



No. HNDC-C-051	Rev. 0	Date 5/22/81	Title: Packaging, Transfer and Transportation of Radioactive Materials
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## I. PURPOSE

The purpose of this procedure is to provide for proper packaging, transfer and transportation of radioactive materials under a Hittman Nuclear & Development Corporation license and the transferees license as well as all applicable government regulations, rules and orders.

## II. POLICY

HNDC is licensed by the NRC in non-agreement states and by the State of Maryland in all agreement states to accept properly packaged radioactive waste for transfer to a licensed burial or other disposal facility. HNDC is also licensed by the State of Maryland to possess, use and store materials that may contain radioactive materials which ultimately must be properly packaged for disposal and/or transfer.

Because of these activities, HNDC, at times, is a shipper of radioactive material and is responsible for ensuring packages of radioactive material are in proper condition for transportation and transfer.

The regulations of the U.S. Department of Transportation, U.S. Nuclear Regulatory Commission and State of Maryland regarding the standards for packaging, transfer and transportation of radioactive materials shall form the minimum criteria for these activities. The license conditions and regulations or orders of the licensing authority for disposal facilities shall form the minimum criteria for packaging for disposal. Conflicts between minimum criteria shall be resolved in favor of the most restrictive criteria unless the regulatory or licensing authority or the disposal facility licensee can officially resolve the conflict (e.g., written authorization to disregard or limit certain criteria).

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### III. RESPONSIBILITIES

#### A. HNDC Responsibility for Packaging, Transfer and Transportation

1. For radioactive materials packaged at HNDC, the Health Physics Department shall be responsible for implementing the policies and procedures regarding packaging and transfer of radioactive materials. The Health Physics Supervisor (HPS) or Radiation Safety officer (RSO) shall certify that these policies and procedures are adhered to by signing the Shipper's Certification for transport of hazardous materials.
2. When HNDC acts as a broker for a shipper or acts as a licensee shipper for a shipment of radioactive material to a disposal facility, the HNDC Radwaste Disposal Operations Department shall be responsible for procuring and distributing to the licensee preparing the waste for disposal the criteria for proper packaging for disposal.
3. All transportation of radioactive materials under an HNDC license shall be a "sole use" or "full load" shipment (i.e., single consignor for all materials on vehicle) unless otherwise specifically authorized by the shipper.

#### B. Responsibility for Packaging and Transfer at Other Licensees Facilities

1. For radioactive materials packaged by, or under the license of another licensee, it is the responsibility of that licensee to package, identify and label the materials properly for transfer or transportation (and burial if applicable) in accordance with the applicable DOT, NRC, and burial site regulations. Such packages are subject to inspection under this procedure and will be refused for transfer to HNDC's license if these criteria are not met.

#### C. Dual Responsibility of HNDC and Other Licensees

1. All packages consigned for burial shall be constructed of wood or metal. The packager of the material is responsible for assigning the specification number to a particular package, if

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necessary, and for maintaining documentation supporting such assignment as required by the Department of Transportation.

#### D. Certification of Shipping Papers

1. The licensee packaging the radioactive material shall certify that these minimum criteria standards are met by signing the Shippers Certification for transport of hazardous materials. If the packages are to be transferred to HNDC's license at another licensee's facility the below inspection and Shippers Certification policy shall be sufficient for the HNDC employee accepting the materials to effect transfer.
2. The HNDC employee accepting radioactive materials for transportation and transfer shall also sign a Shippers Certification after transfer has been effected since HNDC now becomes the shipper. Employees of HNDC who have successfully completed Rad Safe training in accordance with HNDC-C-053 "Radiation Safety Training Procedure," the HPS, and the RSO are the only persons authorized to accept packages at another licensee's facility for transfer to an HNDC license.

### IV. GENERAL PACKAGING REQUIREMENTS

#### A. Liquid Waste

1. Liquid waste and scintillation vials to be shipped for burial, are to be packaged according to burial ground procedures applicable to the specific burial ground being used.

#### B. Authorized Containers for Radioactive Materials

1. The following packagings are authorized for use for the purposes of this procedure. The Quality Assurance Supervisor and Engineering Department will evaluate and approve other packages prior to use. Documentation of the evaluation and authorization will be retained by the Quality Assurance Supervisor and the Engineering Department.

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<u>Radioactive Material Classification</u>	<u>Package Type or Specification</u>
Limited Quantity	Strong, tight package such that leakage or loss of contents will be prevented during normal transporation conditions.
Low Specific Activity	Same as Limited Quantity when carried as Full Load or Exclusive Use. Same as Type A Quantity when not carried as Full Load.
Type A Quantity	DOT Specification 7A (properly packaged and sealed new or reconditioned Specification 17C, 17E, or 17H 55 gallon or 30 gallon steel drums); NRC certified containers; Type B Containers.
Type B Quantity	DOT Specification 6M; NRC Certified Type B Container.
Large Quantity	DOT Specification 6M; NRC Certified Large Quantity Container.
Fissile Material	Case by Case packaging depending upon nuclide and form. Generally DOT 7A, 6M, 6L, 6J, 17H or NRC certified container.

  

V. PROCEDURE

A. Packaging, Marking and Labeling

1. Inspect each package for visible defects. Ensure that the package specification has been embossed, stenciled, etc. on the package. If a drum is reconditioned, ensure that the reconditioners "Tested" or "Inspected" stencil appears on the drum (49CFR 173.28).
2. If the package is free from defects and of the proper specification for the materials to be packaged it may be used for transportation.

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3. A package containing radioactive liquids, to be shipped for purposes other than burial should be lined with a 4 to 8 ml poly liner prior to loading. Free liquids must be in capped containers and placed so that they are surrounded by enough absorbent to absorb two times the volume of liquid. Note: Radioactive liquids to be shipped for burial must be packaged per IV. A.1.
  - (a) Biological materials are to be packaged according to burial ground procedures applicable to the specific burial ground being used.
4. Once the desired contents are put into the package, the contents must be braced, secured, back filled, etc., to prevent movement in the package.
5. The package may be sealed for transport according to the manufacturers or suppliers instructions and procedures. Specification container closures are specified in 49 CFR 178. Ensure gaskets are in place and properly compressed and that the seating surfaces are free of defects.
6. Complete all applicable portions of the Radioactive Shipment Record (RSR) (see Exhibit I) according to the instructions on the back of the Driver's Copy (see Exhibit II).
7. Perform, or verify by visual inspection or review of documentation, the performance of the following checks:
  - (a) Verify that each package has been checked for removable contamination. If significant contamination is detected, the package must be decontaminated before it may be accepted. Significant contamination means contamination as measured on the wiping material which exceeds 2,200 disintegrations per minute of beta gamma per 100 square centimeters or which exceeds 220 disintegrations per minute of alpha per 100 square centimeters (49 CFR 173.397), non-exclusive use and 22,000 dpm of beta gamma per 100 cm<sup>2</sup> or 2,200 dpm alpha per 100 cm<sup>2</sup> if being shipped exclusive use.
  - (b) Verify that each package has been surveyed for contact dose rates and the dose rate at three (3) feet from the package. Package dose rates shall not exceed 1,000 millirem per hour at three (3) feet from the external surface of the package. If any package exceeds 1,000 mRem/hr at three feet, it must be packaged in a container to meet this limit. Packages exceeding 1,000 mRem/hr at three feet may not be accepted. If any HN series casks are used for this purpose, the HN series cask becomes the package, and must be certified for use as as a package.

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- (h) The name and address (or approved abbreviation) of the person assigning the specification number or to whom a certification number has been issued must be plainly and durably marked on the outside of the package in letters at least 1/2 inch high. Normally this will be done by the manufacturer, but for Specification 7A the shipper or packager must assign the specification.
  - (i) Except for Low Specific Activity and Limited Quantity Containers check the outside of the container for the presence of a security seal which is not readily breakable and which, while intact, will be evidence that the package has not been illicitly opened. (For example, a serial numbered lead wire seal which firmly attaches to a closure bolt or nut as a lock wire).
- (8) Verify that all shipping conditions, as delineated on the Certificate of Compliance, are satisfied (for NRC certified casks).

#### B. Shipping Papers

1. Complete, or review for correctness, a Radioactive Shipping Record (RSR) (Exhibit I) in accordance with the instructions on the back of the driver's copy (Exhibit II) to the extent possible after packaging.
2. The person responsible for packaging and classifying the radioactive materials must sign the Shippers Certification thereby assuring compliance with all applicable regulations, orders and license conditions.
3. The person responsible for transporting radioactive materials, after accepting them under an HNDC license, must complete an RSR and sign the Shippers Certification prior to transporting the materials. This does not exempt another licensee packager from completing an RSR and signing the Certification.
4. The Certification may be signed prior to loading or placarding a vehicle carrying the radioactive materials. The shipper is not relieved of the responsibility of offering the proper placards to a carrier even though the Certification has been signed.
5. Special attention shall be given to listing the proper chemical and physical form of the radioactive materials on the RSR. If the materials are radioactive waste, these forms must comply with burial ground acceptance criteria. Materials may not be transferred unless this information is complete and accurate.

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### C. Loading Vehicles

1. Loading shall be performed expeditiously and in a manner to keep radiation exposures as low as reasonably achievable.
2. Packages which read more than 200 mrem on contact must be transported in a closed (enclosed to prevent access) vehicle.
3. Packages which read less than 200 mrem/HR on contact but more than 10 mrem/HR at three feet may be transported in an open transport vehicle provided the dose rate at two meters from the package or case is less than 10 mrem/HR.
4. Packages shall be loaded so that the dose rate on contact with the package (open transport vehicle) or the outer surface of the vehicle (closed transport vehicle) does not exceed 200 mrem/HR.
5. Packages shall be loaded so that the dose rate at two meters from the vertical plane projected by the outer edges of the closed vehicle (enclosed to prevent access) does not exceed 10 mrem/HR.
6. Packages shall be loaded so that the dose rate in any occupied position (including the berth of the cab) does not exceed 2 mrem/HR.
7. After loading is completed, verify that there is no significant loose surface contamination on the vehicle. The package contamination limits apply to vehicles.
8. The above dose rate and contamination limits must be verified by surveys using appropriate instruments for the types of radiation involved. The actual values obtained must be documented on the RSR by the shipper prior to transporting the materials.
9. The vehicle driver shall thoroughly inspect the vehicle for proper loading (and placarding if necessary) and ensure the vehicle is in a proper condition for carrying the load.

### D. Placarding

1. If the transport vehicle contains a package with a Yellow III label or is a sole use shipment of LSA material, open or install the Radioactive placards on the front, rear, and both sides of the vehicle.

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NOTE:

Drivers of placarded loads must be properly qualified under the Motor Carrier Safety Regulations (49 CFR 390-397).

E. Traffic Control

1. The driver shall give the originator of the shipment a copy of the completed Radioactive Shipment Record and notify his dispatcher that he is ready to leave and the time he expects to arrive at his destination. The driver's copy of the shipper's RSR must remain in the cab of the vehicle until the shipment reaches the consignee's location.
2. In the event of any delay in transit which is not the result of an accident, the driver shall notify his dispatcher as soon as possible and explain the reason for the delay and how much longer he expects to be delayed.
3. In the event of an accident, the driver shall follow the procedure on the back of his copy of the RSR.

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## EXHIBIT I

See The Back Of  
This Form For  
The Instructions.

HITTMAN NUCLEAR & DEVELOPMENT CORP.  
3190 RED BRANCH ROAD - COLUMBIA, MARYLAND 21045 - 301/750-7804

Tel: 011-859-9617

## RADIOACTIVE SHIPMENT RECORD

Page \_\_\_\_\_ Of \_\_\_\_\_

Package Identification (1)		Unit No. (2)	Date (3)
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Shipment Origin (4) \_\_\_\_\_ Shipment Destination (6) \_\_\_\_\_

Address (5) \_\_\_\_\_ Address (7) \_\_\_\_\_

Shipment No. (8) \_\_\_\_\_ Carrier (9) \_\_\_\_\_ Driver's  
Signature (10) \_\_\_\_\_

[illegible]Total Number  
Of Containers (12)

**Total Activity**  
as % of 1.0

[illegible]

THE APPLICABLE ROUTINE DETERMINATIONS REQUIRED BY 10 CFR 71.54 HAVE BEEN PERFORMED AND ARE ACCEPTABLE

(28)	DATE	AUTHORIZED SIGNATURE	TITLE
SURVEY DATA SURFACE (29)		MREM/HR 8 FT. (30)	MREM/HR C49 (31) MREM/HR

(32) INSTRUMENT USED: Manufacturer \_\_\_\_\_ Model \_\_\_\_\_ Serial Number \_\_\_\_\_

(33) LOOSE CONTAMINATION \_\_\_\_\_ DPM/100CM<sup>2</sup>

(34) INSTRUMENT USED: Manufacturer \_\_\_\_\_ Model \_\_\_\_\_ Serial Number \_\_\_\_\_

(39) \_\_\_\_\_ DATE \_\_\_\_\_ SURVEYOR'S SIGNATURE \_\_\_\_\_ TITLE \_\_\_\_\_

THIS IS TO CERTIFY THAT THE ABOVE-NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED, AND LABELED, AND ARE IN PROPER CONDITION FOR TRANSPORTATION, ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION.

(36) \_\_\_\_\_ DATE \_\_\_\_\_ AUTHORIZED SIGNATURE \_\_\_\_\_ FILE \_\_\_\_\_

THIS SHIPMENT IS TO BE MAINTAINED AS AN EXCLUSIVE USE SHIPMENT

INSTRUCTIONS FOR MAINTENANCE OF EXCLUSIVE USE SHIPMENT CONTROLS THIS SHIPMENT IS TO BE MAINTAINED AS AN EXCLUSIVE USE SHIPMENT. LOADING MUST BE PERFORMED BY A SINGLE CONSIGNOR HAVING THE EXCLUSIVE USE OF THE VEHICLE. UNLOADING MUST BE DONE BY THE CONSIGNEE AND ONLY AT THE DESIGNATED DESTINATION. REPOSITIONING OR MOVEMENT OF ANY LOADED MATERIAL OTHER THAN THE WRITTEN PERMISSION OF THE CONSIGNOR OR HITMAN NUCLEAR & DEVELOPMENT CORPORATION IS PROHIBITED.

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## EXHIBIT II

### INSTRUCTIONS

All shipments of radioactive materials must be accompanied by a properly completed shipping document.

Item 1: For van or flatbed shipments, fill in "Shielded Van", "Low Level Van", or "Flatbed" as applicable. For cask shipments, fill in the package identification number as follows:

HN-100S - USA/9089/A	HN-200 - USA/8574/B ( )	HN-800 - USA/9080/A
HN-100 Series 1 - USA/9086/A	HN-300 - USA/9092/A	HN-900
HN-100 Series 2 - USA/9079/A	HN-400 - USA/9093/A	

Item 2: For cask shipments, fill in the unit number for van or flatbed shipments, this space is not applicable.

Item 3: Fill in the date the shipment leaves your premises.

Item 4: Fill in the name of your company or institution. (At nuclear power plants, use the plant name rather than the power company name.)

Item 5: Fill in the location or address of your company or institution.

Item 6: Fill in the company name for which the shipment is destined.

Item 7: Fill in the location or address for which the shipment is destined.

Item 8: Fill in your company's shipment number.

Item 9: Fill in the name of the trucking company transporting the shipment.

Item 10: Driver to sign the form after reading the emergency instructions below and the exclusive use statement on the front of the form.

Item 11: This space must be completed with one of the following:

- a. Radioactive device, n. o. s. Radioactive material (no label required)
- b. Radioactive material fissile, n. o. s. Radioactive material
- c. Radioactive material, LSA, n. o. s. Radioactive material
- d. Radioactive material, n. o. s.
- e. Radioactive material, Limited quantity, n. o. s. Radioactive material (no label required)

Item 12: Fill in the total number of containers in the shipment.

Item 13: Fill in total activity of the shipment in millicuries.

Item 14: List the number for each container in the shipment. Record the total number of containers in the bottom space.

Item 15: List the actual or estimated volume in cubic feet for each container in the shipment (outermost dimensions):

55 gallon drum - 7.5 cubic feet	100 cask (liner only) - 170 cubic feet
30 gallon drum - 4.0 cubic feet	700 cask (liner only) - 80 cubic feet
Boxes - outside dimensions	600 cask (liner only) - 85 cubic feet

TOTAL THIS COLUMN

Item 16: List the actual or estimated weight in pounds for each container. TOTAL THIS COLUMN

Item 17: List the dose rate measured at the surface of each container (liner, drum or box) in millirem per hour (mRem/hr).

Item 18: List the dose rate measured at 3 feet or 1 meter from the surface of each container in millirem per hour (mRem/hr).

Item 19: For each container list the symbol of each radionuclide in the radioactive material that is listed in 49 CFR 173.390.

Item 20: List the transport group for the radionuclides listed in column 19 (49 CFR 173.390).

Item 21: List the total number of millicuries for each radionuclide in each container. TOTAL THIS COLUMN

Item 22: List the transport index for each container (49 CFR 173.390). TOTAL THIS COLUMN

For exclusive use or sole use shipments of LSA or White I containers, this column is not applicable. For shipments of Yellow II or Yellow III containers, the total transport index must be less than 50.

Item 23: List any special nuclear material (SNM) in grams for each container. TOTAL THIS COLUMN

If none, fill in "NA".

Item 24: List any source material in pounds for each container. TOTAL THIS COLUMN. If none, fill in "NA".

Item 25: List the chemical form - the atomic or molecular composition of the substance containing the radionuclide if possible; otherwise list a general or other appropriate description. Examples:

a. Protein, amino acid, etc.	c. enzyme
b. Organic or inorganic salt or sludge	d. absorbed on resin

Item 26: List the physical form of the contents of each container: solid, liquid, or gas.

Item 27: Each space must be completed with one of the following abbreviations:

a. W-I - Radioactive White I	c. Y-III - Radioactive Yellow III
b. Y-II - Radioactive Yellow II	d. LSA - Radioactive Low Specific Activity

Item 28: Authorized company representative to read the statement, verify that determinations have been performed and are acceptable, fill in title, date and sign the form. (This statement is not applicable unless shipment contains greater than type A quantities of material.)

Item 29: Measure the dose rate in millirem per hour (mRem/hr) at contact with each side of the vehicle. Record the maximum value.

Item 30: Measure the dose rate in millirem per hour (mRem/hr) 6 feet or 2 meters from each side of the vehicle. Record the maximum value.

Item 31: Measure the dose rate in millirem per hour (mRem/hr) in the cab of the vehicle. Record the maximum value.

Item 32: State the manufacturer, model number and serial number of the instrument used to take the measurements in items 29, 30 and 31.

Item 33: By means of wipe test, measure the loose or removable contamination on the vehicle. Record this value in disintegrations per minute per 100 square centimeters (dpm/100 cm<sup>2</sup>).

Item 34: State the manufacturer, model number and serial number of the instrument used to evaluate the swipes in item 33.

Item 35: Surveyor to fill in title, date and sign the form.

Item 36: Authorized company representative to read the certification, verify that the materials are in accordance with the certification, fill in the title, date and sign the form.

### DRIVER INSTRUCTIONS IN THE EVENT OF AN ACCIDENT

1. Do not leave area unattended until local authorities arrive.
2. Take necessary action to save life or prevent the destruction of property.
3. Set up warning signals to prevent further accidents. Care should be taken when using flame producing signals to prevent possible fire or explosion.
4. Have someone obtain assistance from local authorities such as fire and rescue squads, police, and State and Federal Radiological Assistance Squads.
5. Obtain the names and addresses of any witnesses.
6. Keep people and sightseers away from the area, except to rescue people.
7. Keep yourself and any persons present away from any smoke, mist, dust, or other airborne substances.
8. Do not make any statements except to authorities.
9. When authorities and rescue personnel arrive, give them the shipping papers.
10. Ask authorities to call the HNDC Emergency Number - 301-658-9517.
11. Call HNDC yourself as soon as it is possible.

### DISTRIBUTION

Original and Green Copies: \_\_\_\_\_ Truck Driver

Yellow Copy: \_\_\_\_\_ Mail immediately to HNDC address on the front

White Copy: \_\_\_\_\_ For your files

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