

VEHICLE LOADING, SURVEYS AND PLACARDING  
PROCEDURES FOR SHIPMENTS OF RADIOACTIVE MATERIAL

1.0 GENERAL

This procedure provides direction and guidelines for the loading, surveying, and placarding of vehicles carrying radioactive materials either arriving at or departing from PBNP.

2.0 REFERENCES

- 2.1 49 CFR Parts 100 to 199, Transportation
- 2.2 RDW 4.1, Receipt of Radioactive Material
- 2.3 RDW 5.9, Documentation of Shipping Packages
- 2.4 Letter, dated January 22, 1982, from C. W. Fay to H. G. Shealy outlining drum bracing requirements (Plant File 12.8 SC)

3.0 VEHICLES ARRIVING ONSITE [49 CFR 173.433(c)&(d)]

- 3.1 Empty vehicles arriving onsite to pick up shipments of radioactive material must be surveyed prior to loading. Except as noted in paragraph 3.2 below, the radiation dose rate at each accessible surface of the vehicle must not exceed 0.5 mRem/hour and the removable contamination levels must not exceed the limits specified in Section 5.0 below. Report the survey results to the supervisor in charge of the shipment prior to loading.
- 3.2 In certain situations, it is permissible to exceed the limits specified in Section 3.1 above. If the vehicle is kept closed except during loading and unloading and if the exterior on both sides of the vehicle is conspicuously stenciled with the words "FOR RADIOACTIVE MATERIALS USE ONLY" in letters at least 76 millimeters (3"), then the following limits are applicable:

<u>Contaminant</u>	<u>Maximum Permissible Level</u> <u>(dpm/100 cm<sup>2</sup>)</u>
Beta gamma	22,000
All radionuclides with half-lives less than 10 days	22,000
Natural Uranium, Natural Thorium, Uranium-235, Uranium-238, Thorium-228 and Thorium-230, when contained in ores or physical concentrates	22,000
Alpha (other than noted above)	2,200

8411120390 841105  
PDR ADOCK 05000266  
PDR

- 3.3 Visually inspect the condition of the vehicle tires, wheels, flooring, welds and support beams. Report any leaks, cracks, or deterioration to the supervisor in charge of the shipment.

#### 4.0 CARGO LOADING

##### 4.1 Package Inspection

4.1.1 All packages used to transport radioactive material with activity exceeding  $2.0E-9$  Ci/g ( $9.1E-1$   $\mu$ Ci/lb.) will be inspected by a CHP Supervisor or a person designated by him.

4.1.2 Packages will normally receive two inspections.

- a. The first inspection should be done within five working days of the shipment and will be documented on the checkoff of form CHP-78. This inspection is intended to be the primary assurance that the package is properly prepared for shipment.
- b. The second inspection will be a visual check at the time the package is loaded. This will assure that no deterioration of the package has occurred since the first inspection. The second inspection will be documented by signing off the bottom of form CHP-78.
- c. If no inspection document is required by procedure RDW 5.9, form CHP-78 (Package Inspection Checkoff) will not be used. The first inspection requirement is also waived. However, the visual check must be performed. A Health Physics Supervisor or Nuclear Plant Specialist (or Engineer) will approve the package for shipment. If it meets the criteria of a strong tight container, it may be shipped. In this case, the signature of the Supervisor or Nuclear Plant Specialist (or Engineer) on CHP-11, Radioactive Material Shipment Form, will be evidence that the package was properly inspected.

4.1.3 Casks will be inspected in accordance with their applicable cask checkoff forms when the vehicle arrives on site.

##### 4.2 Pallet Inspection

4.2.1 If packages are shipped on pallets, the supervisor loading the truck shall assure that:

- a. Package is securely banded or otherwise attached to the pallet.
- b. The pallet is strong enough to support the package during the trip.

- 4.2.2 Drums weighing  $\geq 800$  lbs., which are destined for the Barnwell, SC, disposal site, must be palletized.
- 4.2.3 Drums weighting between 600 and 800 lbs, which are sent to Barnwell, SC, must be palletized only if they are shipped in a fixed top trailer.
- 4.2.4 Drums shipped to Richland, WA, need not be palletized.
- 4.2.5 A pallet should have two or more drums on it.
- 4.2.6 Drums should be banded to the pallet as follows:
  - a. One band over top of each drum.
  - b. Two bands around the drums.
- 4.3 Bracing the Load (49 CFR 173.448)
  - 4.3.1 Sufficient bracing shall be used to prevent movement of the packages during conditions normally incident to transport (bouncing, swaying, sliding, etc.).
  - 4.3.2 The supervisor in charge of loading should inspect the bracing before shipment.
  - 4.3.3 Palletized drums should be placed against walls or other secure drums if possible. Drum braces should be used to secure a pallet if the trailer walls and other drums cannot be used to surround it.
- 4.4 Radiation Surveys During Loading

When more than one package is to be shipped, and when the packages have contact readings in excess of 50 mR/hour, the truck should be surveyed as the packages are loaded. If the limits in Section 6.0 below are exceeded, the load should be changed to meet the limits.
- 4.5 Weight of Load
  - 4.5.1 Check with the carrier to assure that the weight of the packages does not exceed the vehicle's capacity.
  - 4.5.2 Authorized weights for casks can be found in file HP 2.6.

5.0 REMOVABLE RADIOACTIVE CONTAMINATION (49 CFR 173.443)5.1 Contamination Control

- 5.1.1 Whenever practical, locate vehicles to be loaded outside the controlled zone.
- 5.1.2 For vehicles that are brought into the controlled zone, establish a stepoff pad for the truck. The truck will be treated as a clean area. As a minimum, all personnel working on the truck surfaces will change into clean shoe covers.
- 5.1.3 A stepoff pad may also be established for vehicles loaded while located outside the controlled zone to provide convenient access. However, except for activities necessary for loading the transport vehicle, all personnel must still enter and leave the controlled zone in the normal manner.

5.2 Procedure

The level of removable contamination may be determined by wiping an area of 100 cm<sup>2</sup> of the package or vehicle surface. An absorbent material should be used with moderate wiping pressure. Sufficient measurements must be taken in the most appropriate locations to yield a representative assessment of the removable contamination levels.

5.3 Contamination Limits

Unless specifically stated otherwise, the maximum permissible level of removable radioactive contamination on a package, vehicle or cask is as noted below.

<u>Contaminant</u>	<u>Maximum Permissible Level</u> <u>(dis./min./100 cm<sup>2</sup>)</u>
Beta gamma emitting nuclides	2200
All radionuclides with half-lives less than ten days.	2200
Natural Uranium, Natural Thorium, Uranium-235, Uranium-238, Thorium-232, Thorium-228 and Thorium-230, when contained in ores or physical concentrates	2200
Alpha (other than noted above)	220

NOTE: THE POLICY AT PBNP IS TO REDUCE REMOVABLE CONTAMINATION LEVELS TO  $\leq$ MDA. THEREFORE, CONTAMINATION LEVELS GREATER THAN MDA REQUIRE THE APPROVAL OF A CHP SUPERVISOR PRIOR TO LOADING.

## 6.0 VEHICLE SURVEYS

### 6.1 Closed Transport, Exclusive Use Vehicle (49 CFR 173.441)

6.1.1 Vehicles designated as closed transport, exclusive use, must satisfy the following conditions.

- a. Each package must be secured such that its position remains fixed within the vehicle during transportation.
- b. There will be no loading or unloading operations between the beginning and end of the transportation.
- c. The driver has been given specific written instructions on how to maintain the shipment under the exclusive use designation. The instructions must be included with the shipping paper information.

6.1.2 After the transport vehicle is loaded, the following surveys are required to check for removable contamination.

- a. Complete a smear survey to check for the presence of removable alpha and beta-gamma contamination in those areas where contamination is most likely to occur, including cargo access doors and suspect areas as identified by visual inspections. As a minimum, take two smears on each interior side of the vehicle, two on the exterior surface of the trailer doors, and two on the off-loading area at the back of the vehicle.
- b. Move the transport vehicle to the controlled zone barrier (if inside the controlled zone) and take a removable contamination (smear) survey of all vehicle tires. If the vehicle did not enter the controlled zone, tire smears are unnecessary.

Contamination limits are listed in Section 5.0 above.

- 6.1.3 Perform a radiation survey of the vehicle and packages to verify that the following limits are not exceeded:
- a. 2 mRem/hour anywhere in the driver's compartment.
  - b. 1000 mRem/hour on the accessible external surface of any package.
  - c. 200 mRem/hour at any point on the external surface of the vehicle including the upper and lower surfaces.
  - d. 10 mRem/hour at any point two meters (6.6 feet) from the vertical planes projected by the four sides of the vehicle.

- 6.1.4 If measured radiation levels are above 50% of the limits, use a second instrument to verify compliance and notify Health Physics supervision concerning the situation.

NOTE: DO NOT ESTIMATE DISTANCES IN PARAGRAPH 6.1.3.d ABOVE WHEN DOSE RATE MEASUREMENTS ARE CLOSE TO 10 MREM/HOUR. USE A TAPE MEASURE.

- 6.1.5 On completion of the above survey:
- a. Install tamper-proof seals on all doors.
  - b. Place RADIOACTIVE placards on the rear, sides, and front of vehicle. Placards must be securely installed. (See Section 7.0 below.)

6.2 Open Transport, Exclusive Use Vehicle Shipments (49 CFR 173.441)

- 6.2.1 Vehicles designated as open transport, exclusive use, must satisfy the following conditions.
- a. Each package must be secured such that its position remains fixed within the vehicle during transportation.
  - b. The driver must be given specific written instructions on how to maintain the shipment under the exclusive use designation. The instructions must be included with the shipping paper information.
- 6.2.2 Perform a smear survey of the accessible parts of the cargo area floor. If the vehicle was on the controlled side, bring it to the boundary and smear the tires. Removable contamination must meet the limits in Section 5.0 above.

- 6.2.3 Perform a radiation survey of the vehicle, packages and casks (where applicable) to ensure that the following limits are not exceeded:
- 2 mR/hour anywhere in the driver's compartment.
  - 200 mRem/hour on the accessible external surface of any package or cask.
  - 200 mRem/hour at any point on the vertical planes projected from the outer edges of the vehicle, on the upper surface of the load, or on the lower external surface of the vehicle.
  - 10 mRem/hour at any point two meters (6.6 feet) from the vertical planes projected by the outer edges of the vehicle.

- 6.2.4 If the measured radiation levels are above 50% of the limits, use a second instrument to verify compliance and notify health physics supervision concerning the situation.

NOTE: DO NOT ESTIMATE DISTANCES IN PARAGRAPH 6.1.4.d ABOVE WHEN DOSE RATE MEASUREMENTS ARE CLOSE TO 10 MREM/HOUR. USE A TAPE MEASURE.

- 6.2.5 Upon completion of the above surveys, place RADIOACTIVE placards on the rear, sides and front of the vehicle. Placards must be securely installed. See Section 7.0 below.

### 6.3 Nonexclusive Use Vehicle Shipments (49 CFR 177.842)

- 6.3.1 Shipments made in nonexclusive use vehicles must satisfy the following conditions.
- The packages must be braced such that they will not move during conditions normally incident to transportation.
  - The number of packages loaded on the vehicle must be limited so that the sum of the transport index numbers of the packages does not exceed 50. (49 CFR 177.842)

Example: Suppose three packages, each with a transport index of nine were to be shipped. The sum of the transport index numbers is  $9 + 9 + 9 = 27$ . This is an acceptable load.

The vehicle driver is responsible for assuring that the addition of radioactive material packages to his load will not result in a total transport index sum greater than 50. This is noted on form CHP-138, Carrier/Driver Instructions. (49 CFR 177.800)

- c. Radioactive material must not be shipped via commercial passenger carrying vehicles, such as a bus or taxi.

6.3.2 Perform a smear survey as follows:

- a. If the package has been placed on the clean side and the vehicle has not entered the controlled zone, no smear survey is necessary.
- b. If the package has not been placed on the clean side and the vehicle has not entered the controlled zone, complete a smear survey of the vehicle as described in Section 6.1.2 above.
- c. If the vehicle has entered the controlled zone, move it to the boundary, and complete a smear survey of all vehicle tires as well as a smear survey of the vehicle as described in Section 6.1.2 above.
- d. Contamination levels must not exceed the limits specified in Section 5.0 above.

6.3.3 Perform a radiation survey of each package to ensure that the following limits are not exceeded. (49 CFR 173.441)

- a. 200 mRem/hour on the accessible external surface of the package.
- b. 10 mRem/hour at one meter (3.3 feet) from the accessible surface of the package; i.e., a maximum transport index of 10.

6.3.4 Separation From Other Cargo

Packages of radioactive material bearing a Yellow II or Yellow III label that are transported in a non-exclusive use vehicle should be separated from the rest of the cargo as follows:

- a. At least 7 feet from any personnel area or compartment on the vehicle.
- b. At least 36 feet from any undeveloped film.

If the distances above cannot be met, contact the NPS or Engineer assigned to radwaste and refer to 49 CFR 177.842.



## 7.0 VEHICLE PLACARDING (49 CFR 172 Subpart F)

The following placarding requirements will be adhered to for vehicles transporting radioactive materials from the PBNP.

7.1 Vehicles carrying packages with Yellow-III labels or being used under the exclusive use rules normally must be placarded.

7.2 The radioactive placard will be placed on each side and each end of the transport vehicle. The front placard may be on the tractor, or trailer, or both, when a semi-trailer truck is used.

7.3 The placard must be securely attached and positioned, if possible, so that water is not directed to it from the wheels of the vehicle.

7.4 The placards must be placed in a readily visible position.

### 7.5 Highway Route Controlled Quantity

When a highway route controlled quantity is to be shipped, the radioactive placard must be on a white square background with a black border. Refer to 49 CFR 172.507 and 172.527 for details.

7.6 Exceptions to this procedure will be on a case-by-case basis as specified by 49 CFR 172, Subpart F.