

DEPARTMENT OF TRANSPORTATION**Pipeline and Hazardous Materials Safety Administration**

49 CFR Parts 171, 172, 173, 174, 175, 176, 177, and 178

[Docket No. PHMSA–2009–0063 (HM–250)]

RIN 2137–AE38

Hazardous Materials Regulations; Compatibility With the Regulations of the International Atomic Energy Agency

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: PHMSA, in coordination with the Nuclear Regulatory Commission (NRC), is proposing to amend requirements in the Hazardous Materials Regulations (HMR) governing the transportation of Class 7 (radioactive) materials based on recent changes contained in the International Atomic Energy Agency (IAEA) publication “Regulations for the Safe Transport of Radioactive Material, 2009 Edition, IAEA Safety Standards Series No. TS–R–1” (hereafter referred to as TS–R–1). The purposes of this rulemaking are to harmonize requirements of the HMR with international standards for the transportation of Class 7 (radioactive) materials and update, clarify, correct, or provide relief from certain regulatory requirements applicable to the transportation of Class 7 (radioactive) materials.

DATES: Comments must be received by November 10, 2011.

ADDRESSES: You may submit comments by any of the following methods:

U.S. Government Regulations.gov Web site: <http://www.regulations.gov>. Use the search tools to find this rulemaking and follow the instructions for submitting comments.

U.S. Mail or private delivery service: Docket Operations, U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, Routing Symbol M–30, 1200 New Jersey Avenue, SE., W12–140, Washington, DC 20590–0001. Fax: 1–202–493–2251.

Hand Delivery: To Docket Operations, Room W12–140 on the ground floor of the West Building, 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

Instructions: You must include the agency name and docket number,

PHMSA–2009–0063 (HM–250) or the Regulatory Identification Number (RIN) for this rulemaking at the beginning of your comment. Note that all comments received will be posted without change to the U.S. Government Regulations.gov Web site: <http://www.regulations.gov>, including any personal information provided. Please see the Privacy Act section of this document.

FOR FURTHER INFORMATION CONTACT: Kurt Eichenlaub, Standards and Rulemaking Division, telephone (202) 366–8553, or Michael Conroy, Engineering and Research Division, telephone (202) 366–4545, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 1200 New Jersey Avenue, SE., Washington, DC 20590–0001.

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I. Background

Under their respective statutory authorities, PHMSA and the NRC jointly regulate the transportation of radioactive materials to, from, and within the United States. In accordance with their July 2, 1979, Memorandum of Understanding (a copy of which has been placed in the docket of this rulemaking) (44 FR 38690):

1. PHMSA regulates both shippers and carriers with respect to:
 - A. Packaging requirements;
 - B. Communication requirements for:
 - Shipping paper contents,
 - Package labeling and marking requirements, and
 - Vehicle placarding requirements;
 - C. Training and emergency response requirements; and
 - D. Highway routing requirements.
2. NRC requires its licensees to satisfy requirements to protect public health

and safety and to assure the common defense and security, and:

A. Certifies Type B and fissile material package designs and approves package quality assurance programs for its licensees;

B. Provides technical support to PHMSA and works with PHMSA to ensure consistency with respect to the transportation of Class 7 (radioactive) materials; and

C. Conducts inspections of licensees and an enforcement program within its jurisdiction to assure compliance with its requirements.”

Since 1968, PHMSA and the NRC (and their predecessor agencies) have, to the extent practicable, harmonized their respective regulations with international regulations of the IAEA in:

- Safety Series No. 6, Regulations for the Safe Transport of Radioactive Material, as published in 1961 and revised in 1964 and 1967. Amendments to the HMR were adopted in a final rule published on October 4, 1968 in Docket HM–2 (33 FR 14918).

- The major updates of Safety Series No. 6 in 1973 and 1985. See the final rules published on March 10, 1983 in Docket HM–169 (48 FR 10218) and September 28, 1995, in Docket HM–169A (60 FR 50291).

- The 1996 major revision to the Safety Series No. 6, renamed “Regulations for the Safe Transport of Radioactive Material, 1996 Edition, No. ST–1” issued by the IAEA in 1996 and republished in 2000 to include minor editorial changes at which time the previous designation was changed to “Regulations for the Safe Transport of Radioactive Material, 1996 Edition, No. TS–R–1, (ST–1, Revised).” See the final rule published on January 26, 2004, in Docket HM–230 (69 FR 3632).

Since then, the IAEA has published amendments and revised editions of TS–R–1 in 2003, 2005, and 2009.

In this notice, PHMSA is proposing to amend the HMR to maintain alignment with the 2009 Edition of TS–R–1 which incorporates all of the changes made to TS–R–1 in the 2003 amendments, the 2005 Edition, as well as other revisions. (In this notice, PHMSA uses the nomenclature “TS–R–1” to refer to the 2009 Edition of TS–R–1, a copy of which may be obtained from the U.S. distributors, Bernan, 15200 NBN Way, P.O. Box 191, Blue Ridge Summit, PA 17214, telephone 800–865–3457, e-mail: customercare@bernand.com, or Renouf Publishing Company Ltd., 812 Proctor Ave., Ogdensburg, NY 13669, telephone: 1–888–551–7470, e-mail: orders@renoufbooks.com. An electronic copy of TS–R–1 has been placed in the docket of this rulemaking and may also

be found at the following IAEA Web site:

http://www-pub.iaea.org/MTCD/publications/PDF/Pub1384_web.pdf.

In addition to changes to harmonize with TS-R-1, PHMSA is proposing regulatory amendments identified through internal regulatory review processes to update, clarify, correct, or provide relief from certain regulatory requirements applicable to the transportation of Class 7 (radioactive) materials.

As in PHMSA's past rulemakings to incorporate updates of the IAEA regulations into the HMR, PHMSA is working in close cooperation with the NRC in the development of this rulemaking. PHMSA anticipates that NRC will publish a parallel rulemaking at a future date. Since the proposed rules will be published separately, there is a risk of differences in overlapping proposals that may affect the compatibility of NRC and PHMSA regulations. PHMSA and NRC will coordinate the development and publication schedules for the final rules, and if necessary, may issue a supplemental notice of proposed rulemaking to ensure that the proposed rules are compatible. This NPRM addresses only the areas for which DOT has jurisdiction as defined in the MOU with NRC. Comments on non-DOT issues or on DOT issues not within the scope of this rulemaking will not be addressed by DOT as part of this rulemaking. Comments responding to the NRC's parallel NPRM, which is expected to be published in the **Federal Register** at a future date, should be submitted in accordance with the public participation guidelines established by NRC.

II. Overview of Proposed Changes in This NPRM

This NPRM proposes changes to the HMR based on changes incorporated in the 2009 Edition of the IAEA Safety Standards publication titled "Regulations for the Safe Transport of Radioactive Material, 2009 Edition, Safety Requirements, No. TS-R-1." One of the goals of this rulemaking is to continue to maintain compatibility between the HMR and the IAEA regulations. PHMSA is not striving to make the HMR identical to the IAEA regulations but rather to remove or avoid potential barriers to international commerce while adhering to domestic law, reflecting domestic practices, and maintaining public health and safety. Accordingly, PHMSA is not proposing to adopt all of the amendments to TS-R-1 since 2000 into the HMR. In many cases, amendments to the IAEA

standards are not being proposed for adoption because the framework or structure of the HMR makes adoption unnecessary or impractical.

If PHMSA inadvertently has omitted an amendment in this NPRM, the omission may be included in the final rule to the extent permitted: (1) If it is clearly within the scope of changes proposed in the notice, (2) does not require substantive changes from the IAEA standards on which it is based, and (3) imposes minimal or no cost impacts on persons subject to the requirement. Otherwise, in order to provide opportunity for notice and comment, the change must be proposed in the NPRM or in a supplemental notice of proposed rulemaking.

Proposed amendments to the HMR in this notice include, but are not limited to, those listed below in Sections II.A (in harmony with TS-R-1) and II.B (additional changes), and a detailed rationale for each proposed amendment is discussed in Part III, Section-By-Section review. In Section II.C, we list those significant amendments to the IAEA regulations since 2000 that we are not proposing to adopt.

A. Changes for Harmonization With the 2009 Edition of TS-R-1

In this NPRM, based on the 2009 TS-R-1 changes, PHMSA is proposing to amend the HMR as follows:

- Revise paragraph § 173.25(a)(4) to adopt the new TS-R-1 requirement for the marking of all overpacks of Class 7 (radioactive) packages with the word "OVERPACK."
- Modify the scoping statement in § 173.401(b)(4), which excludes natural materials and ores containing naturally occurring radionuclides from the HMR, to add the phrase "which are either in their natural state, or which have only been processed for purposes other than for extraction of the radionuclides."
- Add a scoping statement to § 173.401 to clarify that non-radioactive solid objects with radioactive substances on their surfaces in quantities not exceeding the levels cited in the definition of contamination are not subject to subpart I of part 173.
- In § 173.403, define the criticality safety index (CSI) for each conveyance to be the sum of the CSIs of all the packages in that conveyance.
- Modify the wording for category (ii) of LSA-I in § 173.403 to be consistent with the wording in TS-R-1.
- Adopt the slight change in definition of "natural uranium" in § 173.403 from "chemically separated uranium" to "uranium (which may be chemically separated)."

- Revise § 173.410(i)(3) to require that packages containing liquid radioactive material to be transported by air be capable of withstanding, without leakage, an internal pressure which produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa.

- Revise the nomenclature in § 173.411 on Industrial Packagings to refer to Type IP-1, -2, and -3 packages instead of IP-1, -2, and -3 packagings.

- Revise §§ 173.411 and 173.412 to specify that the testing of Types IP-2, IP-3 and Type A packages shall not result in "more than a 20% increase in the maximum radiation level at any external surface of the package."

- Revise § 173.411(b)(4) to refer to "portable tanks" rather than to "tank containers" and revise § 173.411(b)(5) for "cargo tanks and tank cars" and include the TS-R-1 requirements for such tanks.

- Revise § 173.412(f) to specify that the containment system of a Type A package be capable of retaining its contents under the reduction of ambient pressure to 60 kPa (8.7 psi).

- Revise § 173.412(k) to clarify the requirements for enclosure of liquid contents in inner components of Type A packages, including complete retention within the secondary outer containment.

- Revise § 173.420 to require the use of the uranium hexafluoride proper shipping names and UN numbers for shipments of 0.1 kg or more of non-fissile, fissile-excepted, or fissile uranium hexafluoride (UF₆), even if other proper shipping names and UN numbers are feasible.

- Revise § 173.433(c) to authorize the use of an A₂ value for a radionuclide not in the table in 173.435 by using a dose coefficient for the appropriate lung absorption type.

- Revise Tables 7 (General Values for A₁ and A₂) and 8 (General Exemption Values) in § 173.433, to clarify how neutron emitters are to be handled. Also, because the IAEA A₁ default value for alpha emitters is larger than that for beta or gamma emitters, we have added a footnote to ensure that the lower value is required when both alpha and beta or gamma emitters are known to be present.

- In the Table of A₁ and A₂ values for radionuclides in § 173.435, adopt the new IAEA A₁ value for Cf-252 and eliminate the domestic alternative for the A₂ value.

- In the Table of A₁ and A₂ values for radionuclides in § 173.435, adopt the new IAEA A₁ and A₂ values for Kr-79.

- Modify footnote (a) to the table in § 173.435 to refer the reader to the

corresponding footnote (a) to Table 2 in TS-R-1. The 2009 TS-R-1 includes as footnote (a) to Table 2 an extensive list of radionuclides of half-life 10 days or less which were included in A_1/A_2 values for their parent radionuclides.

- In § 173.436, revise the activity limit for an exempt consignment of Te-121m (Tellurium-121m) from 1×10^5 Bq to 1×10^6 Bq.

- In § 173.436, add exempt activity concentration and exempt consignment activity limits for Kr-79.

- Remove the decay chains for Ce-134, Rn-220, Th-226, and U-240 in footnote (b) to the table in § 173.436 and add the decay chain for Ag-108m.

- Specify in § 173.443 that, under certain conditions, the radioactive material package contamination limits apply not only to overpacks, freight containers, tanks, and intermediate bulk containers, but also to conveyances transporting radioactive materials.

- In § 173.443(a)(1), revise to apply to only unpackaged radioactive material, and not apply to overpacks, an exception from the requirement that the package contamination limits be satisfied for the internal surfaces of freight containers, tanks, intermediate bulk containers, and conveyances carrying radioactive material so long as they are in transport under certain exclusive use provisions.

- Revise § 173.465(d)(i) to clarify that the stacking test should use five times the maximum weight of the loaded package, including the maximum weight of the contents that the packaging manufacturer is certifying for the package.

- Revise § 173.469 to authorize the use of ISO 2919 Class 5 impact test as an acceptable alternative to the IAEA 30 foot drop and percussion tests for special form sources weighing less than 500 g.

B. Other Proposed Amendments

In addition to the amendments proposed for harmonization with TS-R-1, PHMSA is also proposing to:

- Revise the shipping paper description requirements in § 172.203 and the labeling requirements in § 172.403 to clarify that the activity shown should be the total maximum activity of all the radioactive contents during transport.

- Revise the marking requirements in § 172.310(b) for Type A packages to eliminate an inconsistency with § 178.350.

- Revise Table 1 in § 172.504 to additionally require conveyances carrying fissile material packages, unpackaged LSA-I material or SCO-I, all conveyances required by §§ 173.427

and 173.441 to operate under exclusive use conditions, and all closed vehicles used in accordance with § 173.443(d) to be placarded.

- Revise § 173.4 to require that excepted packages of radioactive material that also contain small quantities of other hazardous materials are not exempted from the Class 7 related requirements that would be applied if they did not contain small quantities of other hazardous materials, such as the applicable UN number marking.

- Revise the definition of “fissile material” to clarify that certain exceptions are provided in § 173.453.

- Modify § 173.411(c) to extend the retention period for Type IP-2 and Type IP-3 package documentation from one year to two years after the offerror’s latest shipment, to coincide with the minimum retention period for shipping papers.

- Modify § 173.415(a) to extend the retention period for Type A package documentation from one year to two years after the offerror’s latest shipment, to coincide with the minimum retention period currently required for shipping papers.

- Modify § 173.415(a) to include more detailed language describing the kinds of information to be included as part of the Type A package documentation.

- Delete paragraph (c) of § 173.416 which allowed the continued use of an existing Type B packaging constructed to DOT specification 6M, 20WC, or 21WC until October 1, 2008.

- Add a new paragraph in § 173.416 to reference the U.S. Nuclear Regulatory Commission 10 CFR 71.41 provision for special package authorizations by the NRC for domestic shipments of Type B quantities when compliance with all provisions of the regulations is impracticable, but an equivalent level of safety in transport is maintained through alternative means.

- Delete references to DOT Specification 21PF-1A, 21PF-1B, or 21PF-2 overpacks in paragraph § 173.417(a)(3), as these overpacks are no longer in service.

- Delete references to DOT Specification 21PF-1A or 21PF-1B overpacks in paragraph § 173.417(b)(3), as these overpacks are no longer in service.

- Delete paragraph (c) of § 173.417 which allowed the continued use of an existing fissile material packaging constructed to DOT specification 6L, 6M, or 1A2 until October 1, 2008.

- Add a new paragraph in § 173.417 to reference the U.S. Nuclear Regulatory Commission 10 CFR 71.41 provision for special package authorizations by the

NRC for domestic shipments of fissile materials packages when compliance with all provisions of the regulations is impracticable, but an equivalent level of safety in transport is maintained through alternative means.

- Modify § 173.420 to remove paragraph (a)(2)(ii), which references specifications for DOT-106A multi-unit tank car tanks.

- Modify § 173.421 to remove paragraph (b) which permits an excepted package of limited quantity radioactive material that is also a hazardous substance or hazardous waste to be shipped without complying with § 172.203(d) or § 172.204(c)(4); and, modify § 173.422 to permit an excepted package of radioactive material that is also a hazardous substance or hazardous waste to be shipped without having to comply with § 172.202(a)(6), § 172.203(d) or § 172.204(c)(4) and require that packages containing hazardous substances be marked with the letters “RQ.”

- Modify § 173.427(a)(6)(v), to remove the placarding exception for shipments of unconcentrated uranium or thorium ores and clarify that all of the placarding requirements of subpart F of part 172 must be met.

- Modify § 173.427(a)(6)(vi) to require that shipments of low specific activity (LSA) materials or surface contaminated objects (SCO) that contain a subsidiary hazard from another hazard class be labeled for the subsidiary hazard.

- Require in § 173.443(c) that any conveyance, overpack, freight container, tank, or intermediate bulk container involved in an exclusive use shipment under § 173.427(b)(4), § 173.427(c), or § 173.443(b) be surveyed with appropriate radiation detection instrumentation after each such shipment, and not be permitted to be used for another such shipment until the removable surface contamination meets package contamination limits and the radiation dose rate at each accessible surface is no greater than 0.005 mSv/h (0.5 mrem/h). This essentially restricts the use of the phrase “returned to service” to refer only to continued exclusive use service under one of three specific transport scenarios.

- Revise § 173.453 to insert a phrase that would allow a fissile material exception for uranium enriched in uranium-235 to a maximum of 1 percent by weight under the conditions stated there only if the material in question is essentially homogeneous.

- Revise § 173.473 to update the reference to the IAEA regulations to the most currently incorporated by reference version rather than the outdated Safety Series No. 6.

- Revise § 173.476 to extend the retention period for special form documentation from one year to two years after the offerror's latest shipment, to coincide with the minimum retention period for shipping papers.

- Revise § 173.477 to extend the retention period for uranium hexafluoride packaging documentation from one year to two years after the offerror's latest shipment, to coincide with the minimum retention period for shipping papers.

- Delete paragraph (e) of § 174.700, which provides special handling requirements for fissile material, controlled shipments.

- Replace § 175.702(b) and (c) with a new § 175.702(b) containing an introductory phrase to indicate that the limitations on combined (total) criticality safety indexes found in § 175.700(b) also apply.

- Delete § 178.358 "Specification 21PF fire and shock resistant, phenolic-foam insulated, metal overpack" and § 178.358-1 through § 178.358-6 as these overpacks are no longer in service.

C. Amendments to TS-R-1 Not Being Considered for Adoption in This NPRM

Below is a listing of significant amendments to the IAEA regulations made since PHMSA's last harmonization rulemaking that are not being proposed for adoption in this notice with an explanation of why each provision was not proposed.

- The new TS-R-1 paragraph 109 pertaining to security. The security training requirements in § 172.704 and the security plan requirements in Part 172 Subpart I already sufficiently address this topic.

- The revised TS-R-1 definition for fissile material, which makes a distinction between "fissile nuclides" and "fissile material," because this change would also have to be adopted by the NRC.

- The TS-R-1 consignor, carrier, and consignee notification requirements in cases of non-compliance with the regulations. The HMR currently contain reporting requirements for consignors and carriers in the event of "fire, breakage, spillage, or suspected radioactive contamination" in §§ 171.15 and 171.16, and the discovery of "an undeclared hazardous material" in § 171.16, and those reporting requirements are adequate and comprehensive.

- The TS-R-1 provisions pertaining to training. These training requirements are already found in Part 172, Subpart H for all hazardous materials, including Class 7 (radioactive) materials.

- For materials other than liquids, the TS-R-1 provision requiring that packages containing radioactive material to be transported by air be capable of withstanding, without leakage, an internal pressure that produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa. As noted in Section II.A, above, PHMSA is proposing to adopt this requirement for liquids; however, for solid types of contents PHMSA believes that this requirement is flawed, since it unintentionally prohibits air transport of packages containing solid radioactive contents that do not need airtight containment systems to prevent leakage of the radioactive material under a large drop in external pressure. Consideration of a proposal to incorporate this requirement into the HMR in its entirety is postponed pending the outcome of discussions with IAEA member states regarding this issue.

- The TS-R-1 change that removes the restriction on radiation level increase as a criterion for passing the additional performance tests required of a Type A package used for liquid Class 7 (radioactive) contents, so that only the containment requirement would have to be satisfied. PHMSA sees no safety justification for this change, and is not proposing to adopt it.

- The revised TS-R-1 provision pertaining to the fissile material exception on consignment mass limits. The HMR currently has more restrictive requirements, which mirror NRC regulations.

- The revised TS-R-1 provisions on geometry requirements applicable to tested fissile material packages. This TS-R-1 change is applicable to NRC requirements and is not within the scope of this rulemaking.

- The TS-R-1 change to replace "edges" with "edge" when describing the end of a bar used for the penetration test for hypothetical accident conditions. This TS-R-1 change is applicable to NRC requirements and is not within the scope of this rulemaking. (see, however, a similar proposed change to the HMR in § 173.469 for the special form percussion test.)

- The TS-R-1 revisions pertaining to the solar insolation conditions to be assumed in demonstrating that a Type B(U) package will satisfy the performance tests for normal conditions of transport. This TS-R-1 change is applicable to NRC requirements and is not within the scope of this rulemaking.

- The TS-R-1 change in the definition of "multilateral approval." The current HMR definition of

"multilateral approval" is consistent with the TS-R-1 change.

- The TS-R-1 amendment describing dose ranges for which various radiation protection measures are advised. The HMR do not currently require a radiation protection program, and PHMSA does not intend to address that issue in this rulemaking.

- The TS-R-1 amendment to list more detailed conditions for the shipment of uranium hexafluoride (UF₆). PHMSA believes current requirements in the HMR for transporting uranium hexafluoride are adequate, as supported by the strong safety history for such shipments.

III. Section-by-Section Review

Part 171

Section 171.7

Section 171.7 lists all standards incorporated by reference into the HMR. PHMSA evaluated the following updated international standards pertaining to transportation of radioactive material and determined that the revised standards provide an enhanced level of safety without imposing significant compliance burdens. These standards have a well-established and documented safety history; their adoption will maintain the high safety standard currently achieved under the HMR. Therefore, PHMSA proposes to update the incorporation by reference material for the "International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Revised), No. TS-R-1 (ST-1, Revised)," and for International Standards Organization standard "ISO 2919-1980(E) Sealed radioactive sources—classification."

The standards would be updated as follows:

- IAEA, Regulations for the Safe Transport of Radioactive Material, 2009 Edition, Safety Requirements, No. TS-R-1.

- ISO 2919-1999(E) Radiation Protection—Sealed radioactive sources—General requirements and classification.

There are some minor changes in the newer edition of the ISO 2919 Standard. For example, in the requirements for the temperature test for Classes 4, 5, and 6, the 1980 Edition (in paragraph 8.2.2) allows the source used in the high temperature test or a second test source to be used for the thermal shock test. The 1999 Edition (in paragraph 7.2.2) does not allow the use of a second test source. In addition, the 1980 Edition requires only that the test source be held at the maximum temperature for 15

minutes before being subjected to the thermal shock test, while the 1999 edition requires that the source be held at the maximum temperature for at least an hour before carrying out the thermal shock test.

Section 173.469 allows the use of the ISO 2919 category 4 impact test as a substitute for the IAEA impact and percussion tests, and the ISO category 6 temperature test as a substitute for the IAEA heat test. To allow consideration for use of sources where these ISO tests are performed instead of the IAEA tests, PHMSA is proposing to allow testing against the 1999 Edition of ISO 2919 in § 173.469, as opposed to the presently referenced 1980 Edition. Furthermore, since the category 6 ISO temperature test for either version of ISO 2919 is more stringent than the IAEA heat test (which requires no thermal shock test at all), PHMSA is not proposing to require tests to be redone for sources that used the 1980 ISO 2919 classification tests to demonstrate their special form character.

In § 171.7, PHMSA is also proposing to delete references to specification packages which are being removed from the HMR in this rulemaking. PHMSA is proposing to remove section 178.358 for 21PF overpacks and section 178.360 for 2R vessels, and proposing to revise the table of references by deleting references to those sections and removing entries that were referenced by those sections.

Part 172

Section 172.203

Section 172.203 sets forth additional requirements for shipping descriptions on shipping papers. Paragraph (d) currently lists additional information that must be included in the description of a Class 7 (radioactive) material.

Paragraph (d)(2) requires the inclusion of the physical and chemical form of the material, if the material is not in special form. PHMSA is proposing to revise paragraph (d)(2) to specify that when a material is in "special form" the words "special form" must be included in the description, unless those words already appear in the proper shipping name. This ensures that if the material is special form the reader (*i.e.*, carrier, emergency responder, consignee, *etc.*) is aware that the potential for contamination is negligible. In addition, for most radionuclides, the maximum activity that can be transported in a Type A package is greater for special form radioactive material (maximum activity A_1) than for normal form (maximum activity A_2), so having the information available puts the stated activity level in

perspective for enforcement authorities, emergency responders and carriers, thus reducing the likelihood of delays in transportation or emergency response.

Paragraph (d)(3) requires the activity contained in each package of the shipment in terms of the appropriate SI units be listed. In the January 26, 2004 final rule, PHMSA stated that the activity of progeny in radioactive decay chains should be included in the total activity required on shipping papers and labels. However, PHMSA also stated that, when A_1 or A_2 values include contributions from daughter nuclides with half lives less than 10 days, and no daughter has a half life greater than that of the parent, the parent and those daughters are to be treated as a single radionuclide for the contribution of that chain to the "total activity" required to be included on the shipping paper and on the labels. PHMSA noted this approach would occasionally lead to a situation where the true activity contents of the package can be greater than the "total" activity listed on the shipping paper and labels. PHMSA is proposing to avoid such situations by requiring that the "total" activity of all radionuclides present in the package including all parent radionuclides and daughter products, even those daughters that meet the above conditions, be accounted for in the calculation of the total activity to be included on the shipping paper and on the labels. Further, PHMSA is proposing to more closely align with the wording in TS-R-1 by specifying that the activity should be the maximum activity of the radioactive contents during transport. Including the term "maximum" clarifies that in situations where the total activity might change during the expected time the package is in transport, the maximum calculated value should be used to properly bound and communicate the hazard of the material during transport. PHMSA is also proposing to amend this paragraph to permit the mass of each fissile nuclide for mixtures when appropriate to be included.

Paragraph (d)(4) requires the inclusion in the shipping description of the category of label applied to a Class 7 (radioactive) material package. PHMSA is proposing to revise the example in paragraph (d)(4) to clarify that the word "RADIOACTIVE" is not required to be included in the description of the category of label.

Section 172.310

This section sets forth marking requirements for packages containing Class 7 (radioactive) materials. Paragraph (b) requires that each

industrial, Type A, Type B(U), or Type B(M) package must be legibly and durably marked on the outside of the packaging, in letters at least 13 mm (0.5 in) high with the appropriate marking. However, section 178.350 requires that each Specification 7A packaging comply with the marking requirements of § 178.3, which requires the marking to be at least 12.0 mm (0.47 inches) in height, with exceptions for smaller packages. PHMSA is proposing to correct this discrepancy by amending the section 172.310 marking requirement to be the same as the 178.350 requirements.

Section 172.402

This section sets forth additional requirements for the labeling of packages. Paragraph (d) specifies additional labeling requirements for packages containing a Class 7 (radioactive) material. PHMSA is proposing to revise paragraph (d)(1) to clarify that for a package containing a Class 7 (radioactive) material that meets the definition of one or more additional hazard classes a subsidiary label is not required on the package if the non-radioactive material conforms to the small quantity exception in § 173.4, excepted quantities exception in § 173.4a, or de minimis exceptions in § 173.4b.

Section 172.403

This section sets forth requirements for the labeling of packages of radioactive material. Paragraph (d) specifies the requirements for the labeling of EMPTY packages and references paragraph 173.428(d). In HM-230, this paragraph was redesignated as 173.428(e), but the reference to it in 172.403(d) was not changed. PHMSA is proposing to correct this reference.

PHMSA is also proposing to revise paragraph (g)(2) to be consistent with the change proposed herein for paragraph 172.203(d)(3) to clarify that the activity shown on the label should include the activity of all radionuclides present in the package. PHMSA is proposing to more closely align with the wording in TS-R-1 by specifying that the activity should be the maximum activity of the radioactive contents during transport. Further, PHMSA is proposing to amend the activity printing requirement on the RADIOACTIVE label to permit the mass of each fissile nuclide, as appropriate for mixtures, to be included.

Section 172.504

This section sets forth general placarding requirements for bulk

packagings, freight containers, unit load devices, transport vehicles or rail cars containing hazardous materials. In Table 1 of the placarding tables in paragraph (e), PHMSA is proposing to require conveyances carrying fissile material packages, unpackaged low specific activity (LSA) material or surface contaminated object (SCO) material in category I (*i.e.*, LSA-I and SCO-I respectively), all conveyances required by §§ 173.427 and 173.441 to operate under exclusive use conditions, and all closed vehicles used in accordance with § 173.443(d) to be placarded. Currently, placards are only required for class 7 shipments that have Radioactive Yellow III labels and for exclusive use shipments of LSA material and SCO transported in accordance with § 173.427(b)(4) and (5) or (c).

Section 172.505

This section sets forth placarding requirements for subsidiary hazards. In paragraph (b), PHMSA is proposing to remove the reference to “low specific activity uranium hexafluoride” as the change PHMSA is proposing to section 173.420, paragraph (e) would require that the uranium hexafluoride shipping description should take precedence over the shipping description for LSA material and thus there would be no shipments of uranium hexafluoride allowed with low specific activity as part of the proper shipping name. The proposed revision to paragraph (e) requires that all shipments of 454 kg (1,001 pounds) or more gross weight of non-fissile, fissile-excepted, or fissile uranium hexafluoride be placarded with a CORROSIVE placard as well as the required RADIOACTIVE placard.

Part 173

Section 173.4

Section 173.4 specifies exceptions for transporting small quantities of certain hazardous materials by highway and rail. PHMSA is proposing to revise paragraph (a)(1)(iv) to remove the reference to § 173.425. Currently, paragraph (a)(1)(iv) references §§ 173.421, 173.424, 173.425 and 173.426; §§ 173.421 and 173.424 already cite the activity limits in § 173.425, while 173.426 is independent of the activity, so long as the dose rate limit of § 173.421(a)(2) is met.

In addition, PHMSA is proposing to revise paragraph (b) to specify that small quantities of other hazardous materials that are also Class 7 (radioactive) materials must satisfy the requirements of § 173.421, § 173.424, or § 173.426 in their entirety. As a result, this requires

small quantities of other hazardous materials that also meet the definition of a Class 7 (radioactive) material to satisfy the requirements of § 173.422. Consequently this change would require the package to be marked with the UN number for the excepted package category (see § 173.422(a)). This change is proposed for consistency with the situation which would occur if the radioactive material did not have a small quantity of another hazard class; if the other hazard were not present, the UN marking would be required for the excepted radioactive material package.

The proposal to add a reference to § 173.426 in paragraph 173.4(b) is made in order to be consistent with paragraph § 173.4(a)(1)(iv).

Section 173.25

Section 173.25 sets forth requirements for overpacks of hazardous materials packages. Currently, § 173.25(a)(4) requires an overpack to be marked with “OVERPACK” when specification packagings are required and the package markings are not visible; however, for Class 7 that applies only to DOT 7A, Type A packages. PHMSA is proposing to revise that paragraph to require the “OVERPACK” marking on all overpacks containing packages of Class 7 (radioactive) materials, unless package type markings representative of each Class 7 package, contained therein, are visible from the outside of the overpack.

Section 173.401

PHMSA is proposing to modify the scoping statement in § 173.401(b)(4) to add the phrase “which are either in their natural state, or which have only been processed for purposes other than for extraction of the radionuclides.” This proposal aligns domestic regulations with the international standard (TS-R-1) and clarifies that the exception applies to processed natural material and ore.

PHMSA is proposing to add a new paragraph (b)(5) to clarify that non-radioactive solid objects with radioactive substances present on any surfaces in quantities not exceeding the limits cited in the definition of contamination in § 173.403 are not subject to the Class 7 (radioactive) material requirements of the HMR.

Section 173.403

Section 173.403 contains definitions specific to Class 7 (radioactive) materials. In this NPRM, PHMSA is proposing to revise the definitions of contamination, criticality safety index, fissile material, low specific activity and LSA-I, radiation level, and uranium.

PHMSA is proposing to change the definition of contamination by replacing the words “radioactive contamination” in the text for “Fixed radioactive contamination” and “Non-Fixed radioactive contamination” with the word “contamination” alone. The reason is that an object may have radioactive “substances” on its surface with activity/area in excess of the values used to define contamination (so that the object is “contaminated”), and yet if the total activity of those substances is below the exempt consignment activity limit, the contaminated object would not be subject to regulation as a “radioactive material” (Class 7 material) as defined in 173.403. The word “contamination” instead of the phrase “radioactive contamination” also corresponds more closely to the language used in the definition of contamination in TS-R-1. In addition, PHMSA is replacing the phrase “contamination exists in two phases” with “there are two categories of contamination,” because PHMSA believes the word “categories” is more accurate in establishing the two contamination types than the word “phases.”

PHMSA is proposing to revise the definition of “criticality safety index” to include the sum of criticality safety indices of all fissile material packages contained within a conveyance. This revision is necessary for consistency with the criticality safety index limits on conveyances in § 173.457(d).

PHMSA is proposing to revise the definition of “fissile material” to align with NRC’s definition and to clarify that certain exceptions are provided in § 173.453.

PHMSA is proposing to adopt the TS-R-1 change in the definition of “low specific activity (LSA) material” that modifies the wording for the second category of LSA-I to include liquid unirradiated natural or depleted uranium or natural thorium, in addition to the previously included terms. Additionally, PHMSA proposes to correct an inconsistency between the NRC definition and the HMR definition of Low Specific Activity (LSA) material. Presently, the definition contains, in category (iv) of LSA-I, the exclusion of fissile material, which is not excepted under § 173.453. The NRC definition has this restriction not in category (iv) of LSA-I, but rather in the introductory paragraph that encompasses LSA-I, -II, and -III. It is PHMSA’s intention to prevent the possibility of fissile LSA or SCO, thus PHMSA proposes to change the definition of Low Specific Activity (LSA) material to correspond with the existing NRC definition.

PHMSA is proposing to revise the definition of “radiation level” to clarify the types of radiation that contribute to the radiation level.

PHMSA is proposing to revise the definition of uranium, to allow for the possibility that natural uranium doesn't necessarily have to be chemically separated from accompanying constituents.

Section 173.410

Section 173.410 sets forth general design requirements for packages used for the transportation of Class 7 (radioactive) materials. In paragraph (i)(3), PHMSA proposes to revise a requirement for transporting liquid Class 7 (radioactive) material by air to specify that the package must be capable of withstanding, without leakage (*i.e.*, without release of radioactive material), a pressure differential of not less than the “maximum normal operating pressure” (defined in § 173.403) plus 95 kPa (13.8 psig). The HMR currently require a package to be capable of withstanding a pressure differential of not less than 95 kPa. PHMSA is proposing to require that the maximum pressure differential include the maximum normal operating pressure (defined in § 173.403) to account for the contribution of internally generated gas pressure to the overall pressure differential.

Section 173.411

Section 173.411 sets forth requirements for industrial packages. Throughout this section, PHMSA proposes to make editorial revisions to improve consistency with the nomenclature used for package types, and to clarify the meaning of two authorized alternatives to Type IP-2 or IP-3 packages.

PHMSA is proposing to replace the word “packaging” with “package” in each place it appears in this section. The reason for this is that in principle, it is the package—*i.e.*, the packaging with its radioactive contents—which must satisfy the pertinent performance requirements, as applicable. In the case of Type IP-1 packages, the only requirements that must be satisfied are design requirements. Therefore, PHMSA proposes to change IP-1 packaging to Type IP-1 package.

In addition, PHMSA is proposing to replace the terms IP-1, IP-2, and IP-3 with Type IP-1, Type IP-2, and Type IP-3 to make the designations for industrial packages more consistent with the language PHMSA uses for other Class 7 (radioactive) material package types, such as Type A, Type B(U), *etc.*

Similar changes were made to various sections of TS-R-1 in the 2003 revision.

For consistency with the language in TS-R-1, and to provide a measurable requirement in paragraph (b)(2)(ii), PHMSA proposes to replace the requirement that package tests for Type IP-2 and Type IP-3 should not result in a significant increase in the external surface radiation levels with wording to indicate that the package tests should not result in more than a 20% increase in the maximum radiation level at any external surface of the package. Section 173.411 currently includes a 20% requirement for tank containers, tanks, freight containers, and metal intermediate bulk containers that are used as Type IP-2 or Type IP-3 packages; PHMSA is proposing to align the wording in these sections with that of TS-R-1.

PHMSA is proposing to revise the terminology used in describing the alternatives to Type IP-2 and IP-3 packages for materials, including liquids and gases, normally transported in various types of tanks. Section 173.411(b)(4) currently authorizes the use of “tank containers” as Type IP-2 or IP-3 packages under certain conditions, and the same is true in § 173.411(b)(5) for “tanks, other than tank containers.” There has been confusion associated with the meanings of these terms because the HMR do not define “tank container.” For this reason and for consistency with TS-R-1, PHMSA proposes to replace the phrase “tank container” with “portable tank,” which is defined in § 171.8 as “a bulk packaging designed primarily to be loaded onto, or on, or temporarily attached to a transport vehicle or ship and equipped with skids, mountings, or accessories to facilitate handling of the tank by mechanical means.” This definition goes on to specifically exclude, among others, (highway) cargo tanks and (rail) tank cars in the definition of portable tank. Thus by “portable tank” PHMSA means a multi-modal tank designed to be loaded, with its contents, on a flat-bed truck or rail car, or on a vessel. The second alternative used in TS-R-1 is, “tanks, other than portable tanks.” By virtue of the § 171.8 definition of “portable tank,” this would then refer to “cargo tanks and tank cars” and PHMSA proposes to use that phrase for clarity.

For consistency with the language in TS-R-1, PHMSA is proposing in § 173.411(b)(4) to replace the phrase, “They are designed to conform to the standards prescribed in Chapter 6.7 of the United Nations Recommendations on the Transport of Dangerous Goods” with the phrase, “They are designed to

satisfy the requirements prescribed in Chapter 6.7 of the United Nations Recommendations on the Transport of Dangerous Goods.” Likewise, in § 173.411(b)(7), PHMSA proposes to replace the phrase, “They are designed to conform to the standards prescribed in Chapter 6.5 of the United Nations Recommendations on the Transport of Dangerous Goods” with the phrase, “They are designed to satisfy the requirements prescribed in Chapter 6.5 of the United Nations Recommendations on the Transport of Dangerous Goods.”

Section 173.411(b)(5) authorizes the use of DOT Specification IM-101 or IM-102 steel portable tanks as Type IP-2 or IP-3 packages for the transport of LSA-I and LSA-II liquids and gases under the conditions in Table 6 of § 173.427. Since these are in fact “portable tanks,” PHMSA believes that they should more appropriately be cited under the authorization for portable tanks discussed above. However, because requirements for these DOT specification tanks are no longer listed in Part 178 of the HMR (as the manufacture of new IM-101 and IM-102 portable tanks was terminated as of December 31, 2002, and authorization for their use terminated on January 1, 2010), PHMSA proposes to remove the reference to these tanks in paragraph 173.411(b)(5) as possible Type IP-2 or Type IP-3 packages. Their use would still be permitted if it can be shown that they conform to the requirements of paragraph 173.411(b)(4). PHMSA proposes to revise paragraph 173.411(b)(5) to contain the TS-R-1 requirements for tanks, other than portable tanks, that is, cargo tanks and tank cars.

In paragraph (c), PHMSA proposes to extend the retention period for Type IP-2 and Type IP-3 package documentation from one year to two years after the offeror's latest shipment, to correspond to the minimum period an offeror is required to retain copies of shipping papers.

Section 173.412

Section 173.412 sets forth additional design requirements for Type A packages. Paragraph (f) requires the containment system to be capable of retaining its contents under the reduction of ambient pressure to 25 kPa (3.6 psi). This number has been 60 kPa (8.7 psi) for many years in the IAEA regulations, and to harmonize with TS-R-1 PHMSA proposes to change this limit to 60 kPa (8.7 psi) in § 173.412(f). An atmospheric pressure of 60 kPa corresponds roughly to an altitude of 13,800 feet. Thus a Type A package with a containment that can retain its

contents at this external pressure will be able to retain its contents for all altitudes normally encountered during surface transportation. Additional protection from leakage for transportation of liquids by air is given in § 173.410(i)(3), which requires that all types of packages be able to withstand a pressure differential of 95 kPa (13.8 psig).

Paragraph (j)(2) sets forth the limitation on changes to the external radiation field which may result from the various Type A package tests. Presently, the HMR require that there not be a “significant increase” in the radiation level recorded or calculated at the external surfaces of a Type A package before the test. In this NPRM, PHMSA proposes to revise paragraph (j)(2) to specify that the maximum radiation level at the external surface of the package not increase by more than 20%. PHMSA believes that this quantitative requirement is more objective and is also consistent with language in TS–R–1.

Paragraph (k)(3) sets forth requirements for the retention of liquid contents in a Type A package. Currently, the HMR require that the package have either sufficient suitable absorbent material to absorb twice the volume of the liquid contents, or “Have a containment system composed of primary inner and secondary outer containment components designed to assure retention of the liquid contents within the secondary outer component in the event that the primary inner component leaks.” To provide further clarity, PHMSA proposes to adopt the revised wording in TS–R–1, which states, “Have a containment system composed of primary inner and secondary outer containment components designed to enclose the liquid contents completely and ensure their retention within the secondary outer component in the event that the primary inner component leaks.”

Section 173.415

Section 173.415 contains language stating Type A packages are authorized for shipment that do not contain quantities exceeding the A₁ or A₂ values for radionuclides in § 173.435.

Paragraph (a) specifies the Specification 7A recordkeeping requirements. In this NPRM, PHMSA proposes to extend the retention period for Type A package documentation from one year to two years after the offerror’s latest shipment, to correspond to the minimum period for which an offerror is currently required to retain copies of shipping papers. PHMSA is also proposing to include more detailed language

describing the kinds of information expected to be included as part of the Type A package documentation. This would include an engineering drawing and description of the package showing materials of construction, dimensions, weight, closure and closure materials (including gaskets, tape, *etc.*) of each item of the containment system, shielding and packing materials used in normal transportation. If the packaging is subjected to the physical tests of § 173.465–§ 173.466, complete documentation of testing would be required, including date, place of test, signature of testers, a detailed description of each test performed including equipment used, and the damage to each item of the containment system resulting from the test. For any other demonstration of compliance with tests authorized in § 173.461, a detailed analysis would need to be documented which shows that, for the contents being shipped, the package meets the pertinent design and performance requirements for a DOT 7A Type A specification package.

Section 173.416

Section 173.416 provides a list of authorized Type B packages. PHMSA is proposing to remove the present paragraph (c), which allows the continued use of an existing Type B packaging constructed to DOT specification 6M, 20WC, or 21WC until October 1, 2008. These packages are no longer authorized for transport. PHMSA is also proposing to add a new paragraph (c), which authorizes the domestic shipment of a package conducted under a special package authorization granted by the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 71.41(d).

Section 173.417

Section 173.417 provides a list of authorized fissile materials packages. PHMSA is proposing to remove the present paragraph (c), which allows the continued use of an existing fissile material packaging constructed to DOT specification 6L, 6M, or 1A2 until October 1, 2008. These packages are no longer authorized for transport. Additionally, PHMSA proposes to delete the references in paragraph (a)(3), paragraph (b)(3), and paragraph (b)(3)(ii) Table 3 to 21PF overpacks as those overpacks are no longer in service. In addition, PHMSA is correcting a typographical error in the heading of Table 3 in paragraph (b)(3)(ii). PHMSA is proposing to add a new paragraph (c), which authorizes the domestic shipment of a package conducted under a special package authorization granted

by the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 71.41(d).

Section 173.420

Section 173.420 sets forth requirements for uranium hexafluoride (fissile, fissile excepted and non-fissile). In this NPRM, PHMSA is proposing to remove paragraph (a)(2)(ii), which references specifications for DOT–106A multi-unit tank car tanks. PHMSA believes that these multi-unit tank car tanks are not used, nor planned to be used for transporting UF₆. The present paragraph (a)(2)(iii) would be renumbered as (a)(2)(ii).

In addition, PHMSA is proposing to add a new model 30C packaging model in the table in the revised paragraph 173.420(a)(2)(ii)(D), to have the same minimum thickness of 7.93 mm (0.312 in) as the 30B cylinder. This reflects the recent addition of the model 30C cylinder in the American National Standards Institute, ANSI N14.1 standard. The present requirements for UF₆ “heels” in a 30 inch cylinder meeting the requirements for a DOT Specification 7A Type A packaging, as presented in Table 2 in 173.417(a)(2), would hold for the 30C as well as the 30B cylinders.

PHMSA is proposing to add a paragraph (e) to require that, when there is more than one way to describe a UF₆ shipment, the proper shipping name and UN number for the uranium hexafluoride should take precedence (*e.g.*, the uranium hexafluoride shipping description should take precedence over the shipping description for LSA material). This is a TS–R–1 change that assures the corrosive hazard inherent in the shipment of UF₆ is identified in the shipment hazard communications.

Section 173.421

Section 173.421 sets forth requirements for limited quantities of Class 7 (radioactive) materials. Currently, § 173.421(b) permits excepted packages of limited quantities of radioactive material that are a reportable quantity of hazardous substance or waste to be shipped without having to comply with § 172.203(d) or § 172.204(c)(4). PHMSA proposes to extend this relief from these shipping paper requirements to all excepted packages that are a hazardous substance or waste by removing § 173.421(b) and adding the exclusion from § 172.203(d) and § 172.204(c)(4) to § 173.422.

Section 173.422

Section 173.422 sets forth additional requirements for excepted packages containing Class 7 (radioactive)

materials. In this NPRM, PHMSA is proposing to revise the introductory text to specify that a small quantity of another hazard class (as defined in § 173.4) that would otherwise qualify for shipment as a Class 7 (radioactive) material in an excepted package must also satisfy the requirements of § 173.422.

As noted above, § 173.421(b) currently permits excepted packages of limited quantities of radioactive material that are a hazardous substance or hazardous waste to be shipped without having to comply with § 172.203(d) or § 172.204(c)(4). PHMSA proposes to extend this relief from full shipping paper requirements to all excepted packages that are a hazardous substance or hazardous waste by moving the exclusion from § 172.203(d) and § 172.204(c)(4) provisions to § 173.422(e). PHMSA also proposes to add an exclusion from § 172.202(a)(5) for such packages.

PHMSA is also proposing to add to § 173.422(a) a requirement that all excepted packages whose contents meet the definition of a hazardous substance, be marked with the letters "RQ". This will provide consistency with existing marking requirements for a package containing a hazardous substance.

Section 173.427

In the introductory paragraph (a) of § 173.427, PHMSA proposed to change the phrase "LSA material and SCO must be packaged * * *" to "LSA materials and SCO must be transported * * *". This would free PHMSA from treating paragraphs (c) and (d) (which deal with unpackaged LSA/SCO, or with LSA or SCO which require packaging in accordance with NRC requirements in 10 CFR part 71) as exceptions, and clarify that they are subcategories of LSA material or SCO.

In paragraph 173.427(a)(6)(v), PHMSA is proposing to remove the placarding exception for shipments of unconcentrated uranium or thorium ores. The increased communication requirement, just as is the case for other exclusive use shipment of LSA or SCO, is intended to compensate for the fact that packaging requirements are minimal for these materials. PHMSA proposes to clarify that all of the placarding requirements of subpart F of part 172 must be met. The current version refers to vehicle placarding, however, subpart F of part 172 contains requirements for placarding of bulk packagings, freight containers, unit load devices, transport vehicles, and rail cars.

In paragraph 173.427(a)(6)(vi), PHMSA is proposing to require that

when low specific activity (LSA) materials or surface contaminated objects (SCO) are shipped in accordance with that paragraph and contain a subsidiary hazard from another hazard class, the labeling required by 172.402(d) for the subsidiary hazard would be required. Presently, 173.427(a)(6)(vi) excepts such shipments from all marking and labeling requirements, other than for the stenciling or marking as "RADIOACTIVE—LSA" or "RADIOACTIVE—SCO", as appropriate. Shipping paper requirements in 172.202(a)(3) were revised in January 2009 such that a subsidiary hazard class or division number is not required to be entered when a corresponding subsidiary hazard label is not required. Thus, there is currently no requirement for any communication that the subsidiary hazard is present. This proposed change would indicate the presence of the subsidiary hazard by use of the required label and a corresponding entry on the shipping paper.

PHMSA proposes in paragraph (b)(1) to replace IP-1, *etc.*, by Type IP-1, *etc.*, as proposed in § 173.411, to coincide more closely with the IAEA nomenclature in TS-R-1.

PHMSA proposes to rearrange the wording in paragraph (b)(4), to indicate that for an exclusive use shipment of less than an A₂ quantity, the packaging should meet the requirements of § 173.24a or § 173.24b, depending on whether the packaging would be considered non-bulk or bulk according to the definition in § 171.8. For the most part this distinction is irrelevant for radioactive material packages, but there are some cases, such as LSA liquids transported in portable tanks, where the bulk-packaging requirements are more appropriate.

In paragraph (b)(5), PHMSA proposes to withdraw the explicit authorization for certain DOT Specification tank cars and cargo tanks, and replace it with the general authorization for use of portable tanks, cargo tanks and tank cars as proposed in § 173.411. PHMSA believes that the presently authorized DOT Specification tank cars and cargo tanks are seldom used, and that the § 173.411 requirements, both present and proposed, offer a broader range of options.

In § 173.427(c)(3), PHMSA is proposing to change the phrase "where it is suspected that non-fixed contamination exists * * *" to "where it is reasonable to suspect that non-fixed contamination exists * * *". This proposal is intended to clarify that the shipper must have a justifiable reason if

he decides that it is not necessary to take measures to ensure that contamination from SCO-I is not released into the conveyance or to the environment.

PHMSA is also proposing to add a new paragraph (c)(4) to require that when unpackaged LSA-I material or SCO-I required to be transported exclusive use is contained in receptacles or wrapping materials, the outer surfaces of the receptacles or wrapping materials must be marked "RADIOACTIVE LSA-I" or "RADIOACTIVE SCO-I" as appropriate, and a new paragraph (c)(5) to require that all highway or rail conveyances carrying unpackaged SCO-I be placarded.

The proposed changes in paragraphs (a) (which would remove the present restriction to materials not "excepted by paragraph (c) or (d) of this section") and (a)(6)(v) (which requires placarding of exclusive use shipments), already imply that all other exclusive use shipments of unpackaged LSA-I or SCO-I would have to be placarded, because of § 173.427(c)(2), which requires that all shipments of unpackaged LSA-I and SCO-I with contamination greater than the listed values be shipped under exclusive use. The increased marking and placarding requirements for the transportation of unpackaged LSA-I and SCO-I are intended to further identify the presence of a hazard in view of the lesser packaging requirements for these low-level materials.

In an attempt to harmonize more closely with the IAEA regulations, PHMSA is proposing a modification to Table 5. PHMSA proposes to add a separate column for conveyances traveling by inland waterways, in which some authorized activity limits for LSA material and SCO would be reduced from those for other types of conveyances.

In Table 6, PHMSA is proposing to replace the terms IP-1, IP-2, and IP-3 with Type IP-1, Type IP-2, and Type IP-3 to be consistent with the similar changes proposed in § 173.411.

Section 173.433

Section 173.433 sets forth requirements for determining radionuclide values, and for listing radionuclides on shipping papers and labels. In this NPRM, PHMSA is proposing to revise paragraphs (b), (c), and (d)(3).

PHMSA proposes to revise paragraph (b) to clarify the use of line 3 in Tables 7 and 8 for when no relevant data are available. Currently, paragraph (b) allows use of Table 7 for values of A₁ and A₂ and Table 8 for exemption

values when the individual radionuclides are not listed in section 173.435 or section 173.436. Tables 7 and 8 also indicate values that may be used when “No relevant data are available,” but there is no reference in the text to when those entries may be used.

PHMSA also proposes to revise paragraph (c)(1) to conform to the current wording in TS-R-1. Presently, when shippers calculate an A_1 or A_2 value not in the table in § 173.435 (provided they are first approved by the Associate Administrator or, for international transport, multilateral approval is obtained from the pertinent Competent Authorities), the HMR state “it is permissible to use the A_2 value related to its solubility class * * *” This would be replaced by “it is permissible to use an A_2 value calculated using a dose coefficient for the appropriate lung absorption type * * *” This proposed minor change in wording (1) takes into account that there is no ready-made list of A_2 values related to solubility classes, and (2) recognizes that in the Q-system (see Appendix I of “Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material,” IAEA Safety Standards Series No. TS-G-1.1 (Rev. 1)) the doses for the inhalation pathway are calculated on the basis of dose coefficients for the lungs, which in turn are classified by the International Commission on Radiological Protection according to lung absorption types F (fast), M (medium), and S (slow). Further, PHMSA is proposing to add language to paragraph (c) to clarify that this method of calculation only applies to the alternative specified in paragraph (b)(2), which requires approval by the Associate Administrator, or for international transportation, multilateral approval from the pertinent Competent Authorities.

PHMSA is also proposing to revise paragraph (d)(3) to correct incorrect references to other paragraphs. Currently, the explanation of the symbols in paragraph (d)(3) references paragraph (d)(2) and itself. It should reference paragraphs (d)(1) and (d)(2).

PHMSA is also proposing to modify two of the category descriptions in Tables 7 and 8 of § 173.433 for default basic radionuclide values, conforming as nearly as possible to the current wording in TS-R-1. The second category presently reads “Only alpha emitting nuclides are known to be present”; in Tables 7 and 8 PHMSA proposes to replace it with “Alpha emitting nuclides, but no neutron emitters, are known to be present.” In Table 7 PHMSA proposes to add a

footnote for the case that alpha emitters and beta or gamma emitters but no neutron emitters are known to be present. The reason for this footnote is that the IAEA default A_1 value for the case when alpha emitters are known to be present is larger than the value when only beta or gamma emitters are known to be present; the footnote entry clarifies that if both alpha and beta or gamma emitters are present, the lower default A_1 value should be used. The lesser A_1 default value that would be prescribed in this case would be the more logical and conservative choice. The third category presently reads “No relevant data are available”; PHMSA proposes to replace it with “Neutron emitting nuclides are known to be present or no relevant data are available.” The new wording gives appropriate instructions for the appropriate default values to be used in the case that neutrons are known to be present, and in the case that they are known not to be present. With the present wording, there is no indication as to which values should be used if neutrons are known to be present. The proposed wording clarifies that if there are different default values for different types of radiation, the smaller, most conservative value for the types of radiation known to be present should be used.

Section 173.435

A_1 and A_2 values are used in the international and domestic transportation regulations to specify the amount of radioactive material that is permitted to be transported in a particular packaging, and for other purposes. The A_1 and A_2 values for the most commonly transported radionuclides are listed in the “Table of A_1 and A_2 values for radionuclides” in § 173.435. PHMSA is proposing to revise the table as follows:

- In the entry for Cf-252, in column 1, the reference to footnote (h) would be removed, and in columns 3 and 4, the A_1 value is revised;
- A_1 and A_2 values and the intrinsic specific activity for Krypton-79 (Kr-79) would be included in the table in 173.435; the A-values were calculated using the Q system, and added to TS-R-1 in its 2009 edition, and the specific activity calculated from the relation specific activity in Bq/g = 0.693 times Avogadro’s number divided by the half life in seconds times the atomic mass.
- In the entry for Mo-99, in column 1, the reference to footnote (i) would be removed and a reference to footnote (h) is added in its place;
- In the entry for Ir-192, the footnote (c) reference would be moved to the special form columns only; and

- In the footnotes to the table, footnote (a) would be revised, footnote (c) would be revised to indicate that the comparison of “output” activity to the A-values is restricted to special form sources of Ir-192, footnote (h) would be removed, and footnote (i) would be redesignated as footnote (h).

Section 173.436

Section 173.436 specifies the nuclide-specific exemption concentrations and the nuclide-specific exemption-consignment activity limits for radionuclides. The HMR defines a Class 7 (radioactive) material as being any material where both the activity concentration and total activity in the consignment exceed the values specified in the table in § 173.436 or values derived according to instructions in § 173.433. To reflect corresponding changes in TS-R-1, PHMSA is proposing to revise the total consignment activity exemption for Tellurium-121m (Te-121m), from 1×10^5 Bq to 1×10^6 Bq and to add an entry for Krypton-79 (Kr-79). PHMSA is also proposing to revise the list of parent nuclides and their progeny listed in secular equilibrium in footnote (b) to the table. The chains for parents Cerium-134 (Ce-134), Radon-220 (Rn-220), Thorium-226 (Th-226), and Uranium 240 (U-240) are proposed to be removed. PHMSA also proposes to add an entry for Silver-108m (Ag-108m). This is being done because when the nuclide-specific basic values from the BSS (IAEA Safety Series No. 115, International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources) were adopted for transportation purposes, Table I in TS-R-1 was slightly modified through the addition of a few radionuclides and the elimination of others, while corresponding changes in the list in footnote (b) were inadvertently overlooked.

Section 173.443

Section 173.443 specifies contamination control limits. Revisions to each of the affected paragraphs in this section are described as follows:

PHMSA proposes to reorganize paragraph (a); as a result, paragraphs 173.443(a)(1) and (2) would become 173.443(a)(1)(i) and (ii) respectively. In paragraph (a), PHMSA proposes to apply the existing requirement that the level of non-fixed (removable) radioactive contamination on the external surfaces of each package be kept as low as reasonably achievable to the external and internal surfaces of an overpack, freight container, tank,

intermediate bulk container, or conveyance. The proposed amendment ensures that any associated transportation equipment utilized for transportation does not exhibit excessive levels of non-fixed (removable) radioactive contamination and aligns the domestic contamination control requirements with international standards in TS-R-1.

While PHMSA is also proposing to extend the application of the non-fixed (removable) radioactive contamination limits found in § 173.443(a) to the external and internal surfaces of an overpack, freight container, tank, intermediate bulk container, and conveyance, PHMSA proposes to exclude the internal surfaces of a freight container, tank, intermediate bulk container or conveyance dedicated to the transport of unpackaged radioactive material in accordance with § 173.427(c) and remaining under that specific exclusive use. Again, the reasoning for this proposal is to ensure that any associated items utilized during transportation do not exceed designated upper limits for non-fixed (removable) radioactive contamination, while excepting the internal surfaces of components used to transport unpackaged Class 7 (Radioactive) material under exclusive use, so long as they remain under that specific exclusive use. This exception eliminates the need for unnecessary decontamination at the end of or between trips, so long as exclusive use conditions continue to be instituted, when transporting unpackaged LSA-I and SCO-I and aligns domestic contamination control requirements with international standards in TS-R-1.

PHMSA is proposing a new paragraph 173.443(a)(2) to require that contamination determinations be required for conveyances used for non-exclusive use shipments only in the case that there is reason to suspect that contamination might be present.

In Table 9, which is referenced in the new paragraph 173.443(a)(1)(i), PHMSA proposes to change the contamination limits in the column labeled dpm/cm² from 220 to 240 for contamination due to beta and gamma emitters and low toxicity alpha emitters, and from 22 to 24 for that due to all other alpha emitting nuclides, respectively. Historically the values 220 and 22 resulted from the fact that the contamination limits were originally expressed as 10⁻⁴ and 10⁻⁵ uCi/cm² (microcuries per cm²) respectively, which in dpm/cm² are equivalent to 222 and 22. In SI units, these limits are equivalent to 3.7 and 0.37 Bq/cm² respectively. Because the IAEA decided

to round these numbers to one significant figure, the limits became 4 and 0.4 Bq/cm². Since SI units are the regulatory standard units (see § 171.10), the limits are 4 and 0.4 Bq/cm² and a direct conversion from those values gives 240 and 24 dpm/cm².

In paragraph (b), PHMSA is proposing to extend the non-fixed (removable) radioactive contamination limits established in this paragraph (up to ten times the limits in § 173.443(a) during exclusive use shipments by rail or highway, if the initial contamination is no greater than the § 173.443(a) limits) to the external and internal surfaces of overpacks, freight containers, tanks, intermediate bulk containers, and conveyances, in addition to the external surfaces of each package. This proposal ensures that any radioactive substances on the associated items utilized during transportation do not exceed the designated upper limits for non-fixed (removable) radioactive contamination of the package during transport.

In paragraph (c), PHMSA is proposing to eliminate the ambiguity and confusion concerning the phrase “returned to service,” primarily for conveyances, but also for overpacks, freight containers, tanks, and intermediate bulk containers that may have had radioactive substances deposited on them during certain Class 7 (radioactive) exclusive use transport scenarios. Under this proposal, with limited exceptions provided by §§ 173.443(a) and (d), a conveyance, overpack, freight container, tank, or intermediate bulk container used for exclusive use transport of radioactive materials under §§ 173.427(b)(4), 173.427(c), or 173.443(b) would need to be surveyed with appropriate radiation detection instruments and would have to exhibit a radiation dose rate at any accessible surface of no greater than 0.005 mSv per hour (0.5 mrem per hour), and removable radioactive surface contamination no greater than the limits in § 173.443(a), in order to continue to be used for one of the following specified Class 7 (radioactive) materials exclusive use transport scenarios:

(1) The use of the packaging exception for less than an A₂ quantity authorized in § 173.427(b)(4);

(2) The use of the authorization in § 173.427(c) to ship unpackaged LSA-I and SCO-I; and

(3) The use of the authorization in § 173.443(b) to ship packages that may develop increased contamination during transport up to ten times the normal package limits, so long as they meet the package limits at the beginning of transport.

The procedure described in § 173.443(c) would not be applicable, and would in fact generally be prohibited, for unrestricted return to general service of the item or conveyance. The rationale for this proposed change in wording of § 173.443(c), and of § 174.715(a), § 175.705(c), § 176.715, and § 177.843(a), is justified as follows: (1) If this “returned to service” criterion were to be considered a criterion for unrestricted release following exclusive use transport of Class 7 (radioactive) materials, it would be providing a radioactive material unrestricted transfer (free release) limit, which the U.S. DOT does not have the authority to do. (2) Given that non-hazardous material, or even foodstuffs, could be transported in contact with these items or conveyances, an unacceptable health physics practice would result if these limits were construed to be a criterion for free release, *i.e.*, for unrestricted radioactive material transfer. (3) Adhering to the removable contamination requirement (no greater than the § 173.443(a) values) and the radiation level requirement (no greater than 0.005 mSv per hour, or 0.5 mrem per hour, at the surface of the vehicle) of § 173.443(c) would not provide sufficient protection for unrestricted transfer, considering that over time factors such as weathering could gradually convert any fixed contamination to non-fixed contamination. (4) Such a practice of providing a free release or unrestricted transfer of radioactive material at these levels would be incompatible with currently generally accepted radiation protection practices.

In paragraph (d), PHMSA is proposing to require placarding of closed transport vehicles used solely for the exclusive transportation by highway or rail of Class 7 (radioactive) material packages with contamination levels that do not exceed 10 times the package contamination limits prescribed in paragraph (a) of § 173.443. PHMSA proposes to add the qualifier “exclusive use” to ensure that the exclusive use requirements described under the definition of “exclusive use” in § 173.403 are satisfied for these shipments.

Also in paragraph (d), PHMSA proposes to delete the word “packages” to allow this paragraph to apply to unpackaged radioactive material. This is also needed for consistency with similar requirements found in paragraphs 174.715(b) and 177.843(b).

In summary, this proposed rulemaking would establish a policy that, for exclusive use Class 7

(radioactive) transport required because of specific contamination issues, the return to service criteria for conveyances and associated items would be those described in § 173.443(c), *i.e.*, the radiation level at the surface of the conveyance and associated items must be no greater than 0.5 mrem per hour, and that the removable non-fixed contamination be no greater than the package limits in § 173.443(a). This “return to service” means only that the conveyance and associated equipment may then be used for another exclusive use shipment of radioactive materials using one of the three scenarios described above (but not for other exclusive use or non-exclusive use shipments, or for transporting non-hazardous materials). An exception would continue to be allowed for the inside surfaces of containers and conveyances dedicated to the transport of unpackaged LSA-I or SCO-I, or a closed transport vehicle, under continued exclusive use, in accordance with § 173.443(d).

If exclusive use transport has been completed, the consignee, who may then become a consignor offering the conveyance or items for transport, would need to determine if the consignment meets the HMR definition of radioactive material. If it does, the onward shipment would need to be transported in accordance with the HMR. If the consignment meets the Class 7 exempt criteria, or the shipper further decontaminates it until it does, then the consignment would not be regulated in transport as Class 7 (radioactive) material. However, ultimately, the HMR do not regulate the transfer of radioactive substances. Whether the consignor transfers the radioactive substances to a licensed or non-licensed entity (transported either under the HMR or not, based on the HMR definition of radioactive material) is dependent on the definitions and requirements for the transfer of the radioactive substance in their license agreement or other applicable regulations, without regard to the HMR radioactive material definition.

In paragraph (e), PHMSA is proposing to add required actions for leaking or suspect Class 7 (radioactive) packages or unpackaged material, which includes immediate actions and assessments, protective requirements, recovery techniques, and prerequisites for continued transport.

Section 173.453

In 173.453(d) PHMSA is proposing to insert a phrase that would allow a fissile material exception for uranium enriched in uranium-235 to a maximum of 1

percent by weight under the conditions stated there only if the material in question is essentially homogeneous. The NRC explains that prior to the DOT and NRC 2004 rulemakings, paragraph 10 CFR 71.53(b) stated that uranium enriched up to 1% was exempt (fissile excepted) “provided that the fissile material is distributed homogeneously throughout the package contents and does not form a lattice arrangement within the package.” The homogeneity and lattice arrangement language was eliminated and replaced with a restriction on special moderators when this exemption was revised in 2004 to its current form in 10 CFR 71.15(d) (based on recommendation from Oak Ridge National Laboratory in NUREG/CR-5342 “Assessment and Recommendations for Fissile-Material Packaging Exemptions and General Licenses Within 10 CFR part 71”). In the absence of special moderators, such low enriched uranium systems can only become critical if configured into a very large, heterogeneous, water-moderated lattice. Subsequent to removing the requirement, the NRC was contacted by the U.S. Department of Energy (DOE) who indicated that it had a forthcoming shipment of slightly enriched uranium—just under 1% by weight—in the form of a large, heterogeneous lattice, which could not be shown to be subcritical in the presence of fresh water. This particular shipment was modified to reduce the amount of material per conveyance to a safely-subcritical mass, but resulted in the [NRC] staff revisiting this particular fissile material exemption. Further shipments of low-enriched uranium in a sufficiently-large heterogeneous lattice that would not be demonstrably subcritical are considered to be very unlikely and it is believed that the DOE is likely to be the only shipper that may have such a shipment.

Section 173.465

Section 173.465 sets forth the requirements for Type A packaging tests. In paragraph (a), PHMSA propose to add a statement indicating when a test for a Type A package is deemed to be successful; this statement is currently found in § 173.412(j), but including it with the description of the test methods aids the reader and gives this section a more logical coherence. In § 173.465(d)(i), PHMSA is proposing to adopt the revised TS-R-1 language to clarify that the stacking test should use five times the maximum weight of the loaded package.

Section 173.466

Section 173.466 specifies additional tests for Type A packagings designed for liquids and gases. In paragraph (a), PHMSA proposes to add a statement indicating when a test for a Type A package designed for liquids or gases is deemed to be successful; this statement is currently found in § 173.412(k), but including it with the description of the test methods aids the reader and gives this section a more logical coherence.

Section 173.469

Section 173.469 specifies tests for special form Class 7 (radioactive) materials. In paragraph (b)(2)(ii), PHMSA is proposing to replace the word “edges” with the word “edge” since this refers to the edge of a flat circular surface.

In paragraph (b)(2)(iii), PHMSA is proposing to revise the thickness requirement for the lead sheet used for the percussion test to be not more than 25 mm (1 inch) in thickness, which is consistent with the requirement in TS-R-1.

Presently paragraph (d)(1) allows the use of Class 4 impact test prescribed in ISO 2919, “Sealed Radioactive Sources—Classification” as an alternative to the impact test and percussion test of § 173.469 if the mass of the special form material is less than 200 g. PHMSA is proposing to add another alternative that was added to TS-R-1. This would allow the use of the ISO 2919 Class 5 impact test as an alternative to the impact and percussion test if the mass of the special form material is less than 500 g.

As mentioned in the discussion of the listing in § 171.7 of a newer revision of ISO 2919, because some details of the heat test have changed, PHMSA proposes to add a grandfather provision in a new paragraph (e) in § 173.469 indicating that sources subjected to the ISO 2919 heat test before the effective date of the final rule to demonstrate that they are a special form that would not have to be retested.

Section 173.473

Section 173.473 specifies requirements for foreign-made packages. PHMSA is proposing to revise § 173.473 to update the reference to the most recent edition of the IAEA standards for transportation of radioactive materials, TS-R-1.

Section 173.476

Section 173.476 specifies approval requirements for the transportation of Class 7 (radioactive) materials. PHMSA is proposing to revise paragraph (a) to extend the retention period for special

form documentation from one year to two years after the offerror's latest shipment, to coincide with the minimum retention period for shipping papers. In addition, PHMSA proposes to revise paragraph (d) to replace the reference to an obsolete proper shipping name with a reference to the current proper shipping name, "Radioactive material, Type A package, special form, fissile."

Section 173.477

Section 173.477 established approval requirements of packagings containing greater than 0.1 kg of non-fissile or fissile-excepted uranium hexafluoride. In paragraph (a), PHMSA proposes to extend the retention period for uranium hexafluoride packaging documentation from one year to two years after the offerror's latest shipment, to coincide with the minimum retention period for shipping papers.

Section 174.715

In § 173.443(c), PHMSA proposes to eliminate the ambiguity and confusion concerning the phrase "returned to service," for conveyances, overpacks, freight containers, tanks, and intermediate bulk containers that may have had radioactive substances deposited on them during certain Class 7 (radioactive) exclusive use transport scenarios. The changes proposed for § 174.715(a) are intended to make this section consistent with the changes proposed in § 173.443(c).

Section 174.700

PHMSA is proposing to remove and reserve the present paragraph (e), which provides special handling requirements for fissile material, controlled shipments. In the January 26, 2004 rulemaking (HM-230) PHMSA eliminated the concept of "fissile material, controlled shipment," and removed other references to it from the HMR. Section 173.457 provides requirements for transportation of fissile material packages based on the criticality safety index (CSI) which makes this paragraph no longer necessary.

Section 175.702

Section 175.700(b)(2)(ii)(B) limits the CSI loaded on an aircraft to 100 for exclusive use, and § 175.700(b)(2)(ii)(A) limits the CSI to 50 for non-exclusive use. This is consistent with the requirements and limitations in § 173.457(e). However, § 175.702(b) does not place any such limit, rather it states that if a CSI total is reached in a group of packages then the groups must be separated by 20 feet. This seems to

indicate that one could have more materials with a total CSI greater than 50 on an aircraft for passenger and cargo, and greater than 100 for exclusive use cargo only. To make these two sections consistent PHMSA proposes to replace § 175.702(b) and (c) with a new § 175.702(b) containing an introductory phrase to indicate that the limitations on combined (total) criticality safety indexes found in § 175.700(b) also apply.

Section 175.705

Section 175.705(c) presently requires that an aircraft in which Class 7 (radioactive) material has been released be taken out of service and not be returned to service or routinely occupied until the aircraft is checked for radioactive contamination and it is determined in accordance with § 173.443 of this subchapter that the dose rate at every accessible surface is less than 0.005 mSv per hour and there is no significant removable contamination. PHMSA is proposing to clarify that the totality of any radioactive substances remaining after clean-up must not meet the definition of radioactive material (as defined in § 173.403) before returning the aircraft to service.

Section 176.715

In § 173.443(c), we are proposing to eliminate the ambiguity and confusion concerning the phrase "returned to service," for conveyances, overpacks, freight containers, tanks, and intermediate bulk containers that may have had radioactive substances deposited on them during certain Class 7 (radioactive) exclusive use transport scenarios. The changes proposed for § 176.715 are intended to make this section consistent with the changes proposed in § 173.443(c).

Section 177.843

In § 177.843(a), PHMSA is proposing to add references to § 173.427(c) and § 173.443(b). This is part of a larger proposed change that is intended to make this section consistent with the changes proposed in § 173.443(c). In § 173.443(c), PHMSA proposes to eliminate the ambiguity and confusion concerning the phrase "returned to service," for conveyances, overpacks, freight containers, tanks, and intermediate bulk containers that may have had radioactive substances deposited on them during certain Class 7 (radioactive) exclusive use transport scenarios.

Section 178.350

Section 178.350 sets forth the general requirements for Specification 7A (Type A) packaging. PHMSA proposes to revise paragraph (c) to clarify that a DOT Specification 7A Type A package, must satisfy the requirements of 178.2 as well as the marking requirements of 178.3. This is proposed, in part, to emphasize that a manufacturer of DOT Specification 7A Type A packaging, must provide the user with appropriate information, including closure requirements, to ensure that the packaging is capable of successfully passing the applicable performance tests.

Sections 178.358, 178.358-1 Through 178.358-6

PHMSA is proposing to remove Sections 178.358 and 178.358-1 through § 178.358-6 because 21PF overpacks for uranium hexafluoride cylinders are no longer authorized.

Sections 178.360, 178.360-1 Through 178.360-4

PHMSA is proposing to remove Sections 178.360, and 178.360-1 through 178.360-4 pertaining to the DOT Specification 2R inside containment vessel since specification 2R was only required, under certain conditions, to be used as the inner container for the DOT Specification 20WC, 21WC, 6L, and 6M packages, and authorization for use of these latter packages was terminated on Oct. 1, 2008.

IV. Regulatory Analyses and Notices

A. Statutory/Legal Authority for This Rulemaking

49 U.S.C. 5103(b) authorizes the Secretary of Transportation to prescribe regulations for the safe transportation, including security, of hazardous materials in intrastate, interstate, and foreign commerce. 49 U.S.C. 5120(b) authorizes the Secretary of Transportation to ensure that, to the extent practicable, regulations governing the transportation of hazardous materials in commerce are consistent with standards adopted by international authorities. In this notice, PHMSA is proposing to amend the HMR to more fully align with the most recent IAEA revisions to TS-R-1, including requirements governing packaging, contamination control, hazard communication, and revisions to various radionuclide specific values.

B. Executive Order 12866, Executive Order 13563, and DOT Regulatory Policies and Procedures

Executive Orders 12866 and 13563 require agencies to regulate in the “most cost-effective manner,” to make a “reasoned determination that the benefits of the intended regulation justify its costs,” and to develop regulations that “impose the least burden on society.” This notice of proposed rulemaking is not considered a significant regulatory action under section 3(f) of Executive Order 12866 and, therefore, was not reviewed by the Office of Management and Budget. The notice is not considered a significant rule under the Regulatory Policies and Procedures of the Department of Transportation (44 FR 11034). If adopted, the changes proposed in this notice would apply to offerors and carriers of radioactive materials, (including distributors and radiopharmaceutical companies), packaging manufacturers, radioactive material consultants, and trainers. Potential benefits identified in this NPRM include enhanced safety resulting from the consistency of domestic and international requirements for transportation of radioactive materials. In addition, the proposed changes should permit continued access to foreign markets by domestic shippers of radiopharmaceuticals and other radioactive materials.

The majority of proposals should result in cost savings and ease the regulatory compliance burden for shippers engaged in domestic and international commerce, including trans-border shipments within North America. The total net increase in costs to businesses in implementing the proposed amendments is considered to be minimal. Incremental costs of various proposals are expected to be offset by safety and regulatory efficiency benefits.

A preliminary regulatory evaluation is available for review in the public docket for this rulemaking. For a number of proposals, numerical data needed to derive accurate cost and benefit estimates was either incomplete, difficult to obtain, or non-existent. Therefore, PHMSA used professional judgment to estimate the incremental costs and benefits of certain proposals, and in some cases, PHMSA used a numerical range to account for uncertainty. PHMSA encourages interested parties to provide information and quantitative data relevant to the proposals in this notice and the associated costs and benefits described

in the preliminary regulatory evaluation for this rulemaking.

C. Executive Order 13132

Executive Order 13132 requires agencies to assure meaningful and timely input by state and local officials in the development of regulatory policies that may have a substantial, direct effect on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. A rule has implications for Federalism under Executive Order 13132, Federalism, if it has a substantial direct effect on state or local governments and would either preempt state law or impose a substantial direct cost of compliance on them. PHMSA does not believe the changes proposed in this NPRM would have any substantial direct effect on state or local governments, but we invite states and local governments to comment on the effect that the adoption of this rule may have on state or local safety or environmental protection programs.

D. Executive Order 13175

This proposed rule has been analyzed in accordance with the principles and criteria contained in Executive Order 13175 (“Consultation and Coordination with Indian Tribal Governments”). Because this proposed rule does not significantly or uniquely affect the communities of the Indian Tribal governments and does not impose substantial direct compliance costs, the funding and consultation requirements of Executive Order 13175 do not apply.

E. Regulatory Flexibility Act, Executive Order 13272, and DOT Procedures and Policies

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires an agency to review regulations to assess their impact on small entities, unless the agency determines that a rule is not expected to have a significant impact on a substantial number of small entities. PHMSA believes the changes proposed in this NPRM would facilitate the transportation of radioactive materials in international commerce by providing consistency with international transportation standards. The majority of amendments proposed in this notice should result in cost savings and ease the regulatory compliance burden for shippers engaged in domestic and international commerce, including trans-border shipments within North America.

Many companies should realize economic benefits as a result of these amendments. Additionally, the effects of the proposals in this notice will relieve U.S. companies, including small entities competing in foreign markets, from the burden of complying with a dual system of regulations. Therefore, PHMSA certifies that the amendments proposed in this notice would not have a significant economic impact on a substantial number of small entities. PHMSA invites interested parties to comment on this preliminary determination.

This notice has been developed in accordance with Executive Order 13272 (“Proper Consideration of Small Entities in Agency Rulemaking”) and DOT’s procedures and policies to promote compliance with the Regulatory Flexibility Act to ensure that potential impacts of draft rules on small entities are properly considered.

F. Paperwork Reduction Act

PHMSA currently has approved information collections under Office of Management and Budget (OMB) Control Number 2137-0034, “Hazardous Materials Shipping Papers and Emergency Response Information,” and OMB Control Number 2137-0510, “Radioactive Materials Transportation Requirements.” Specifically, this NPRM may result in:

- A decrease in the annual information collection burden of OMB Control Number 2137-0034 due to reductions in the shipping paper requirements for exempted quantities of RAM shipments. These reductions in burden include not requiring the mass of these shipments on the shipping papers for air shipments in 172.202(a)(6), the additional description in 172.203(d) for RAM shipments, and not requiring the shippers certification statement for RAM shipments in 172.204(c)(4); and
- An increase in the annual information collection burden of OMB Control Number 2137-0510 due to an increase in the duration of a record keeping requirement in 173.411(c) and 173.415(a), a demonstration of compliance with test authorized in 173.415(a)(1) and (a)(2).

Section 1320.8(d), Title 5, Code of Federal Regulations requires that PHMSA provide interested members of the public and affected agencies an opportunity to comment on information and recordkeeping requests. This notice identifies revised information collection requests that PHMSA will submit to OMB for approval based on the requirements proposed in this NPRM.

PHMSA has developed burden estimates to reflect changes in this NPRM, and estimates the information collection and recordkeeping burden as proposed in this NPRM to be as follows:

OMB Control Number 2137–0034

Annual Decrease in Number of Respondents: 10,000.

Annual Decrease in Annual Number of Responses: 100,000.

Annual Decrease in Annual Burden Hours: 138.

Annual Decrease in Annual Burden Costs: \$5,520.

OMB Control Number 2137–0510

Annual Increase in Number of Respondents: 3.

Annual Increase in Annual Number of Responses: 3.

Annual Increase in Annual Burden Hours: 53.

Annual Increase in Annual Burden Costs: \$22,000.

PHMSA specifically requests comments on these information collections and the recordkeeping burden associated with developing, implementing, and maintaining these requirements for approval under this proposed rule.

Address written comments to the Dockets Unit as identified in the **ADDRESSES** section of this rulemaking. We must receive your comments prior to the close of the comment period identified in the **DATES** section of this rulemaking. Under the Paperwork Reduction Act of 1995, no person is required to respond to an information collection unless it displays a valid OMB control number. If these proposed requirements are adopted in a final rule with any revisions, PHMSA will resubmit any revised information collection and recordkeeping requirements to the OMB for reapproval.

Please direct your requests for a copy of this proposed revised information collection to Steven Andrews or T. Glenn Foster, Office of Hazardous Materials Standards (PHH–12), Pipeline and Hazardous Materials Safety Administration, 1200 New Jersey Avenue, SE., 2nd Floor, Washington, DC 20590–0001.

G. Regulation Identifier Number (RIN)

A regulation identifier number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN contained in the heading of this document can be used to cross-reference this action with the Unified Agenda.

H. Unfunded Mandates Reform Act

This proposed rule does not impose unfunded mandates, under the Unfunded Mandates Reform Act of 1995. It does not result in costs of \$141.3 million or more to either state, local, or Tribal governments, in the aggregate, or to the private sector, and is the least burdensome alternative that achieves the objective of the rule.

I. Environmental Assessment

The National Environmental Policy Act, 42 U.S.C. 4321–4375, requires that Federal agencies analyze proposed actions to determine whether the action will have a significant impact on the human environment. In accordance with the Council on Environmental Quality (CEQ) regulations, Federal agencies must conduct an environmental review considering (1) The need for the proposed action; (2) alternatives to the proposed action; (3) probable environmental impacts of the proposed action and alternatives; and (4) the agencies and persons consulted during the consideration process. 40 CFR 1508.9(b).

1. Purpose and Need

PHMSA is proposing to amend requirements in the Hazardous Materials Regulations (HMR) pertaining to the transportation of Class 7 (radioactive) materials based on recent changes contained in the International Atomic Energy Agency (IAEA) publication, entitled “Regulations for the Safe Transport of Radioactive Material, 2009 Edition, IAEA Safety Standards Series No. TS–R–1,” and additional miscellaneous amendments based on PHMSA’s own initiative. The amendments are intended to update, clarify, or provide relief from certain existing regulatory requirements to promote safer transportation practices; eliminate unnecessary regulatory requirements; facilitate international commerce; and make these requirements easier to understand.

2. Alternatives

In developing this proposed rule, PHMSA considered three alternatives:

1. Do nothing.
2. Adopt the international standards in their entirety.
3. Adopt IAEA regulations and DOT/NRC based changes that enhance safety and decrease regulatory compliance obstacles.

Alternative 3 is PHMSA’s recommended alternative, because it is the only alternative that addresses, in all respects, the purpose of this regulatory action to facilitate the safe and efficient transportation of hazardous materials in

international commerce. PHMSA rejected Alternative 1 because it would not facilitate uniformity, compliance, commerce and safety in the transportation of hazardous materials. PHMSA rejected Alternative 2 because PHMSA believes that, in some instances, more stringent regulations are necessary to enhance transportation safety, and in other instances less stringent regulations are appropriate to reduce economic burden. In addition, PHMSA and the NRC have identified domestic-only changes that would increase safety, reduce costs, and improve compliance.

3. Analysis of Environmental Impacts

Hazardous materials are transported by aircraft, vessel, rail, and highway. The potential for environmental damage or contamination exists when packages of Class 7 (radioactive) material are involved in accidents or en route incidents resulting from cargo shifts, valve failures, package failures, or loading, unloading, or handling problems. The ecosystems that could be affected by a release include air, water, soil, and ecological resources (for example, wildlife habitats). The adverse environmental impacts associated with releases of most hazardous materials are short-term impacts that can be greatly reduced or eliminated through prompt clean up of the accident scene. Most Class 7 (radioactive) materials are not transported in quantities sufficient to cause significant, long-term environmental damage if they are released, and those that have the potential to significantly impact human life or the environment must meet strict packaging and handling standards to ensure that even under accident conditions the hazardous material would not be released into the environment.

The hazardous material regulatory system is a risk management system that is prevention-oriented and focused on identifying a hazard and reducing the probability and quantity of a hazardous material release. Making the regulatory provisions in the HMR clearer and more consistent with international standards will promote compliance and facilitate efficient transportation, thereby enhancing the safe transportation of hazardous materials and the protection of the environment. Relaxing certain regulatory requirements is based on PHMSA’s experience, review, and conclusion that the changes are safe. PHMSA certifies that the amendments proposed in this notice will not have a significant impact on the environment. PHMSA invites comments from

interested parties on the accuracy of this preliminary determination.

4. Agency Consultation and Public Participation

PHMSA, in consultation with the NRC, certifies that the amendments proposed in this notice will not have a significant impact on the environment. PHMSA invites comments from interested parties on the accuracy of this preliminary determination.

J. Privacy Act

Anyone is able to search the electronic form of any written communications and comments received into any of our dockets by the name of the individual submitting the document (or signing the document, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000 (65 FR 19477) or you may visit <http://www.dot.gov/privacy.html>.

K. International Trade Analysis

The Trade Agreements Act of 1979 (Pub. L. 96-39), as amended by the Uruguay Round Agreements Act (Pub. L. 103-465), prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. For purposes of these requirements, Federal agencies may participate in the establishment of international standards, so long as the standards have a legitimate domestic objective, such as providing for safety, and do not operate to exclude imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. PHMSA

participates in the establishment of international standards to protect the safety of the American public, and PHMSA has assessed the effects of the proposed rule to ensure that it does not exclude imports that meet this objective. Accordingly, this rulemaking is consistent with PHMSA's obligations under the Trade Agreement Act, as amended.

List of Subjects

49 CFR Part 171

Exports, Hazardous materials transportation, Hazardous waste, Imports, Incorporation by reference, Reporting and recordkeeping requirements.

49 CFR Part 172

Education, Hazardous materials transportation, Hazardous waste, Incorporation by reference, Labeling, Markings, Packaging and containers, Reporting and recordkeeping requirements.

49 CFR Part 173

Hazardous materials transportation, Incorporation by reference, Packaging and containers, Radioactive materials, Reporting and recordkeeping requirements, Uranium.

49 CFR Part 174

Hazardous materials transportation, Radioactive materials, Railroad safety.

49 CFR Part 175

Air carriers, Hazardous materials transportation, Incorporation by reference, Radioactive materials, Reporting and recordkeeping requirements.

49 CFR Part 176

Hazardous materials transportation, Incorporation by reference, Maritime

carriers, Radioactive materials, Reporting and recordkeeping requirements.

49 CFR Part 177

Hazardous materials transportation, Motor carriers, Radioactive materials, Reporting and recordkeeping requirements.

49 CFR Part 178

Hazardous materials transportation, Incorporation by reference, Motor vehicle safety, Packaging and containers, Reporting and recordkeeping requirements.

In consideration of the foregoing, 49 CFR chapter I is proposed to be amended as follows:

PART 171—GENERAL INFORMATION, REGULATIONS, AND DEFINITIONS

1. The authority citation for part 171 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.45 and 1.53; Pub. L. 101–410 section 4 (28 U.S.C. 2461 note); Pub. L. 104–134 section 31001.

2. In § 171.7, the table in paragraph (a)(3) is amended as follows:

a. Under the entry “International Atomic Energy Agency (IAEA),” the entry “IAEA Regulations for the Safe Transport of Radioactive Material, (IAEA Regulations), 1996 Edition (Revised), No. TS–R–1 (ST–1, Revised)” is revised; and

b. Under the entry “International Organization for Standardization,” the entry “ISO 2919–1980(E) Sealed radioactive sources—classification” is revised.

§ 171.7 Reference material.

- (a) * * *
- (3) * * *

Source and name of material	49 CFR reference
* * * * *	* *
International Atomic Energy Agency (IAEA), P.O. Box 100, Wagramer Strasse 5, A-1400 Vienna, Austria:	
* * * * *	* *
IAEA Safety Standards, Regulations for the Safe Transport of Radioactive Material, 2009 Edition, Safety Requirements, No. TS–R–1.	171.22; 171.23; 171.26; 173.415; 173.416; 173.417; 173.473.
* * * * *	* *
International Organization for Standardization, Case Postale 56, CH-1211, Geneve 20, Switzerland:	
* * * * *	* *
ISO 2919–1999(E) Radiation Protection—Sealed radioactive sources—General requirements and classification.	173.469.
* * * * *	* *

PART 172—HAZARDOUS MATERIALS TABLE, SPECIAL PROVISIONS, HAZARDOUS MATERIALS COMMUNICATIONS, EMERGENCY RESPONSE INFORMATION, TRAINING REQUIREMENTS, AND SECURITY PLANS

3. The authority citation for Part 172 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.53.

4. In § 172.203, paragraphs (d)(2), (d)(3), and (d)(4) are revised to read as follows:

§ 172.203 Additional description requirements.

* * * * *

(d) * * *

(2) For special form materials, the words “special form” must be included, unless the words “special form” already appear in the proper shipping name. If the material is not in special form, a description of the physical and chemical form of the material (generic chemical descriptions are permitted).

(3) The total maximum activity of the radioactive contents contained in each package during transport in terms of the appropriate SI units (*e.g.*, Becquerels (Bq), Terabecquerels (TBq), *etc.*). The activity may also be stated in appropriate customary units (Curies (Ci), milliCuries (mCi), microCuries (uCi), *etc.*) in parentheses following the SI units. Abbreviations are authorized. Except for plutonium-239 and plutonium-241, the weight in grams or kilograms of fissile radionuclides (or the mass of each fissile nuclide for mixtures

when appropriate) may be inserted instead of activity units. For plutonium-239 and plutonium-241, the weight in grams of fissile radionuclides (or the mass of each fissile nuclide for mixtures when appropriate) may be inserted in addition to the activity units.

(4) The category of label applied to each package in the shipment. For example: “RADIOACTIVE WHITE–I,” or “WHITE–I.”

* * * * *

5. In § 172.310, paragraph (b) is revised to read as follows:

§ 172.310 Class 7 (radioactive) materials.

* * * * *

(b) Each industrial, Type B(U), or Type B(M) package must be legibly and durably marked on the outside of the packaging, in letters at least 13 mm (0.5 in) high, with the words “TYPE IP–1,” “TYPE IP–2,” “TYPE IP–3,” “TYPE B(U)” or “TYPE B(M),” as appropriate. Each Type A package must be marked in accordance with § 178.350. A package which does not conform to Type IP–1, Type IP–2, Type IP–3, Type A, Type B(U) or Type B(M) requirements may not be so marked.

* * * * *

6. In § 172.402, paragraph (d)(1) is revised to read as follows:

§ 172.402 Additional labeling requirements.

* * * * *

(d) * * *

(1) A subsidiary label is not required for a package containing material that satisfies all of the criteria in § 173.4,

§ 173.4a, or § 173.4b applicable to the subsidiary hazard class.

* * * * *

7. In § 172.403, paragraphs (d) and (g)(2) are revised to read as follows:

§ 172.403 Class 7 (radioactive) material.

* * * * *

(d) *EMPTY label.* See § 173.428(e) and of this subchapter for EMPTY labeling requirements.

* * * * *

(g) * * *

(2) *Activity.* The total maximum activity of the radioactive contents in the package during transport must be expressed in appropriate SI units (*e.g.*, Becquerels (Bq), Terabecquerels (TBq), *etc.*). The activity may also be stated in appropriate customary units (Curies (Ci), milliCuries (mCi), microCuries (uCi), *etc.*) in parentheses following the SI units. Abbreviations are authorized. Except for plutonium-239 and plutonium-241, the weight in grams or kilograms of fissile radionuclides (or the mass of each fissile nuclide for mixtures when appropriate) may be inserted instead of activity units. For plutonium-239 and plutonium-241, the weight in grams of fissile radionuclides (or the mass of each fissile nuclide for mixtures when appropriate) may be inserted in addition to the activity units.

* * * * *

8. In § 172.504, in paragraph (e), Table 1 is revised to read as follows:

§ 172.504 General placarding requirements.

* * * * *

(e) * * *

TABLE 1

Category of material (hazard class or division number and additional description, as appropriate)	Placard name	Placard design section reference (§)
1.1	EXPLOSIVES 1.1	172.522
1.2	EXPLOSIVES 1.2	172.522
1.3	EXPLOSIVES 1.3	172.522
2.3	POISON GAS	172.540
4.3	DANGEROUS WHEN WET	172.548
5.2 (Organic peroxide, Type B, liquid or solid, temperature controlled)	ORGANIC PEROXIDE	172.552
6.1 (Material poisonous by inhalation (see § 171.8 of this subchapter))	POISON INHALATION HAZARD	172.555
7 (Radioactive Yellow III or Fissile labels only)	RADIOACTIVE ¹	172.556

¹ RADIOACTIVE placard also required for all shipments of unpackaged LSA–I material or SCO–I, all conveyances required by §§ 173.427 and 173.441 of this subchapter to be operated under exclusive use, and all closed vehicles used in accordance with § 173.443(d).

* * * * *

9. In § 172.505, paragraph (b) is revised to read as follows:

§ 172.505 Placarding for subsidiary hazards.

* * * * *

(b) In addition to the RADIOACTIVE placard which may be required by § 172.504(e) of this subpart, each transport vehicle, portable tank or freight container that contains 454 kg (1001 pounds) or more gross weight of non-fissile, fissile-excepted, or fissile uranium hexafluoride must be

placarded with a CORROSIVE placard on each side and each end.

* * * * *

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

10. The authority citation for part 173 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.45, 1.53.

11. In § 173.4, paragraphs (a)(1)(iv) and (b) are revised to read as follows:

§ 173.4 Small quantity exceptions.

(a) * * *

(1) * * *

(iv) An activity level not exceeding that specified in § 173.421, § 173.424, or § 173.426, as appropriate, for a package containing a Class 7 (radioactive) material.

* * * * *

(b) A package containing a Class 7 (radioactive) material must also conform to the requirements of § 173.421, § 173.424, or § 173.426.

* * * * *

12. In § 173.25, paragraph (a)(4) is revised to read as follows:

§ 173.25 Authorized packagings and overpacks.

(a) * * *

(4) The overpack is marked with the word “OVERPACK” when specification packagings are required, or for Class 7 (radioactive) material when a Type A, Type B(U), Type B(M) or industrial (Type IP–1, –2, or –3) package is required. The “OVERPACK” marking is not required when the required markings representative of each package type contained in the overpack are visible from the outside of the overpack.

* * * * *

13. In § 173.401, paragraph (b)(4) is revised and a new paragraph (b)(5) is added to read as follows:

§ 173.401 Scope.

* * * * *

(b) * * *

(4) Natural material and ores containing naturally occurring radionuclides which are either in their natural state, or which have only been processed for purposes other than for extraction of the radionuclides, and which are not intended to be processed for the use of these radionuclides, provided the activity concentration of the material does not exceed 10 times the exempt material activity concentration values specified in § 173.436, or determined in accordance with the requirements of § 173.433.

(5) Non-radioactive solid objects with radioactive substances present on any surfaces in quantities not exceeding the threshold limits set forth in the

definition of contamination in § 173.403.

14. In 173.403, the definitions for “Contamination,” “Criticality Safety Index (CSI),” “Fissile material,” “Low Specific Activity (LSA) material,” paragraph (2) of the definition “Package,” “Radiation level,” and “Uranium” are revised to read as follows:

§ 173.403 Definitions.

* * * * *

Contamination means the presence of a radioactive substance on a surface in quantities in excess of 0.4 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters or 0.04 Bq/cm² for all other alpha emitters. There are two other categories of contamination:

(1) *Fixed contamination* means contamination that cannot be removed from a surface during normal conditions of transport.

(2) *Non-fixed* contamination means contamination that can be removed from a surface during normal conditions of transport.

* * * * *

Criticality Safety Index (CSI) means a number (rounded up to the next tenth) which is used to provide control over the accumulation of packages, overpacks or freight containers containing fissile material. The CSI for packages containing fissile material is determined in accordance with the instructions provided in 10 CFR 71.22, 71.23, and 71.59. The CSI for an overpack, freight container, consignment or conveyance containing fissile material packages is the arithmetic sum of the criticality safety indices of all the fissile material packages contained within the overpack, freight container, consignment or conveyance.

* * * * *

Fissile material means plutonium-239, plutonium-241, uranium-233, uranium-235, or any combination of these radionuclides. Fissile material means the fissile nuclides themselves, not material containing fissile nuclides. Unirradiated natural uranium and depleted uranium and natural uranium or depleted uranium, that has been irradiated in thermal reactors only, are not included in this definition. Certain exceptions for fissile materials are provided in § 173.453.

* * * * *

Low Specific Activity (LSA) material means Class 7 (radioactive) material with limited specific activity which is not fissile material or is excepted under § 173.453, and which satisfies the descriptions and limits set forth below.

Shielding material surrounding the LSA material may not be considered in determining the estimated average specific activity of the LSA material. LSA material must be in one of three groups:

(1) LSA–I:

(i) Uranium and thorium ores, concentrates of uranium and thorium ores, and other ores containing naturally occurring radionuclides which are intended to be processed for the use of these radionuclides; or

(ii) Natural uranium, depleted uranium, natural thorium or their compounds or mixtures, provided they are unirradiated and in solid or liquid form; or

(iii) Radioactive material for which the A₂ value is unlimited; or

(iv) Other radioactive material in which the activity is distributed throughout and the estimated average specific activity does not exceed 30 times the values for activity concentration specified in § 173.436 or calculated in accordance with § 173.433, or 30 times the default values listed in Table 8 of § 173.433.

(2) LSA–II:

(i) Water with tritium concentration up to 0.8 TBq/L (20.0 Ci/L); or

(ii) Other radioactive material in which the activity is distributed throughout and the average specific activity does not exceed 10^{–4} A₂/g for solids and gases, and 10^{–5} A₂/g for liquids.

(3) LSA–III. Solids (e.g., consolidated wastes, activated materials), excluding powders, that meet the requirements of § 173.468 and in which:

(i) The radioactive material is distributed throughout a solid or a collection of solid objects, or is essentially uniformly distributed in a solid compact binding agent (such as concrete, bitumen, ceramic, etc.);

(ii) The radioactive material is relatively insoluble, or it is intrinsically contained in a relatively insoluble material, so that, even under loss of packaging, the loss of Class 7 (radioactive) material per package by leaching when placed in water for seven days would not exceed 0.1 A₂; and

(iii) The estimated average specific activity of the solid, excluding any shielding material, does not exceed 2 × 10^{–3} A₂/g.

* * * * *

Package * * *

(2) “Industrial package” means a packaging together that, together with its low specific activity (LSA) material or surface contaminated object (SCO) contents, meets the requirements of §§ 173.410 and 173.411. Industrial

packages are categorized in § 173.411 as either

- (i) “Industrial package Type 1 (Type IP–1)”;
- (ii) “Industrial package Type 2 (Type IP–2)”;
- (iii) “Industrial package Type 3 (Type IP–3)”.

* * * * *

Radiation level means the radiation dose-equivalent rate expressed in millisieverts per hour or mSv/h (millirem per hour or mrem/h). It consists of the sum of the dose-equivalent rates from all types of ionizing radiation present including alpha, beta, gamma, and neutron radiation. Neutron flux densities may be used to determine neutron radiation levels according to Table 1:

TABLE 1—NEUTRON FLUENCE RATES TO BE REGARDED AS EQUIVALENT TO A RADIATION LEVEL OF 0.01 MSV/H (1MREM/H) ¹

Energy of neutron	Flux density equivalent to 0.01 mSv/h (1 mrem/h) neutrons per square centimeter per second (n/cm ² /s) ¹
Thermal (2.5 10E–8) MeV	272.0
1 keV	272.0
10 keV	281.0
100 keV	47.0
500 keV	11.0
1 MeV	7.5
5 MeV	6.4
10 MeV	6.7

¹ Flux densities equivalent for energies between those listed in this table may be obtained by linear interpolation.

* * * * *

Uranium—natural, depleted or enriched means the following:

- (1)(i) “Natural uranium” means uranium (which may be chemically separated) containing the naturally occurring distribution of uranium isotopes (approximately 99.28% uranium-238 and 0.72% uranium-235 by mass).
- (ii) “Depleted uranium” means uranium containing a lesser mass percentage of uranium-235 than in natural uranium.
- (iii) “Enriched uranium” means uranium containing a greater mass percentage of uranium-235 than 0.72%.

(2) For each of these definitions, a very small mass percentage of uranium-234 may be present.

* * * * *

15. In § 173.410, paragraph (i)(3) is revised to read as follows:

§ 173.410 General design requirements.

* * * * *

- (i) * * *
- (3) Packages containing liquid contents must be capable of withstanding, without leakage, an internal pressure which produces a pressure differential of not less than the maximum normal operating pressure plus 95 kPa (13.8 psi).

16. Section 173.411 is revised to read as follows:

§ 173.411 Industrial packages.

(a) *General.* Each industrial package must comply with the requirements of this section which specifies package tests, and record retention applicable to Industrial Package Type 1 (Type IP–1), Industrial Package Type 2 (Type IP–2), and Industrial Package Type 3 (Type IP–3).

(b) *Industrial package certification and tests.* (1) Each Type IP–1 package must meet the general design requirements prescribed in § 173.410.

(2) Each Type IP–2 package must meet the general design requirements prescribed in § 173.410 and when subjected to the tests specified in § 173.465(c) and (d) or evaluated against these tests by any of the methods authorized by § 173.461(a), must prevent:

- (i) Loss or dispersal of the radioactive contents; and
- (ii) More than a 20% increase in the maximum radiation level recorded or calculated at any external surface of the package.

(3) Each Type IP–3 package must meet the requirements for Type IP–1 and Type IP–2 packages, and must meet the requirements specified in § 173.412(a) through (j).

(4) Portable tanks may be used as Type IP–2 or Type IP–3 packages provided that:

- (i) They satisfy the requirements for Type IP–1 packages specified in paragraph (b)(1);
- (ii) They are designed to satisfy the requirements prescribed in Chapter 6.7 of the United Nations Recommendations on the Transport of Dangerous Goods, (IBR, *see* § 171.7 of this subchapter), “Requirements for the Design, Construction, Inspection and Testing of Portable Tanks and Multiple-Element Gas Containers (MEGCs),” or other requirements at least equivalent to those standards;
- (iii) They are capable of withstanding a test pressure of 265 kPa (37.1 psig); and
- (iv) They are designed so that any additional shielding which is provided must be capable of withstanding the static and dynamic stresses resulting

from handling and routine conditions of transport and of preventing more than a 20% increase in the maximum radiation level at any external surface of the portable tanks.

(5) Cargo tanks and tank cars may be used as Type IP–2 or Type IP–3 packages for transporting LSA–I and LSA–II liquids and gases as prescribed in Table 6 of § 173.427, provided that:

- (i) They satisfy the requirements for Type IP–1 packages specified in paragraph (b)(1) of this section;
- (ii) They are capable of withstanding a test pressure of 265 kPa (37.1 psig); and
- (iii) They are designed so that any additional shielding which is provided must be capable of withstanding the static and dynamic stresses resulting from handling and routine conditions of transport and of preventing more than a 20% increase in the maximum radiation level at any external surface of the tanks.

(6) Freight containers may be used as Type IP–2 or Type IP–3 packages provided:

- (i) The radioactive contents are restricted to solid materials;
- (ii) They satisfy the requirements for Type IP–1 packages specified in paragraph (b)(1) of this section; and
- (iii) They are designed to conform to the standards prescribed in the International Organization for Standardization document ISO 1496–1: “Series 1 Freight Containers—Specifications and Testing—Part 1: General Cargo Containers; excluding dimensions and ratings (IBR, *see* § 171.7 of this subchapter). They must be designed such that if subjected to the tests prescribed in that document and the accelerations occurring during routine conditions of transport they would prevent:

- (A) Loss or dispersal of the radioactive contents; and
- (B) More than a 20% increase in the maximum radiation level at any external surface of the freight containers.

(7) Metal intermediate bulk containers may be used as Type IP–2 or Type IP–3 packages, provided:

- (i) They satisfy the requirements for Type IP–1 packages specified in paragraph (b)(1) of this section; and
- (ii) They are designed to satisfy the requirements prescribed in Chapter 6.5 of the United Nations Recommendations on the Transport of Dangerous Goods, (IBR, *see* § 171.7 of this subchapter), “Requirements for the Construction and Testing of Intermediate Bulk Containers,” for Packing Group I or II, and if they were subjected to the tests prescribed in that document, but with the drop test conducted in the most

damaging orientation, they would prevent:

(A) Loss or dispersal of the radioactive contents; and

(B) More than a 20% increase in the maximum radiation level at any external surface of the intermediate bulk container.

(c) Except for Type IP-1 packages, each offeror of an industrial package must maintain on file for at least two years after the offeror's latest shipment, and must provide to the Associate Administrator on request, complete documentation of tests and an engineering evaluation or comparative data showing that the construction methods, package design, and materials of construction comply with that specification.

17. In § 173.412, paragraphs (f), (j)(2), and (k)(3)(i) are revised to read as follows:

§ 173.412 Additional design requirements for Type A packages.

* * * * *

(f) The containment system will retain its radioactive contents under the reduction of ambient pressure to 60 kPa (8.7 psi).

* * * * *

(j) * * *

(2) More than a 20% increase in the maximum radiation level at any external surface of the package.

(k) * * *

(3) * * *

(ii) Have a containment system composed of primary inner and secondary outer containment components designed to enclose the

liquid contents completely and ensure retention of the liquid within the secondary outer component in the event that the primary inner component leaks.

* * * * *

18. In § 173.415, paragraph (a) is revised to read as follows:

§ 173.415 Authorized Type A packages.

(a) DOT Specification 7A (see § 178.350 of this subchapter) Type A general packaging. Each offeror of a Specification 7A package must maintain on file for at least two years after the offeror's latest shipment, and must provide to DOT on request, an engineering drawing and description of the package showing materials of construction, dimensions, weight, closure and closure materials (including gaskets, tape, *etc.*) of each item of the containment system, shielding and packing materials used in normal transportation, and

(1) If the packaging is subjected to the physical tests of § 173.465–§ 173.466, complete documentation of testing, including date, place of test, signature of testers, a detailed description of each test performed including equipment used, and the damage to each item of the containment system resulting from the test, or

(2) For any other demonstration of compliance with tests authorized in § 173.461, a detailed analysis which shows that, for the contents being shipped, the package meets the pertinent design and performance requirements for a DOT 7A Type A specification package.

* * * * *

19. In § 173.416, paragraph (c) is revised to read as follows:

§ 173.416 Authorized Type B packages.

* * * * *

(c) A domestic shipment of a package conducted under a special package authorization granted by the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 71.41(d) provided it is offered for transportation in accordance with the requirements in § 173.471(b) and (c).

20. In § 173.417, paragraphs (a)(3) introductory text, (b)(3) introductory text, Table 3 in paragraph (b)(3)(ii), and (c) are revised to read as follows:

§ 173.417 Authorized fissile materials packages.

(a) * * *

(3) DOT Specification 20PF-1, 20PF-2, or 20PF-3 (see § 178.356 of this subchapter) phenolic-foam insulated overpack with snug fittings inner metal cylinders, meeting all requirements of §§ 173.24, 173.410, 173.412, and 173.420 and the following:

* * * * *

(b) * * *

(3) DOT Specifications 20PF-1, 20PF-2, or 20PF-3 (see § 178.356 of this subchapter) phenolic-foam insulated overpack with snug fitting inner metal cylinders, meeting all requirements of §§ 173.24, 173.410, and 173.412, and the following:

* * * * *

(ii) * * *

TABLE 3—AUTHORIZED QUANTITIES OF URANIUM HEXAFLUORIDE

Protective overpack specification number	Maximum inner cylinder diameter		Maximum weight of UF ₆ contents		Maximum U-235 enrichment (weight/percent)	Minimum criticality safety index
	Centimeters	Inches	Kilo-grams	Pounds		
20PF-1	12.7	5	25	55	100.0	0.1
20PF-2	20.3	8	116	255	12.5	0.4
20PF-3	30.5	12	209	460	5.0	1.1

(c) A domestic shipment of a package conducted under a special package authorization granted by the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 71.41(d) provided it is offered for transportation in accordance with the requirements in § 173.471(b) and (c).

21. In § 173.420, paragraph (a) is revised and a new paragraph (e) is added to read as follows:

§ 173.420 Uranium hexafluoride (fissile, fissile excepted and non-fissile).

(a) In addition to any other applicable requirements of this subchapter, quantities greater than 0.1 kg of fissile, fissile excepted or non-fissile uranium hexafluoride must be offered for transportation as follows:

(1) Before initial filling and during periodic inspection and test, packagings must be cleaned in accordance with American National Standard N14.1 (IBR, see § 171.7 of this subchapter).

(2) Packagings must be designed, fabricated, inspected, tested and marked in accordance with—

(i) American National Standard N14.1 in effect at the time the packaging was manufactured; or

(ii) Section VIII of the ASME Code (IBR, see § 171.7 of this subchapter), provided the packaging—

(A) Was manufactured on or before June 30, 1987;

(B) Conforms to the edition of the ASME Code in effect at the time the packaging was manufactured;

(C) Is used within its original design limitations; and

(D) Has shell and head thicknesses that have not decreased below the minimum value specified in the following table:

Packaging model	Minimum thickness; millimeters (inches)
1S, 2S	1.58 (0.062)
5A, 5B, 8A	3.17 (0.125)
12A, 12B	4.76 (0.187)
30B, 30C	7.93 (0.312)
48A, F, X, and Y	12.70 (0.500)
48T, O, OM, OM Al- lied, HX, H, and G	6.35 (0.250)

(3) Each package must be designed so that it will:

(i) Withstand a hydraulic test at an internal pressure of at least 1.4 MPa (200 psi) without leakage;

(ii) Withstand the test specified in § 173.465(c) without loss or dispersal of the uranium hexafluoride; and

(iii) Withstand the test specified in 10 CFR 71.73(c)(4) without rupture of the containment system.

(4) Uranium hexafluoride must be in solid form.

(5) The volume of solid uranium hexafluoride, except solid depleted uranium hexafluoride, at 20 °C (68 °F) may not exceed 61% of the certified volumetric capacity of the packaging. The volume of solid depleted uranium hexafluoride at 20 °C (68 °F) may not exceed 62% of the certified volumetric capacity of the packaging.

(6) The pressure in the package at 20 °C (68 °F) must be less than 101.3 kPa (14.8 psig).

* * * * *

(e) The proper shipping name and UN number "Radioactive material, uranium hexafluoride, UN 2978" must be used for the transportation of non-fissile or fissile-excepted uranium hexafluoride. The proper shipping name and UN number "Radioactive material, uranium hexafluoride, fissile, UN 2977" must be used for the transport of fissile uranium hexafluoride.

22. Section 173.421 is revised to read as follows:

§ 173.421 Excepted packages for limited quantities of Class 7 (radioactive) materials.

A Class 7 (radioactive) material with an activity per package which does not exceed the limited quantity package limits specified in Table 4 in § 173.425, and its packaging, are excepted from requirements in this subchapter for specification packaging, marking (except for the UN identification number marking requirement described in § 173.422(a)), labeling, and if not a hazardous substance or hazardous

waste, shipping papers, and the requirements of this subpart if:

(a) Each package meets the general design requirements of § 173.410;

(b) The radiation level at any point on the external surface of the package does not exceed 0.005 mSv/hour (0.5 mrem/hour);

(c) The nonfixed (removable) radioactive surface contamination on the external surface of the package does not exceed the limits specified in § 173.443(a);

(d) The outside of the inner packaging or, if there is no inner packaging, the outside of the packaging itself bears the marking "Radioactive";

(e) The package does not contain fissile material unless excepted by § 173.453.

(f) The material is otherwise prepared for shipment as specified in accordance with § 173.422.

23. Section 173.422 is revised to read as follows:

§ 173.422 Additional requirements for excepted packages containing Class 7 (radioactive) materials.

An excepted package of Class 7 (radioactive) material that is prepared for shipment under the provisions of § 173.421, § 173.424, § 173.426, or § 173.428, or a small quantity of another hazard class (as defined in § 173.4) which also meets the requirements of one of these sections, is not subject to any additional requirements of this subchapter, except for the following:

(a) The outside of each package must be marked with the UN identification number for the material preceded by the letters UN, as shown in column (4) of the Hazardous Materials Table in § 172.101, and for materials that meet the definition of a hazardous substance, with the letters "RQ";

(b) Sections 171.15 and 171.16 of this subchapter, pertaining to the reporting of incidents;

(c) Sections 174.750, 175.700(b), and 176.710 of this subchapter (depending on the mode of transportation), pertaining to the reporting of decontamination;

(d) The training requirements of subpart H of part 172 of this subchapter; and

(e) For materials that meet the definition of a hazardous substance or a hazardous waste, the shipping paper requirements of subpart C of part 172 of this subchapter, however such shipments are not subject to shipping paper requirements applicable to Class 7 (radioactive) materials in §§ 172.202(a)(6), 172.203(d) and 172.204(c)(4).

24. Section 173.427 is revised to read as follows:

§ 173.427 Transport requirements for low specific activity (LSA) Class 7 (radioactive) materials and surface contaminated objects (SCO).

(a) In addition to other applicable requirements specified in this subchapter, LSA materials and SCO must be transported in accordance with the following conditions:

(1) The external dose rate may not exceed an external radiation level of 10 mSv/h (1 rem/h) at 3 m (10 feet) from the unshielded material;

(2) The quantity of LSA and SCO material transported in any single conveyance may not exceed the limits specified in Table 5;

(3) LSA material and SCO that are or contain fissile material must conform to the applicable requirements of § 173.453;

(4) Packaged and unpackaged Class 7 (radioactive) materials must conform to the contamination control limits specified in § 173.443;

(5) External radiation levels may not exceed those specified in § 173.441; and

(6) For LSA material and SCO consigned as exclusive use:

(i) Shipments must be loaded by the consignor and unloaded by the consignee from the conveyance or freight container in which originally loaded;

(ii) There may be no loose radioactive material in the conveyance; however, when the conveyance is the packaging, there may not be any leakage of radioactive material from the conveyance;

(iii) Packaged and unpackaged Class 7 (radioactive) materials must be braced so as to prevent shifting of lading under conditions normally incident to transportation;

(iv) Specific instructions for maintenance of exclusive use shipment controls shall be provided by the offeror to the carrier. Such instructions must be included with the shipping paper information;

(v) The shipment must be placarded in accordance with subpart F of part 172 of this subchapter;

(vi) For domestic transportation only, packaged and unpackaged Class 7 (radioactive) materials containing less than an A₂ quantity are excepted from the marking and labeling requirements of this subchapter, except for subsidiary hazard labeling as required in 172.402(d). However, the exterior of each package or unpackaged Class 7 (radioactive) material must be stenciled or otherwise marked "RADIOACTIVE—LSA" or "RADIOACTIVE—SCO", as appropriate, and packages or unpackaged Class 7 (radioactive) materials that contain a hazardous

substance must be stenciled or otherwise marked with the letters "RQ" in association with the description in this paragraph (a)(6)(vi); and

(vii) Transportation by aircraft is prohibited except when transported in an industrial package in accordance with Table 6 of this section, or in an authorized Type A or Type B package.

(b) Except as provided in paragraph (c) or (d) of this section, LSA material and SCO must be packaged as follows:

(1) In an industrial package (Type IP-1, Type IP-2 or Type IP-3; § 173.411), subject to the limitations of Table 6;

(2) In a DOT Specification 7A (§ 173.350 of this subchapter) Type A package;

(3) In any Type B(U) or B(M) packaging authorized pursuant to § 173.416;

(4) For domestic transportation of an exclusive use shipment that is less than an A₂ quantity, in a packaging which meets the requirements of §§ 173.24,

173.24a (non-bulk) or 173.24b (bulk) as appropriate, and 173.410.

(5) In portable tanks, cargo tanks and tank cars, as provided in §§ 173.411(b)(4) and (5), respectively.

(c) LSA-I and SCO-I materials may be transported unpackaged under the following conditions:

(1) All unpackaged material, other than ores containing only naturally occurring radionuclides, must be transported in such a manner that under routine conditions of transport there will be no escape of the radioactive contents from the conveyance nor will there be any loss of shielding;

(2) Each conveyance must be under exclusive use, except when only transporting SCO-I on which the contamination on the accessible and the inaccessible surfaces is not greater than 4.0 Bq/cm² for beta and gamma emitters and low toxicity alpha emitters and 0.4 Bq/cm² for all other alpha emitters;

(3) For SCO-I where it is reasonable to suspect that non-fixed contamination

may exist on inaccessible surfaces in excess of the values specified in paragraph (c)(2) of this section, measures shall be taken to ensure that the radioactive material is not released into the conveyance or to the environment;

(4) When the unpackaged LSA-I or SCO-I material is contained in receptacles or wrapping materials and is transported under exclusive use, the outer surfaces of the receptacles or wrapping materials must be marked "RADIOACTIVE LSA-I" or "RADIOACTIVE SCO-I" as appropriate; and

(5) The highway or rail conveyance must be placarded in accordance with subpart F of part 172 of this subchapter.

(d) LSA and SCO that exceed the packaging limits in this section must be packaged in accordance with 10 CFR part 71.

(e) Tables 5 and 6 are as follows:

TABLE 5—CONVEYANCE ACTIVITY LIMITS FOR LSA MATERIAL AND SCO

Nature of material	Activity limit for conveyances other than by inland waterway	Activity limit for hold or compartment of an inland waterway conveyance
1. LSA-I	No limit	No limit.
2. LSA-II and LSA-III; Non-combustible solids	No limit	100 A ₂
3. LSA-II and LSA-III; Combustible solids and all liquids and gases	100 A ₂	10 A ₂
4. SCO	100 A ₂	10 A ₂

TABLE 6—INDUSTRIAL PACKAGE INTEGRITY REQUIREMENTS FOR LSA MATERIAL AND SCO

Contents	Industrial packaging type	
	Exclusive use shipment	Non exclusive use shipment
1. LSA-I:		
Solid	Type IP-1	Type IP-1
Liquid	Type IP-1	Type IP-2
2. LSA-II:		
Solid	Type IP-2	Type IP-2
Liquid and gas	Type IP-2	Type IP-3
3. LSA-III	Type IP-2	Type IP-3
4. SCO-I	Type IP-1	Type IP-1
5. SCO-II	Type IP-2	Type IP-2

25. In § 173.433, paragraphs (b) introductory text, (c) introductory text, (c)(1), (d)(3) and (h) are revised to read as follows:

§ 173.433 Requirements for determining basic radionuclide values, and for the listing of radionuclides on shipping papers and labels.

* * * * *

(b) For individual radionuclides which are not listed in the tables in

§ 173.435 or § 173.436 or for which no relevant data are available:

* * * * *

(c) In calculating A₁ and A₂ values for approval in accordance with paragraph (b)(2) of this section:

(1) It is permissible to use an A₂ value calculated using a dose coefficient for the appropriate lung absorption type, as recommended by the International Commission on Radiological Protection, if the chemical forms of each

radionuclide under both normal and accident conditions of transport are taken into consideration.

* * * * *

(d) * * *

(3) If the package contains both special and normal form Class 7 (radioactive) material, the activity which may be transported in a Type A package must satisfy:

$$\sum_i \frac{B(i)}{A_1(i)} + \sum_j \frac{C(j)}{A_2(j)} \leq 1$$

The symbols are defined as in paragraphs (d)(1) and (d)(2) of this section.

(h) Tables 7 and 8 are as follows:

Where:

* * * * *

TABLE 7—GENERAL VALUES FOR A₁ AND A₂

Radioactive contents	A ₁		A ₂	
	(TBq)	(Ci)	(TBq)	(Ci)
1. Only beta or gamma emitting nuclides are known to be present	1 × 10 ⁻¹	2.7 × 10 ⁰	2 × 10 ⁻²	5.4 × 10 ⁻¹
2. Alpha emitting nuclides, but no beta, gamma, or neutron emitters, are known to be present ¹	2 × 10 ⁻¹	5.4 × 10 ⁰	9 × 10 ⁻⁵	2.4 × 10 ⁻³
3. Neutron emitting nuclides are known to be present or no relevant data are available	1 × 10 ⁻³	2.7 × 10 ⁻²	9 × 10 ⁻⁵	2.4 × 10 ⁻³

¹ If beta or gamma emitting nuclides are also known to be present, the A₁ value of 0.1 TBq (2.7 Ci) should be used.

TABLE 8—GENERAL EXEMPTION VALUES

Radioactive contents	Activity concentration for exempt material		Activity limits for exempt consignments	
	(Bq/g)	(Ci/g)	(Bq)	(Ci)
1. Only beta or gamma emitting nuclides are known to be present	1 × 10 ¹	2.7 × 10 ⁻¹⁰	1 × 10 ⁴	2.7 × 10 ⁻⁷
2. Alpha emitting nuclides, but no neutron emitters, are known to be present	1 × 10 ⁻¹	2.7 × 10 ⁻¹²	1 × 10 ³	2.7 × 10 ⁻⁸
3. Neutron emitting nuclides are known to be present or no relevant data are available	1 × 10 ⁻¹	2.7 × 10 ⁻¹²	1 × 10 ³	2.7 × 10 ⁻⁸

26. In the table in § 173.435, Kr-79 is added in alphanumeric order, and the entries for Cf-252, Ir-192, Kr-81 and Mo-99 are revised, footnotes (a) and (c) are

revised, footnote (h) is removed and footnote (i) is redesignated as paragraph (h), to read as follows:

§ 173.435 Table of A₁ and A₂ values for radionuclides.

The table of A₁ and A₂ values for radionuclides is as follows:

Symbol of radionuclide	Element and atomic number	A ₁ (TBq)	A ₁ (Ci) ^b	A ₂ (TBq)	A ₂ (Ci) ^b	Specific activity	
						(TBq/g)	(Ci/g)
*	*	*	*	*	*	*	*
Cf-252 .....	.....	1 × 10 ⁻¹	2.7	3.0 × 10 ⁻³	8.1 × 10 ⁻²	2.0 × 10 ¹	5.4 × 10 ²
*	*	*	*	*	*	*	*
Ir-192 .....	.....	^c 1.0	^c 2.7 × 10 ¹	6.0 × 10 ⁻¹	1.6 × 10 ¹	3.4 × 10 ²	9.2 × 10 ³
*	*	*	*	*	*	*	*
Kr-79	Krypton (36)	4.0 × 10 ⁰	1.1 × 10 ²	2.0 × 10 ⁰	5.4 × 10 ¹	4.2 × 10 ⁴	1.1 × 10 ⁶
Kr-81 .....	.....	4.0 × 10 ¹	1.1 × 10 ³	4.0 × 10 ¹	1.1 × 10 ³	7.8 × 10 ⁻⁴	2.1 × 10 ⁻²
*	*	*	*	*	*	*	*
Mo-99(a)(h) .....	.....	1.0	2.7 × 10 ¹	6.0 × 10 ⁻¹	1.6 × 10 ¹	1.8 × 10 ⁴	4.8 × 10 ⁵
*	*	*	*	*	*	*	*

^a A₁ and/or A₂ values for these parent radionuclides include contributions from daughter nuclides with half-lives less than 10 days as listed in footnote (a) to Table 2 in the "IAEA Regulations for the Safe Transport of Radioactive Material, No. TS-R-1" (IBR, see § 171.7 of this subchapter).

^b The values of A₁ and A₂ in curies (Ci) are approximate and for information only; the regulatory standard units are Terabecquerels (TBq), (see § 171.10).

^c The activity of Ir-192 in special form may be determined from a measurement of the rate of decay or a measurement of the radiation level at a prescribed distance from the source.

^d These values apply only to compounds of uranium that take the chemical form of UF₆, UO₂F₂ and UO₂(NO₃)₂ in both normal and accident conditions of transport.

^e These values apply only to compounds of uranium that take the chemical form of UO₃, UF₄, UCl₄ and hexavalent compounds in both normal and accident conditions of transport.

^f These values apply to all compounds of uranium other than those specified in notes (d) and (e) of this table.

^g These values apply to unirradiated uranium only.

^h A₂ = 0.74 TBq (20 Ci) for Mo-99 for domestic use.

27. In § 173.436, add new entry r Kr-79, and revise entries Kr-81, Te-121m, and footnote (b) to read as follows:

§ 173.436 Exempt material activity concentrations and exempt consignment activity limits for radionuclides.

activity limits for radionuclides is as follows:

The table of exempt material activity concentrations and exempt consignment

Symbol of radionuclide	Element and atomic number	Activity concentration for exempt material (Bq/g)	Activity concentration for exempt material (Ci/g)	Activity limit for exempt consignment (Bq)	Activity limit for exempt consignment (Ci)
Kr-79	Krypton (36)	1.0×10^3	2.7×10^{-8}	1.0×10^5	2.7×10^{-6}
Kr-81		1.0×10^4	2.7×10^{-7}	1.0×10^7	2.7×10^{-4}
Te-121m		1.0×10^2	2.7×10^{-9}	1.0×10^6	2.7×10^{-5}

* * * * *

^b Parent nuclides and their progeny included in secular equilibrium are listed as follows:

- Sr-90 Y-90
- Zr-93 Nb-93m
- Zr-97 Nb-97
- Ru-106 Rh-106
- Ag-108m Ag-108
- Cs-137 Ba-137m
- Ce-144 Pr-144
- Ba-140 La-140
- Bi-212 Tl-208 (0.36), Po-212 (0.64)
- Pb-210 Bi-210, Po-210
- Pb-212 Bi-212, Tl-208 (0.36), Po-212 (0.64)
- Rn-222 Po-218, Pb-214, Bi-214, Po-214
- Ra-223 Rn-219, Po-215, Pb-211, Bi-211, Tl-207
- Ra-224 Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64),
- Ra-226 Rn-222, Po-218, Pb-214, Bi-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
- Ra-228 Ac-228
- Th-228 Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
- Th-229 Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209
- Th-nat Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
- Th-234 Pa-234m
- U-230 Th-226, Ra-222, Rn-218, Po-214
- U-232 Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
- U-235 Th-231
- U-238 Th-234, Pa-234m
- U-nat Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
- Np-237 Pa-233
- Am-242m Am-242
- Am-243 Np-239

* * * * *

28. Section 173.443 is revised to read as follows:

§ 173.443 Contamination Control.

(a) The level of non-fixed (removable) radioactive contamination on the external surfaces of each package as well as the external and internal surfaces of conveyances, overpacks, freight containers, tanks, and intermediate bulk containers offered for transport must be kept as low as reasonably achievable.

(1) Excluding the internal surfaces of a conveyance, freight container, tank, or intermediate bulk container dedicated to the transport of unpackaged

radioactive material in accordance with § 173.427(c) and remaining under that specific exclusive use, the level of non-fixed radioactive contamination may not exceed the limits set forth in Table 9 and must be determined by either:

(i) Wiping an area of 300 cm² of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient measurements must be taken in the most appropriate locations to yield a representative assessment of the non-fixed contamination levels. The amount of radioactivity measured on any single wiping material, divided by the surface area wiped and divided by the

efficiency of the wipe procedure (the fraction of removable contamination transferred from the surface to the absorbent material), may not exceed the limits set forth in Table 9 at any time during transport. For this purpose the actual wipe efficiency may be used, or the wipe efficiency may be assumed to be 0.10; or

(ii) Alternatively, the level of non-fixed radioactive contamination may be determined by using other methods of equal or greater efficiency.

(2) A conveyance used for non-exclusive use shipments is not required to be surveyed unless there is reason to suspect that it may exhibit contamination.

TABLE 9—NON-FIXED EXTERNAL RADIOACTIVE CONTAMINATION LIMITS FOR PACKAGES

Contaminant	Maximum permissible limits		
	Bq/cm ²	uCi/cm ²	dpm/cm ²
1. Beta and gamma emitters and low toxicity alpha emitters	4	10 ⁻⁴	240
2. All other alpha emitting radionuclides	0.4	10 ⁻⁵	24

(b) In the case of packages transported as exclusive use shipments by rail or public highway only, except as provided in paragraph (d) of this section, the removable (non-fixed) radioactive contamination on the external surface of any package, as well as on the associated accessible internal surfaces of any conveyance, overpack, freight container, tank, or intermediate bulk container, at any time during transport, may not exceed ten times the levels prescribed in paragraph (a) of this section. The levels at the beginning of transport may not exceed the levels prescribed in paragraph (a) of this section.

(c) Except as provided in paragraphs (a) and (d) of this section, each conveyance, overpack, freight container, tank, or intermediate bulk container used for transporting Class 7 (radioactive) materials as an exclusive use shipment that utilizes the provisions of paragraph (b) of this section, § 173.427(b)(4), or § 173.427(c) must be surveyed with appropriate radiation detection instruments after each exclusive use transport. Except as provided in paragraphs (a) and (d) of this section, these items may not be returned to Class 7 (radioactive) materials exclusive use transport service, and then only for a subsequent exclusive use shipment utilizing one of the above cited provisions, unless the radiation dose rate at each accessible surface is 0.005 mSv per hour (0.5 mrem per hour) or less, and there is no significant removable (non-fixed) radioactive surface contamination as specified in paragraph (a) of this section. The requirements of this paragraph do not address return to service of items outside of the above cited provisions.

(d) Paragraphs (b) and (c) of this section do not apply to any closed transport vehicle used solely for the exclusive use transportation by highway or rail of Class 7 (radioactive) material with contamination levels that do not exceed ten times the levels prescribed in paragraph (a) of this section if—

(1) A survey of the interior surfaces of the empty vehicle shows that the radiation dose rate at any point does not exceed 0.1 mSv per hour (10 mrem per hour) at the surface or 0.02 mSv per

hour (2 mrem per hour) at 1 m (3.3 feet) from the surface;

(2) Each vehicle is stenciled with the words “For Radioactive Materials Use Only” in letters at least 76 millimeters (3 inches) high in a conspicuous place on both sides of the exterior of the vehicle; and

(3) Each vehicle is kept closed except for loading or unloading; and

(4) Each vehicle is placarded in accordance with subpart F of part 172 of this subchapter.

(e) If it is evident that a package of radioactive material, or conveyance carrying unpackaged radioactive material, is leaking, or if it is suspected that the package, or conveyance carrying unpackaged material, may have leaked, access to the package or conveyance must be restricted and, as soon as possible, the extent of contamination and the resultant radiation level of the package or conveyance must be assessed. The scope of the assessment must include the package, the conveyance, the adjacent loading and unloading areas, and, if necessary, all other material which has been carried in the conveyance. When necessary, additional steps for the protection of persons, property, and the environment must be taken to overcome and minimize the consequences of such leakage. Packages, and conveyances carrying unpackaged material, which are leaking radioactive contents in excess of limits for normal conditions of transport may be removed to an interim location under supervision, but must not be forwarded until repaired or reconditioned and decontaminated, or as approved by the Associate Administrator for Hazardous Material Safety.

29. In § 173.453, paragraph (d) is revised to read as follows:

§ 173.453 Fissile materials—exceptions.
* * * * *

(d) Uranium enriched in uranium-235 to a maximum of 1 percent by weight, and with total plutonium and uranium-233 content of up to 1 percent of the mass of uranium-235, provided that the material is essentially homogeneous, and the mass of any beryllium, graphite, and hydrogenous material enriched in

deuterium constitutes less than 5 percent of the uranium mass.
* * * * *

30. In § 173.465, paragraphs (a) and (d)(1) are revised to read as follows:

§ 173.465 Type A packaging tests.

(a) The packaging, with contents, must be capable of withstanding the water spray, free drop, stacking and penetration tests prescribed in this section. One prototype may be used for all tests if the requirements of paragraph (b) of this section are met. The tests are judged to be successful if the requirements of § 173.412(j) are met.
* * * * *

(d) * * *

(1) The specimen must be subjected for a period of at least 24 hours to a compressive load equivalent to the greater of the following:

(i) A total weight equal to five times the maximum weight of the package; or

(ii) The equivalent of 13 kilopascals (1.9 psi) multiplied by the vertically projected area of the package.
* * * * *

31. In § 173.466, paragraph (a) introductory text is revised to read as follows:

§ 173.466 Additional tests for Type A packagings designed for liquids and gases.

(a) In addition to the tests prescribed in § 173.465, Type A packagings designed for liquids and gases must be capable of withstanding the following tests in this section. The tests are judged to be successful if the requirements of § 173.412(k) are met.
* * * * *

32. In § 173.469, revise paragraphs (b)(2)(ii), (b)(2)(iii), (d)(1) and (d)(2), and add paragraph (e) to read as follows:

§ 173.469 Tests for special form Class 7 (radioactive) materials.
* * * * *

(b) * * *

(2) * * *

(ii) The flat face of the billet must be 2.5 cm (1 inch) in diameter with the edge rounded off to a radius of 3 mm ± 0.3 mm (0.12 inch ± 0.012 inch).

(iii) The lead must be of hardness number 3.5 to 4.5 on the Vickers scale and thickness not more than 2.5 cm (1

inch), and must cover an area greater than that covered by the specimen.

* * * * *

(d) * * *

(1) The impact test and the percussion test of this section provided that the mass of the special form material is—

(i) less than 200 g and it is alternatively subjected to the Class 4 impact test prescribed in ISO 2919, “Radiation Protection—Sealed radioactive sources—General requirements and classification” (IBR, see § 171.7 of this subchapter), or

(ii) less than 500 g and it is alternatively subjected to the Class 5 impact test prescribed in ISO 2919, “Radiation Protection—Sealed radioactive sources—General requirements and classification” (IBR, see § 171.7 of this subchapter); and

(2) The heat test of this section, provided the specimen is alternatively subjected to the Class 6 temperature test specified in the International Organization for Standardization document ISO 2919, “Radiation Protection—Sealed radioactive sources—General requirements and classification” (IBR, see § 171.7 of this subchapter).

(e) Special form materials that were successfully tested prior to [EFFECTIVE DATE OF FINAL RULE] in accordance with the requirements of paragraph (d) of this section in effect prior to [EFFECTIVE DATE OF FINAL RULE] may continue to be offered for transportation and transported without additional testing under this section.

33. In § 173.473, paragraph (a)(1) is revised to read as follows:

§ 173.473 Requirements for foreign-made packages.

* * * * *

(a) * * *

(1) Have the foreign competent authority certificate revalidated by the U.S. Competent Authority, unless this has been done previously. Each request for revalidation must be in triplicate, contain all the information required by Section VIII of the IAEA regulations in “IAEA Regulations for the Safe Transport of Radioactive Material, No. TS-R-1” (IBR, see § 171.7 of this subchapter), and include a copy in English of the foreign competent authority certificate. The request and accompanying documentation must be sent to the Associate Administrator for Hazardous Materials Safety (PHH-23), Department of Transportation, East Building, 1200 New Jersey Avenue, SE., Washington DC 20590-0001.

Alternatively, the request with any attached supporting documentation submitted in an appropriate format may

be sent by facsimile (fax) to (202) 366-3753 or (202) 366-3650, or by electronic mail to *ramcert@dot.gov*. Each request is considered in the order in which it is received.

* * * * *

34. In § 173.476, paragraphs (a) and (d) are revised to read as follows:

§ 173.476 Approval of special form Class 7 (radioactive) materials.

(a) Each offeror of special form Class 7 (radioactive) materials must maintain on file for at least two years after the offeror’s latest shipment, and provide to the Associate Administrator on request, a complete safety analysis, including documentation of any tests, demonstrating that the special form material meets the requirements of § 173.469. An IAEA Certificate of Competent Authority issued for the special form material may be used to satisfy this requirement.

* * * * *

(d) Paragraphs (a) and (b) of this section do not apply in those cases where A_1 equals A_2 and the material is not required to be described on the shipping papers as “Radioactive material, Type A package, special form” or “Radioactive material, Type A package, special form, fissile.”

35. In § 173.477, paragraph (a) is revised to read as follows:

§ 173.477 Approval of packagings containing greater than 0.1 kg of non-fissile or fissile-excepted uranium hexafluoride.

(a) Each offeror of a package containing more than 0.1 kg of uranium hexafluoride must maintain on file for at least two years after the offeror’s latest shipment, and provide to the Associate Administrator on request, a complete safety analysis, including documentation of any tests, demonstrating that the package meets the requirements of 173.420. An IAEA Certificate of Competent Authority issued for the design of the packaging containing greater than 0.1 kg of non-fissile or fissile-exempted uranium hexafluoride may be used to satisfy this requirement.

* * * * *

PART 174—CARRIAGE BY RAIL

36. The authority citation for Part 174 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.53.

§ 174.700(e) [Removed and reserved]

37. In § 174.700, paragraph (e) is removed and reserved.

38. In § 174.715, paragraph (a) is revised to read as follows:

§ 174.715 Cleanliness of transport vehicles after use.

(a) Each transport vehicle used for transporting Class 7 (radioactive) materials under exclusive use conditions (as defined in § 173.403 of this subchapter) in accordance with § 173.427(b)(4), § 173.427(c), or § 173.443(b), must be surveyed with appropriate radiation detection instruments after each use. A transport vehicle may not be returned to Class 7 (radioactive) materials exclusive use transport service, and then only for a subsequent exclusive use shipment utilizing the provisions of any of the paragraphs § 173.427(b)(4), § 173.427(c), or § 173.443(b), until the radiation dose rate at any accessible surface is 0.005 mSv per hour (0.5 mrem per hour) or less, and there is no significant removable radioactive surface contamination, as specified in § 173.443(a) of this subchapter.

* * * * *

PART 175—CARRIAGE BY AIRCRAFT

39. The authority citation for Part 175 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.45 and 1.53.

40. In § 175.702, paragraph (b) is revised and paragraph (c) is removed to read as follows:

§ 175.702 Separation distance requirements for packages containing Class 7 (radioactive) materials in cargo aircraft.

* * * * *

(b) In addition to the limits on combined criticality safety indexes stated in § 175.700(b) of this subchapter,

(1) The criticality safety index of any single group of packages must not exceed 50.0 (as used in this section, the term “group of packages” means packages that are separated from each other in an aircraft by a distance of 6 m (20 feet) or less); and

(2) Each group of packages must be separated from every other group in the aircraft by not less than 6 m (20 feet), measured from the outer surface of each group.

41. In § 175.705, paragraph (c) is revised to read as follows:

§ 175.705 Radioactive Contamination.

* * * * *

(c) An aircraft in which Class 7 (radioactive) material has been released must be taken out of service and may not be returned to service or routinely occupied until the aircraft is checked for radioactive substances and it is determined that any radioactive substances present do not meet the

definition of radioactive material, as defined in § 173.403 of this subchapter.

* * * * *

PART 176—CARRIAGE BY VESSEL

42. The authority citation for Part 176 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.53.

43. Section 176.715 is revised to read as follows:

§ 176.715 Contamination control.

Each hold, compartment, or deck area used for transporting Class 7 (radioactive) materials under exclusive use conditions in accordance with § 173.427(b)(4), or § 173.427(c) must be surveyed with appropriate radiation detection instruments after each use. Such holds, compartments, and deck areas may not be used again for Class 7 (radioactive) materials exclusive use transport service, and then only for a subsequent exclusive use shipment utilizing the provisions of § 173.427(b)(4), or § 173.427(c) until the radiation dose rate at every accessible surface is less than 0.005 mSv/h(0.5 mrem/h), and the removable (non-fixed) radioactive surface contamination is not greater than the limits prescribed in § 173.443(a) of this subchapter.

PART 177—CARRIAGE BY PUBLIC HIGHWAY

44. The authority citation for Part 177 continues to read as follows:

Authority: 49 U.S.C. 5101–5127; 49 CFR 1.53.

45. In § 177.843, paragraph (a) is revised to read as follows:

§ 177.843 Contamination of vehicles.

(a) Each motor vehicle used for transporting Class 7 (radioactive) materials under exclusive use conditions in accordance with § 173.427(b)(4), § 173.427(c), or § 173.443(b) of this subchapter must be surveyed with radiation detection instruments after each use. A vehicle may not be returned to Class 7 (radioactive) materials exclusive use transport service, and then only for a subsequent exclusive use shipment utilizing the provisions of any of the paragraphs § 173.427(b)(4), § 173.427(c), or § 173.443(b), until the radiation dose rate at every accessible surface is 0.005 mSv/h (0.5 mrem/h) or less and the removable (non-fixed) radioactive surface contamination is not greater than the level prescribed in § 173.443(a) of this subchapter.

* * * * *

PART 178 — SPECIFICATIONS FOR PACKAGINGS

46. The authority citation for Part 178 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.53.

47. In § 178.350, paragraph (c) is revised to read as follows:

§ 178.350 Specification 7A; general packaging, Type A.

* * * * *

(c) Each Specification 7A packaging must comply with the requirements of §§ 178.2 and 178.3. In § 178.3(a)(2) the term “packaging manufacturer” means the person certifying that the package meets all requirements of this section.

§§ 178.358 through 178.358–6 [Removed and reserved]

48. Remove and reserve §§ 178.358 through 178.358–6.

§§ 178.360 through 178.360–4 [Removed and reserved]

49. Remove and reserve §§ 178.360 through 178.360–4.

Issued in Washington, DC on August 1, 2011 under authority delegated in 49 CFR part 106.

Magdy El-Sibaie,

Associate Administrator for Hazardous Materials Safety.

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