

ADVANCED MEDICAL SYSTEMS OPERATING PROCEDURE

SHIPMENT OF SOLID RADIOACTIVE WASTE

ISP-26 Rev. 1/95

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1.0 PURPOSE: To ensure that the solid radioactive waste is Shipped in accordance with the current federal, state and local regulations and requirements.

2.0 PRECAUTIONS AND LIMITATIONS:

2.1 This procedure applies to all shipments of solid radioactive waste.

2.2 The shipment of radioactive material is a highly regulated activity. The shipper must be familiar with the current rules and regulations in order to prevent violations and penalties.

2.3 It is prudent to communicate with the Regulatory affairs personnel at the disposal site prior to shipment in order to answer any questions they may raise regarding the material being shipped and determine any special local requirements.

3.0 INSTRUCTIONS:

3.1 For Each Package or Container

3.1.1 Determine the radionuclide(s) present.

3.1.2 Determine whether the material is normal or special form. (49CFR173.403)

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3.1.3 Determine the DOT subtype (type quality).

<u>Subtype</u>	<u>Cobalt 60</u>
Limited Quantity	$\leq 0.007\text{Ci}$
Type A Quantity	$\leq 7\text{Ci}$
Type B Quantity	> 7 but $< 21,000\text{Ci}$
Highway Route Controlled	$> 21,000\text{Ci}$

3.1.4 Determine if the material is LSA.

- a. Convert the activity to mCi.
- b. Determine the A_2 value for each nuclide.
(49CFR173.435)
- c. Determine the LSA limit for each nuclide.
(49CFR713.403(n))

NOTE: For Cobalt 60 the LSA limit is 0.3mCi/g.

- d. Determine the weight of the package contents in grams. (454g/lb). Do not include the weight of the drum, cask, shielding, etc.
- e. Determine specific activity for each nuclide by dividing total activity of nuclide by total gram weight of package contents.
- f. For each nuclide, divide the specific activity, as determined in step e, by the LSA limit.
- g. For single nuclide waste, if the result of step f is less than or equal to one (1), then the material qualifies as LSA.
- h. For mixtures of nuclides, if the sum of the fractions determined in step f is less than or equal to one (1), then the material qualifies as LSA.
- i. If the result in step f is greater than one (1), the material would be a Type A, B or HRC Quantity.

- j. For LSA material, determine if it is an LSA Type A or LSA Type B quantity.

For each nuclide, divide the total activity, in Curies, by the A_2 value.

For single nuclide waste, if the result is less than or equal to one (1), the material is LSA Type A.

For mixtures of nuclides, if the sum of the fractions is less than or equal to one (1), the material is LSA Type A.

If the result is greater than one (1), the material is LSA Type B.

3.2 Determine the packaging required for transport

- 3.2.1 The following chart summarizes the type packaging required for each DOT subtype quantity.

DOT SUBTYPES	LIMITED QUANTITY	TYPE A QUANTITY	TYPE B QUANTITY	LSA TYPE A EXCLUSIVE USE	LSA TYPE A NON-EXCLUSIVE USE	LSA TYPE B NON-EXCLUSIVE USE	LSA TYPE B EXCLUSIVE USE
TYPE PACKAGING	STRONG TIGHT CONTAINER	TYPE A PACKAGING	TYPE B PACKAGING	TYPE A PACKAGING	STRONG TIGHT CONTAINER	TYPE B PACKAGING	TYPE A PACKAGING WITH NRC
REGULATORY AGENCY	DOT	DOT	NRC	DOT	DOT	NRC	NRC
<u>DOT REGS.</u>							
173.24	X	X	X	X	X	X	X
173.411		X	X	X	X	X	X
173.412		X	X	X except (a)(b)(d) & ()		X	X
173.413			X			X	
173.415		X		X			
173.416			X			X	
173.465		X	X	X		X	X
173.466		X					
<u>NRC REGS.</u>							
71.43			X			X	X
71.45			X			X	X
71.51			X			X	
71.52							X
71.71			X			X	X
71.73			X			X	

Note that the steel drums typically used to contain radioactive waste are a DOT specification packaging; however, they do not qualify as Type A packaging. Therefore, they must either be transported in a Type A package or an exclusive use vehicle.

- 3.2.2 Multiple types of packages may be transported on the same vehicle as long as they are appropriate for the material being shipped.
- 3.3 Obtain the proper packaging and load the radioactive material.
- 3.4 Package Limits and Communication Requirements

- 3.4.1 The package may be any of the following:

- a. Type A packaging with contents.
- b. Type B packaging with contents.
- c. Strong tight container containing either LSA Type A material or limited quantity material.

- 3.4.2 Radiation level limits.

- a. Survey the package on all surfaces including the bottom. Readings that are equal to or greater than 80% of the maximum limits shall be verified with at least one other instrument. Document the results.
- b. Packages with any reading equal to or greater than 90% of the maximum limits will not be released for shipment.

Strong tight containers containing LSA Type A quantity material that read equal to or greater than 90% of the maximum limits will be held for shipment in a cask with adequate shielding.

Casks that read equal to or greater than 90% of the maximum limits will have the particular material causing the high reading removed or repositioned in order to bring the reading down.

3.4.3 Contamination limits.

- a. Smears shall be taken in the locations most likely to yield significant removable contamination.
- b. The maximum permissible contamination limit is 2,200 dpm/100cm².

3.4.4 Specification marking

- a. DOT subtypes "Limited Quantity" and "LSA exclusive use" are excepted from the specification marking requirements.
- b. DOT subtypes "Type A", "Type B" and "Highway Route Controlled Quantity" are required to be marked with the following:

Proper shipping name and ID number
Consignee's or Consignor's name and address

Gross weight

"Type A", "Type B", "LSA", etc.

3.4.5 Labeling

- a. DOT subtypes "Limited Quantity" and "LSA exclusive use" are excepted from the labeling requirements.
- b. The proper label to be affixed is determined by surveying the package and applying the criteria of 49CFR172.403(c).
- c. Multiple hazards must be so labeled.

3.4.6 Waste classification.

- a. Each package of radioactive waste must be classified in accordance with the criterion of 10CFR61.55 and clearly labeled to identify its class.
- b. Each package must meet the minimum requirements for waste packages as specified in 10CFR61.56.

3.5 Transport Vehicle Communication Requirements

3.5.1 Placarding requirements.

- a. Verify that placards are attached to transport vehicle (all 4 sides) if it is carrying any package with a Radioactive Yellow III label or an exclusive use LSA shipment.
- b. Verify that each placard is visible from the direction it faces.
- c. Photograph all sides of the transport vehicle before release to document that all placards were in place.

3.5.2 Shipping paper requirements.

- a. Bill of Lading must contain the following:
 1. Proper shipping name prescribed for the material in 49CFR172.101 and 102.
 2. The hazard class "Radioactive" if not included in the proper shipping name.
 3. The identification number, "UN--" or "NA--".
 4. The total quantity of the hazardous material covered by the description.
 5. The name of each radionuclide.
 6. A description of the physical and chemical form of the material, if not special form.
 7. The activity contained in each package in the shipment in terms of Curies, millicuries or microcuries.

NOTE: If the Bill of Lading is accompanied by a manifest, then the total Curies in the shipment may be listed instead of individual packages.

8. The category of label applied to each package.
9. For a DOE or NRC approved package, a notation of the package identification marking.
10. A signed certification statement that the materials are properly classified, described, packaged, marked and labeled.

NOTE: In filling out the Bill of Lading, identify the hazardous material description by placing an "X" in the column captioned "HM".

b. Shipping manifest requirements.

Each disposal site has a shipping manifest document for itemizing the individual drums/packages that form the shipment. Instructions are provided with the documents. A copy of the completed manifest must accompany the shipment.

c. State notification forms.

The state(s) which have radioactive material disposal sites may have prior notification requirements, typically three (3) days prior to shipment. A copy of the notification form(s) must accompany the shipment.

d. State certification forms.

The state(s) which have radioactive material disposal sites may require that a state certification form be completed for each shipment. A copy of this certification form must accompany these shipments.

e. Drivers' instructions for the maintenance of exclusive use certification.

See ISP-22

3.6 Transport Vehicle Requirements

3.6.1 Non-exclusive use shipments.

- a. No package shall exceed 200mR/hr on any surface and have a Transport Index in excess of ten (10).

3.6.2 Exclusive use shipments.

- a. No package shall exceed one thousand (1,000) mR/hr on any surface.
- b. Shipment shall be in a closed transport vehicle.
- c. The package(s) must be secured within the vehicle so that its position remains fixed.
- d. There shall be no loading or unloading operations between the beginning and the end of transportation.

3.6.3 The radwaste packages shall be loaded onto the transport vehicle in such a manner that the following radiation levels are not exceeded:

- a. 200mR/hr at any point on outer surfaces of vehicle including top and bottom. For flatbed trailer, at any point on the vertical planes projected from the outer edges of the vehicle.
- b. 10mR/hr at any point two (2) meters from the outer lateral surfaces of the vehicle (excluding top and bottom). For flatbed trailers, at any point two (2) meters from the vertical planes projected from the outer edge of the vehicle.
- c. 2mR/hr in any normally occupied cab space.
- d. The surveys required shall be made with properly calibrated instruments by at least two (2) individuals utilizing different instruments. Readings will be taken along the entire surface.

The results of the surveys will be compared and any discrepancies investigated. Readings equal to or greater than 80% of the maximum limits will be verified.

- e. No vehicle with a reading equal to or greater than 90% of the maximum limits will be released for shipment.
- f. A copy of the Transportation Vehicle Survey, Form ISP-26A, should accompany the shipment.

TRANSPORTATION VEHICLE SURVEY

ISP-26A

Shipment ID: _____ Shipment Date: _____

Meter used: _____ Cal Due: _____

Meter used: _____ Cal Due: _____

All readings in mR/hr

Comments: _____

Maximum Allowable Readings

Surface - 200mR/hr
@ 2 meters - 10mR/hr
Cab - 2mR/hr

Performed by: _____ Date: _____

Performed by: _____ Date: _____

Reviewed by RSO: _____ Date: _____