF RADIOACTIVE MATERIALS.  
Package contains more than Limited Quantities.

   a. Survey surface of package (not greater than 0.5 mrem/hr) then: Display White I transport sign, or

Survey surface of package (no greater than 50 mrem/hr). Survey one meter (no greater than 1 mrem/hr) then: Display Yellow II transport sign, or

Survey surface of package (no greater than 200 mrem/hr). Survey one meter (no greater than 10 mrem/hr) then: Display Yellow III transport sign. Placard vehicle.
b. Yellow II or III signs - determine Transport Index and enter.

c. Wipe test external surface (not to exceed 6600 dpm per 300 cm²).

d. Sign shipper's certificate.