Minimum Required Packaging For Class 7 (Radioactive) Materials

This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials.

Packaging Based on Activity[1]

Category	Excepted Quantity[2]	Type A	Type B	Type B - HRCQ
Activity	≤ Table 4[3]	≤ A_1 or A_2	>A_1 or A_2	> 3000 A_1 or > 3000 A_2 or > 1000 TBq (whichever is least)
Packaging	Excepted Package[4]	Type A[5]	Type B[6]	Type B[6]

1. Material not defined as Class 7 is not regulated in transport [§173.403]
2. Includes Limited Quantity [§173.421] and Instruments and Articles [§173.424].
3. Activity limits for Limited Quantities and Instruments and Articles [§173.425].
4. Excepted package must meet [§173.410].
5. Except for LSA or SCO, a Type A package may not contain a quantity of radioactive material greater than A_1 or A_2 [§173.431(a)].
6. Type B(U) or Type B(M).

Packaging Options for LSA or SCO ≤ 1 Rem/hour at 3 meters unshielded[7, 8]

Packaging	Unpackaged (LSA-I and SCO-I) only	Minimum Package[2, 3]	Industrial Package[4]	DOT Specification 7A Type A[5]	Type B(U) or B(M)	Specification tank cars[6]
Reference	§173.427(c)[1]	§173.427(b)(4)	§173.427(b)(1)	§173.427(b)(2)	§173.427(b)(3)	§173.427(b)(5)

1. See regulations in §173.427(c) for additional transport controls for unpackaged material.
2. Only for domestic exclusive use and activity less than A_2 quantity.
3. The packaging must meet §173.24, §173.24a, and §173.410.
4. Use of Industrial Package (IP-1, 2, or 3) must be in accordance with Table 6 [§173.427] and must meet §173.411.
5. Except for LSA or SCO, a Type A package may not contain a quantity of radioactive material greater than A_1 or A_2 [§173.431(a)].
6. For exclusive use, LSA-I liquid only, see specifications for tank cars or cargo tanks.
7. For LSA or SCO that exceeds 1 rem/hr at 3 m see 10 CFR 71 and NUREG 1608, Section 4.1.3.
8. LSA and SCO must comply with the conditions of §173.427(a), as appropriate.

Package and Vehicle Radiation Level Limits (49 CFR 173.441)[1]

This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials.

Transport Vehicle Use	Non-Exclusive	Exclusive		
Transport Vehicle Type	Open or Closed	Open (flat-bed)	Open w/Enclosure[2]	Closed
Package (or freight container) **Limits:**				
External Surface	2 mSv/hr (200 mrem/hr)	2 mSv/hr (200 mrem/hr)	10 mSv/hr (1000 mrem/hr)	10 mSv/hr (1000 mrem/hr)
Transport Index (TI)[3]	10	No limit		
Criticality Safety Index (CSI)[6]	50	No limit		
Roadway or Railway Vehicle (or freight container) **Limits:**				
Any point on the outer surface	N/A	N/A	N/A	2 mSv/hr (200 mrem/hr)
Vertical planes projected from outer edges		2 mSv/hr (200 mrem/hr)	2 mSv/hr (200 mrem/hr)	N/A
Top of		load: 2mSv/hr (200 mrem/hr)	enclosure: 2 mSv/hr (200 mrem/hr)	vehicle: 2 mSv/hr (200 mrem/hr)
2 meters from		vertical planes: 0.1 mSv/hr (10 mrem/hr)	vertical planes: 0.1 mSv/hr (10 mrem/hr)	outer lateral surfaces: 0.1 mSv/hr (10 mrem/hr)
Underside		2 mSv/hr (200 mrem/hr)		
Occupied position	N/A[4]	0.02 mSv/hr (2 mrem/hr)[5]		
Sum of package TI's	50	No limit		
Sum of package CSI's[6, 7]	50	100		

1. The limits in this table do not apply to excepted packages (§§173.421, 173.424, 173.426. 173.428).
2. Securely attached (to vehicle), access-limiting enclosure; package personnel barriers are considered as enclosures.
3. The dimensionless number equivalent to maximum radiation level at 1 m (3.3 feet) from the exterior package surface, in millirem/hour rounded up to the next tenth (§ 173.403).
4. No dose limit is specified, but separation distances apply to Radioactive Yellow-II, Radioactive Yellow-III, or CSI labeled packages (§ 177.842).
5. Does not apply to carriers if operating under a state or federally regulated radiation protection program and if personnel wear radiation dosimetry devices (§ 173.441(b)(4)).
6. These provisions do not apply to shipment by vessel - see §§176.700-720 for vessel requirements.
7. The number of packages containing fissile material stored in transit in any one storage area must be limited so that the total sum of the CSI's is ≤ 50, and such groups of packages must be spaced at least 6 m (20 ft) from other such groups [§§173.457 and 173.459].

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Package and Vehicle Contamination Limits (49 CFR 173.443)

This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials.

NOTE: All values for contamination in DOT rules are to be averaged over each 300 cm^2.
Sufficient measurements must be taken in the appropriate locations to yield representative assessments.
Wipe efficiency must be determined in accordance with §173.443(a)(1) or assumed to be 0.1.

$\beta\gamma$ means the sum of beta emitters, gamma emitters, and low-toxicity alpha emitters.
α means the sum of all other alpha emitters (i.e., other than low-toxicity alpha emitters).

Non-fixed Radioactive Contamination Limits for Packages §173.443(a) (Table 9)	**Maximum Permissible Limit**		
$\beta\gamma$:	**4 Bq/cm^2**	**1x10^{-4} µCi/cm^2**	**220 dpm/cm^2**
α:	**0.4 Bq/cm^2**	**1x10^{-5} µCi/cm^2**	**22 dpm/cm^2**

Non fixed (removable) contamination must be kept as low as reasonably achievable (ALARA)

The following exceptions from the above limits exist:

Applicable conditions which must be met:

In an exclusive use shipment, contamination on a package:

(1) may not exceed the values in §173.443(a) at the beginning of transport [§173.443(b)].

(2) may not exceed 10 times the values in §173.443(a) during transport [§173.443(b)].

Vehicle must not be returned to service until the radiation level is shown to be ≤ 0.005 mSv/hr (0.5 mrem/hr) at any accessible surface, and there is no significant removable (non-fixed) contamination, as specified in §173.443(a) [§173.443(c)].

In a closed transport vehicle used solely for transporting radioactive materials packages, the contamination levels on the packages may not exceed 10 times the values in §173.443(a).
Additional conditions include:
(1) A survey of the interior surfaces of the empty vehicle must show that the radiation level at any point does not exceed 0.1 mSv/hr (10 mrem/hr) at the surface, or 0.02 mSv/hr (2 mrem/hr) at 1 meter (3.3 ft).
(2) Exterior of vehicle must be conspicuously stenciled, "For Radioactive Materials Use Only" in letters at least 76 mm (3 inches) high, on both sides of the exterior.
(3) Vehicle must be kept closed except for loading and unloading [§173.443(d)].

Excepted package-empty packaging [§173.428]
Conditions include:
(1) Internal contamination may not exceed 100 times §173.443(a) (Table 9) [§173.428(c)].
(2) External contamination on the package may not exceed §173.443(a) (Table 9) [§173.428(a)].
(3) Radiation level must be ≤ 0.005 mSv/hr (0.5 mrem/hr) at any external surface [§173.428(a)].
(4) Package must be marked with UN 2908 in accordance with §173.422(a).
(5) Packaging is in unimpaired condition and securely closed to prevent leakage [§173.428(b)].
(6) Labels are removed, obliterated, or covered, and the "Empty" label (§172.450) is affixed to the packaging [§173.428(d)].
(7) The package contains ≤ 15 grams of U-235.

In addition, after any incident involving spillage, breakage, or suspected radioactive contamination, the modal-specific DOT regulations (§174.750(a), railway; §175.700(b), air; and §177.843(c), highway) specify that vehicles, buildings, areas, or equipment have "no significant removable surface contamination," before being returned to service or routinely occupied. The carrier must also notify offeror at the earliest practicable moment after each incident. In the event of certain hazardous materials incidents, the regulations (§§171.15 and 171.16) specify the criteria for immediate notice and detailed hazardous materials incident reports.

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Hazard Communications for Class 7 (Radioactive) Materials

Marking (49 CFR Part 172, Subpart D)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments.
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials.

Markings Always Required

Bulk Packages (i.e., a maximum capacity greater than 119 gallons as a receptacle for liquid; a maximum net mass greater than 882 lbs and a maximum capacity greater than 119 gallons as a receptacle for solid; or a water capacity greater than 1000 lbs as a receptacle for a gas, with no intermediate form of containment) [§171.8]

- U.N. identification number on:
  - orange panels [§172.332(b)]
  - white square-on-point display [§172.336(b)]

Non-Bulk Packages (§ 171.8)

- Proper shipping name [§172.301]
- U.N. identification number [§172.301]
- Name and address of consignor or consignee, *unless*:
  - highway only and no motor carrier transfers, or
  - part of carload or truckload lot or freight container load, and entire contents of railcar, truck, or freight container are shipped from one consignor to one consignee [§172.301(d)]

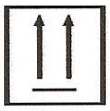
Excepted Packages

- Limited Quantity
  - UN 2910 [§173.422(a)]
  - "Radioactive" [§173.421(a)(4)]
- Instruments and Articles
  - UN 2911 [§173.422(a)]
- Manufactured Articles containing natural uranium or thorium
  - UN 2909 [§173.422(a)]
  - "Radioactive" [§173.421(a)(4)]
- Empty Packaging
  - UN 2908 [§173.422(a)]

Additional Markings Sometimes Required

Materials-Based Requirements:

- Each package with a gross mass greater than 50 kg (110 lbs), must have its gross mass including the unit of measurement marked on the outside of the package [§172.310(a)]
- If non-bulk combination package containing liquid use, underlined double arrows indicating upright orientation (two opposite sides) [ISO Std 780-1985 marking] [§172.312]



- If a Hazardous substance (§171.8) in non-bulk package, the letters "RQ" in association with the proper shipping name [§173.427(a)(6)(vi) for LSA/SCO or §172.324(b) for other material]

Package-Based Requirements:

- The package type as TYPE IP-1, TYPE IP-2, TYPE IP-3, TYPE A, TYPE B(U) or TYPE B(M), as appropriate in letters 13 mm (0.5 in) high or greater [§172.310(b)]
- "USA DOT 7A Type A" for Specification 7A packagings (§ 178.350 and markings required by § 178.3)
- For NRC approved Type B(U), B(M), or fissile material packages the package identification marking from the CoC (e.g., USA/9166/B(U), USA/9150/B(U)-85) [§173.471(b)]
- For Type B(U) or B(M) the trefoil symbol per 49 CFR Part 172 App. B [§172.310(d)]

- Marked with the international vehicle registration code of the country of origin of the design, for IP-1, IP-2, IP-3, or a Type A package (e.g., USA) [§172.310(c)]
- For NRC certified packages, the model number, gross weight, serial number, and package ID number [10 CFR 71.85]

Administrative-Based Requirements:

- If a DOT exemption is being used, the outside of the package must be marked "DOT-E", followed by the exemption number [§§172.301(c)) and 172.302(c)]
- Each Type B(U), B(M), or fissile material package destined for export, "USA" in conjunction with the specification markings or certificate identification [§172.310(e)]

Optional Markings

- Both the name and address of consignor and consignee are recommended

Special Considerations/Exceptions for Marking

- Markings are required to be: (1) durable, printed in English on a package surface, label, tag, or sign; (2) displayed on a background of sharply contrasting color; (3) unobscured by labels or attachments; and (4) isolated from other marks (such as advertising) [§172.304].
- Shipment of LSA or SCO consigned as exclusive use by §173.427 are excepted from the marking requirements (i.e., proper shipping name and identification number) except that the exterior of each packaged or unpackaged material must be marked "Radioactive-LSA" or "Radioactive-SCO", as appropriate.
- For bulk packages, marking (i.e., orange panels) may be required on more than one side of the package [§172.302(a), §172.331(c)] and must be displayed in proximity to any required placards [§172.334(f)].
- For an overpack, a statement that the contained packages comply with prescribed specifications [§173.25(a)(4)]. **Rev. 1 October 1, 2004**

Hazard Communications for Class 7 (Radioactive) Materials

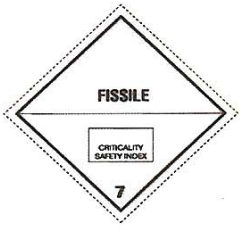
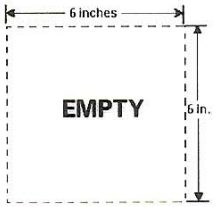
Labeling (49 CFR 172, Subpart E)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments.
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials.

Placement of Radioactive Labels

- Labeling is required to be: (1) printed or affixed to the package surface (not the bottom); (2) placed near the proper shipping name marking; (3) multiple labels must be within 150 mm (6 in) of each other; (4) in contrast with its background; (5) unobscured by markings or attachments; (6) within color, design, and size tolerance; and (7) representative of the HAZMAT contents of the package [§172.406, §172.407]
- Packages of radioactive material must have two labels affixed to opposite sides [§172.403]
- For radioactive material, the label to apply must be the highest category required for any of the two determining conditions (i.e., TI and maximum radiation level on package surface). RADIOACTIVE WHITE - I is the lowest category, and RADIOACTIVE YELLOW - III is the highest category.

Determination of Required Label [§172.403]

				
49 CFR 172.436	49 CFR 172.438	49 CFR 172.440	49 CFR 172.441	49 CFR 172.450
WHITE-I	**YELLOW-II**	**YELLOW-III**	**FISSILE**	**EMPTY LABEL**
Surface Radiation Level ≤ 0.005 mSv/hr (0.5 mrem/hr)	Surface Radiation Level >0.005 mSv/hr (0.5 mrem/hr), but ≤ 0.5 mSv/hr (50 mrem/hr)	Surface Radiation Level > 0.5 mSv/hr (50 mrem/hr), but ≤ 2 mSv/hr (200 mrem/h) or > 2 mSv/hr (200 mrem/h), but ≤ 10 mSv/hr (1000 mrem/h) must be exclusive use closed transport [§173.441(b)]	Each package containing fissile material (other than fissile excepted) must be labeled with two FISSILE labels, affixed adjacent to the appropriate RADIOACTIVE labels [§172.402(d)(2)]	The EMPTY label is required for shipments of empty Class 7 (radioactive) packages made pursuant to §173.428. It must cover any previous labels, or they must be removed or obliterated.
TI = 0 (if the measured TI is ≤ 0.05 the value may be considered to be 0)	TI > 0 but ≤ 1	TI > 1 but ≤ 10 or > 10 [exclusive use]	CSI = As defined by §173.403 and as determined by 10 CFR 71.22, 71.23, and 71.59	

Contents on Radioactive Labels

- RADIOACTIVE and FISSILE labels must contain (entered using a durable, weather-resistant means):
  (1) Except for LSA-I material, the names of the radionuclides in the package (§§ 172.403(g)(1) and 173.433(g)). The term "LSA-I" may be used in place of the names of radionuclides. Symbols (e.g., Co-60) are acceptable [§172.403(g)]
  (2) The activity in the package expressed in SI units (e.g., Bq, TBq), or in customary units (e.g., Ci, mCi) in parentheses following SI units. Abbreviations are authorized. The weight in g or kg of fissile radionuclides may be inserted instead of activity units. For Pu-239 and Pu-241 the weight in g of fissile radionuclides may be inserted in addition to activity units [§172.403(g)]
  (3) The Transport Index (TI) is entered *only* on YELLOW-II and YELLOW-III labels [§172.403(g)]
  (4) The Criticality Safety Index (CSI) is entered *only* on the FISSILE label [§172.403(e)]

Special Considerations/Exceptions for Labeling

- Any package containing a Highway Route Controlled Quantity must be labeled RADIOACTIVE YELLOW-III [§172.403(c)].
- For materials meeting the definition of another hazard class, labels for each secondary hazard class need to be affixed to the package. The subsidiary label *may* not be required on opposite sides, but must display the hazard class or division number in the lower corner [§172.402].
- When one or more packages of Class 7 (radioactive) material are placed in an overpack, the overpack must be labeled in accordance with [§172.403(h)].
- Overpacks [§172.403(h)]
  - The contents entry may state "mixed" in place of the names of the radionuclides, unless each inside package contains the same radionuclide(s)
  - The "activity" entry must be determined by adding together the activity of the contained packages
  - The TI may be determined by adding together the TIs of the contained packages or determined by direct measurement
  - A different RADIOACTIVE label may be assigned based on the surface contact reading and TI of the overpack
  - For fissile material, the CSI for the FISSILE label on the overpack is the sum of the CSIs present on the packages in the overpack
- A label is not required on a package of LSA or SCO when transported under §173.427(a)(6)(vi).
- Excepted packages [e.g., Limited quantity (UN 2910), Instruments or Articles (UN 2911), and Manufactured articles of uranium and thorium (UN 2909) are excepted from labeling. However if a limited quantity meets the definition for another hazard, it is re-classed for that hazard. Hazard communication requirements for the other class are required [§173.423].
- Empty packages (UN2908) are required to be labeled "EMPTY" in accordance with §173.428.
- The "Cargo Aircraft Only" label is typically required for radioactive materials packages shipped by air [§172.402(c)].

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Hazard Communications for Class 7 (Radioactive) Materials

Placarding (49 CFR Part 172, Subpart F)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments.
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials.

Visibility and Display of Radioactive Placard

- Placards are required to be displayed:
  - on four sides of the vehicle [§172.504(a)]
  - visible from the direction they face on each side and each end of the vehicle (i.e., four placards) [§172.516(a)]
  - on the front of a motor vehicle instead of, or in addition to on the front of the cargo body (i.e., five placards) [§172.516(b)]
  - securely attached or affixed to the vehicle, or in a holder [§172.516(c))(1)]
  - clear of appurtenances and devices (e.g., ladders, pipes, tarpaulins) [§172.516(c))(2)]
  - so far as practicable, be located so that dirt or water is not directed to it from the wheels of the transport vehicle [§172.516(c))(3)]
  - at least 3 inches from any markings (such as advertisements) which may reduce placard's effectiveness [§172.516(c))(4)]
  - upright and on-point such that the words read horizontally, left to right [§172.516(c))(5)]
  - in contrast with the background, or have a solid or dotted line border which contrasts with the background [§172.516(c))(7)]
- Placards must be maintained by carrier to maintain format, color, legibility, and visibility [§172.516(c))(6)]

Conditions Requiring Placarding

- Placards are required for any vehicle containing a package with a RADIOACTIVE Yellow-III label [§172.504(e) Table 1]
- Placards are required for shipment of LSA or SCO consigned as exclusive use [§173.427(a)(6)(v)]
- Placards are required for a Highway Route Controlled Quantity (HRCQ) of radioactive material, and
  - must be displayed on a square background [§§ 172.507 and 172.527]
  - HRCQ packages must be labeled with RADIOACTIVE Yellow III labels [§172.403(c)]

Radioactive Placard

		
49 CFR 172.556	IAEA TS-R-1 (1996) paras. 546-548	49 CFR 172.527 and 556
RADIOACTIVE PLACARD (Domestic)	**RADIOACTIVE PLACARD (International)**	**RADIOACTIVE PLACARD FOR HIGHWAY ROUTE CONTROLLED QUANTITY** (either domestic or international placard could be in middle)

Special Considerations/Exceptions for Placarding

- Domestically, substitution of the UN ID number for the word "RADIOACTIVE" on the placard is prohibited for Class 7 materials [§172.503]. However, some import shipments may have this substitution in accordance with international regulations [§171.12].
- If placarding for more than one hazard class, both placards must display the hazard class number [§172.519(b)(4)].
- Uranium Hexafluoride (UF_6) shipments ≥ 454 kg (1001 lbs) gross weight require both RADIOACTIVE and CORROSIVE (Class 8) placards on each side and each end [§172.505(b)].
- For shipments of radiography cameras in convenience overpacks, if the overpack does not require a RADIOACTIVE - YELLOW III label, vehicle placarding is not required (regardless of the label which must be placed on the camera) [§172.403(h)(5)].
- A placard or placard holder may be hinged provided the required format, color, and legibility of the placard are maintained [§172.516(e)].
- Placards must conform to the specifications in §§172.519 and 172.556.

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Hazard Communications for Class 7 (Radioactive) Materials

Shipping Papers (49 CFR Part 172, Subpart C)

NOTE: IAEA, ICAO, and IMO may require additional hazard communication information for international shipments.
This table must not be used as a substitute for the DOT and NRC regulations on the transportation of radioactive materials.

Entries Always Required

- The basic description, in sequence:
  Proper Shipping Name,
  Hazard Class (7),
  U.N. Identification Number
  [§ 172.202(a)&(b)]
- Proper page numbering
  (i.e., Page 1 of 4) [§172.201(c))]
- 24 hour emergency response telephone number (Use of a number that requires a call back - e.g., answering machine - is not authorized) [§§ 172.201(d) and 172.604]
- The total quantity of the material described (mass, volume, or activity) in appropriate units (lbs, mL . . .) [§172.202(a)(5)]
- The number and type of packages [§172.202(a)(6)]
- The name of each radionuclide (as determined by §173.433(g)). The activity must be in SI units (e.g., Bq, TBq), and may be in customary units (e.g., Ci, mCi) in parentheses following SI units. Abbreviations are authorized. [§172.203(d)(1)&(3)]
- If not special form, a description of chemical and physical form [§172.203(d)(2)]
- For each labeled package:
  - The category of label used;
  - The transport index of each package with a Yellow-II or Yellow-III label [§172.203(d)(5)]
  - The criticality safety index of a package with a Fissile label [§172.203(d)(6)]
- Shipper's certification (not required for private carriers) and signature [§172.204]

Entries Sometimes Required

Materials-Based Requirements:

- If Hazardous substance (§171.8), "RQ" as part of the basic description [§172.203(c))(2)]
- "Highway Route Controlled Quantity" or "HRCQ", entered in association with the basic description [§172.203(d)(10)]
- For a package containing fissile material, the words "Fissile Excepted", if the package is excepted by §173.453 or otherwise the criticality safety index for that package [§ 172.203(d)(6)]
- If the material is considered hazardous waste and the word "waste" does not appear in the shipping name, then "waste" must precede the shipping name (e.g., Waste Radioactive material, Type A package, 7, UN2915) [§172.101(c))(9)]

Package-Based Requirements:

- Package identification marking for DOE or NRC certified packages [§172.203(d)(7)]
- IAEA Certificate of Competent Authority ID number for export shipments or shipments using foreign-made packaging (see §173.473) [§172.203(d)(8)]

Administrative-Based Requirements:

- "Exclusive Use-Shipment" [§172.203(d)(9)]
- If a DOT exemption is being used, "DOT-E" followed by the exemption number [§ 172.203(a)]
- "Cargo Aircraft Only" [§ 172.203(f)]
- If subsidiary hazard is present, the hazard class or division number [§ 172.202(a)(2)]

Optional Entries

- Additional information is permitted (e.g., functional description of the product), provided it is not inconsistent with the required basic description [§172.201(a)(4)]
- Except for Pu-239 and Pu-241, the weight in g or kg of fissile radionuclides may be inserted instead of activity units. For Pu-239 and Pu-241 the weight in g of fissile radionuclides may be inserted in addition to activity units [§ 172.203(d)(3)]
- Emergency response information may be entered on the shipping papers, or may be a separate document carried with the shipping papers [§ 172.602(b)]

Special Considerations/Exceptions for Shipping Papers

- Excepted packages, [e.g., Limited quantity (UN 2910), Instruments or Articles (UN 2911), Manufactured articles of uranium and thorium (UN 2909), and Empty packages (UN 2908)] are excepted from shipping papers. For limited quantities, this is only true if the limited quantity is not a hazardous substance (RQ) or hazardous waste [§173.422(e)].
- Shipping paper accessibility - accident or inspection [§177.817(e)].
- For shipments of multiple cargo types, any HAZMAT entries must appear as the first entries on the shipping papers, be designated by an "X" (or "RQ") in the hazardous material column, or be highlighted in a contrasting color [§172.201(a)].
- Instructions for maintenance of exclusive use shipment controls for LSA or SCO material must be included with the shipping papers [§§ 173.403 and 173.427(a)(6)(iv)].
- Shipping paper retention, 375 days [§172.201(e)] for shipper. Each mode of transport has a similar requirement (Rail § 174.24(b); Air § 175.30(a)(2); Vessel § 176.24(b); Highway § 178.817(f)).

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