

DRAFT ENVIRONMENTAL ASSESSMENT AND FINDING OF
NO SIGNIFICANT IMPACT
FOR THE PROPOSED RULE AMENDING 10 CFR PART 71

Revisions to Transportation Safety Requirements and Harmonization with International Atomic
Energy Agency Transportation Requirements

Office of Federal and State Materials and Environmental Management Programs

U.S. Nuclear Regulatory Commission

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I. THE PROPOSED ACTION

The proposed action is to amend the U.S. Nuclear Regulatory Commission's (NRC) Title 10 of the *Code of Federal Regulations* (10 CFR) Part 71 regulations. The proposed amendments would revise the requirements for the packaging and transportation of radioactive material.

1. Make the NRC regulations compatible with the 2009 edition of the International Atomic Energy Agency (IAEA) transportation standard, "Regulations for the Safe Transport of Radioactive Material" (TS-R-1),
2. Maintain consistency with changes in the U.S. Department of Transportation's (DOT) regulations, and
3. Make other changes.
 - a. Revise the requirements for shipping fissile material under a general license. The fissile material would be required to be homogeneously distributed and not form a lattice arrangement.
 - b. Revise quality assurance program regulations to (1) add provisions to allow changes to approved quality assurance programs that do not reduce

commitments made to the NRC to be implemented without prior NRC approval; and (2) implement a change in practice where quality assurance program approvals would not expire.

II. THE NEED FOR THE PROPOSED ACTION

The IAEA is authorized to establish safety standards to protect public health and safety and to minimize the danger to life or property. The IAEA has developed international safety standards for the safe transport of radioactive material, TS-R-1. The IAEA safety standards are developed in consultation with the competent authorities of Member States – the U.S. is a Member State and the DOT is the U.S. competent authority before the IAEA for radioactive material transportation matters, so they reflect an international consensus on what is needed to provide for a high-level of safety. By providing a global framework for the consistent regulation of the transport of radioactive material, the international transportation standards facilitate international commerce and contributes to the safe conduct of international trade involving that material. By periodically revising its regulations to be compatible with the IAEA and DOT regulations, the NRC is able to remove inconsistencies between the national regulations and those of other countries that are based on the IAEA transportation standards that could impede international commerce.

The IAEA periodically reviews and revises its transportation standards to reflect knowledge gained in scientific and technical advances and accumulated experience. The NRC has a long-standing practice of harmonizing its packaging and transportation regulations with those of the DOT and the IAEA. On January 26, 2004 (69 FR 3698), the NRC published in the *Federal Register* a final revision to 10 CFR Part 71, “Compatibility with IAEA Transportation

Safety Standards (TS-R-1) and Other Transportation Safety Amendments.” That revision, in combination with a parallel revision of the hazardous materials transportation regulations of the DOT, brought the U.S. domestic transport regulations into general accord with the 1996 edition of TS-R-1 (as amended in 2000). The DOT published its corresponding revision to Title 49 of the CFR on the same date (69 FR 3633). This rulemaking effort involves changing provisions in the NRC regulations at 10 CFR Part 71 to increase consistency and compatibility with the 2009 edition of TS-R-1 and changes being proposed by the DOT. In November 2012, the IAEA issued new standards for the safe transport of radioactive material and designated them as “Specific Safety Requirements Number SSR-6” (SSR-6). This rulemaking does not incorporate the 2012 IAEA changes, which will undergo a comprehensive review by the NRC staff to determine if additional changes to 10 CFR Part 71 are warranted. In addition to making the changes necessary to maintain consistency with the IAEA’s transportation standards and the DOT regulations, the NRC is proposing to revise 10 CFR Part 71 to streamline the regulatory oversight of quality assurance programs and to correct and clarify other requirements.

Consistent with the approach taken in the IAEA’s transportation standards, the NRC and DOT regulations include exemption values, which allow material that poses a slight radiological risk to be exempted from the transportation regulations. This allows material that would not typically be considered to be radioactive to be transported without the additional regulations required for radioactive material (i.e., it would not be required to be handled as hazardous material while being transported). Material that qualifies for the exemption from the regulations that apply to the transportation of radioactive material is not exempted from other regulatory controls, including the controls that apply to the disposal or release of radioactive material.

The current, radionuclide-specific exemption values replaced the activity concentration threshold of 70 Bq/g (0.002 μ Ci/g) that were used previously. Many natural materials and ores containing naturally occurring radionuclides qualified for the exemption when it was based on the activity concentration threshold of 70 Bq/g (0.002 μ Ci/g), but exceed the radionuclide-specific exemption values. The IAEA recognized that applying the radionuclide-specific, activity concentration exemption values that it established in TS-R-1 to natural materials and ores might result in unnecessary regulation of these shipments. The IAEA established a broader exemption for these materials to avoid the unnecessary regulation of these materials during transport – comprising all operations and conditions associated with the movement of the radioactive material – which pose only a slight radiological risk. The IAEA exemption for natural materials and ores containing naturally occurring radionuclides allows the activity concentration of the material to be up to 10 times the values for the activity concentration for exempt material, if the material is not intended to be processed for the use of the naturally occurring radionuclides. The NRC and DOT regulations include this exemption for natural materials and ores.

In 2003, the IAEA changed the exemption for natural materials and ores to specifically include natural materials and ores that have been processed for purposes other than the extraction of the radionuclides. The NRC is proposing to change its requirements to allow natural materials and ores that have been processed to qualify for the exemption to be consistent with the IAEA exemption.

This proposed rulemaking is needed for the NRC to: (1) make changes in 10 CFR Part 71 to make the NRC regulations for the packaging and transportation of radioactive material compatible with the 2009 edition of the IAEA's transportation standards (TS-R-1),

(2) maintain consistency with changes in the DOT regulations; and (3) make other changes to the requirements for the packaging and transportation of radioactive material.

III. ENVIRONMENTAL IMPACTS OF PROPOSED ACTION

The proposed action consists of a number of proposed changes to 10 CFR Part 71. Many of these proposed changes fall within the categorical exclusions listed in 10 CFR 51.22, “Criterion for categorical exclusion; identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review” within 10 CFR Part 51, “Environmental Protection Regulations for Domestic Licensing and Regulatory Functions.” The Commission has previously determined that such actions, neither individually nor cumulatively, would have significant impacts on the human environment and the environmental impacts of these changes are not evaluated in detail in this Environmental Assessment. The table below shows those proposed changes that fall within the categorical exclusions and the categorical exclusion that is being applied to the change.

Table 1: Changes Qualifying for Categorical Exclusions

Proposed Change	Alternative(s)
10 CFR 51.22(c)(2) provides a categorical exclusion for amendments in 10 CFR Chapter I (including Part 71) that are corrective or of a minor or non-policy nature and do not substantially modify existing regulations.	
10 CFR 71.0(d)(1). Revise to delete § 71.20 from the list of sections for which general licenses are issued without a required NRC package approval. This change is corrective in nature and does not substantially change the existing regulations, because § 71.20 has already expired.	2, 3
10 CFR 71.17(c). Revise to clarify that the requirements in paragraph (c) are a responsibility of the general licensee and not a condition required to be satisfied to be granted the general license. General licensees would still be required to have (or maintain) a copy of the applicable certificate and related documents and to comply with the terms and conditions of the license,	3

certificate, or other approval and the applicable requirements of subparts A, G, and H. No new requirements have been added. Therefore, this change is corrective and minor in nature and does not substantially modify the regulations.	
10 CFR 71.19. Redesignate paragraphs (b) through (e) and revise redesignated paragraph (b)(2). Paragraph (a) has expired. Revise paragraph (b)(2) to delete the unnecessary phrase “[a]fter December 31, 2003,” because all future shipments would now occur after that date. These changes are corrective in nature and do not substantially change the existing regulations.	3
10 CFR 71.21 paragraph (a). Revise paragraph (a) to update the cross-reference to the applicable DOT requirement, which was relocated by the DOT in a recent rulemaking. This change is corrective in nature and does not substantially change the existing regulations.	2, 3
10 CFR 71.21(d). Revise paragraph (d) to clarify that the requirement addresses the responsibility of the general licensee rather than a requirement to be granted a general license and to delete a sentence that exempts the general licensee from quality assurance requirements for design, construction, and fabrication activities that do not apply to a general licensee. General licensees would still be required to have (or maintain) a copy of the applicable certificate and related documents and to comply with the terms and conditions of the license, certificate, or other approval and the applicable requirements of subparts A, G, and H. No new requirements have been added. Therefore, these changes are corrective and minor in nature and do not substantially modify the regulations.	3
10 CFR 71.75(b). Revise to correct the description of the billet and the lead sheet in (b)(2)(ii) and (b)(2)(iii). These changes are corrective in nature and do not substantially change the existing regulations.	2, 3
10 CFR 71.85 paragraphs (a), (b), and (c). Revise by replacing “licensee” with “certificate holder” and add paragraph (d) to require the licensee to ensure that the preliminary determinations have been made. These changes are minor in nature and address who is responsible for making the preliminary determinations, so the changes do not substantially change the regulations.	3
10 CFR 71.101(a). Revise to clarify the responsibilities of licensees and certificate holders to reflect the activities that licensees and certificate holders conduct. This change is minor in nature and does not substantially modify the existing regulations.	3
10 CFR 71.103(a). Revise to remove a footnote, because subsequent changes made to the regulations that explicitly address the application of quality assurance requirements to certificate holders and applicants for a certificate of compliance have made the footnote unnecessary. This change is corrective in nature and does not substantially change the existing regulations.	3

<p>Part 71, Appendix A, paragraphs IV.a.–IV.f. Redesignate paragraphs IV.c.–IV.f. as paragraphs IV.d.-IV.g.; add paragraph IV.c.; redesignate the text of paragraph V. as paragraph V.a.; and add paragraph V.b. These changes clarify the process of calculating values for A_1 and A_2 and make corrections. These changes are either corrective or of a minor nature that do not substantially modify the existing regulations.</p>	<p>2, 3</p>
<p>Part 71, Appendix A, Table A-1. Revise the A_1 entry for californium-252 (Cf-252) to the IAEA value in TS-R-1. The IAEA has revised the A_1 value for Cf-252 to the value that currently applies to domestic transportation. This change is minor, corrective in nature, and does not substantially modify existing regulations, because the A_1 value for domestic transportation would not be changed. Revise the entry for iridium-192 (Ir-192) to relocate footnote c to the columns that provide the A_1 values. Revise the entry for krypton-81 (Kr-81) to reflect the addition of krypton-79 (Kr-79) to the table. Revise the entry for molybdenum-99 (Mo-99) to update the lettering of the footnote. Delete footnote h and redesignate footnote i as footnote h. Revise footnote a to identify that the A_1 and/or A_2 values that include contributions from daughter radionuclides with half-lives of less than 10 days. These changes are minor, corrective in nature, and do not substantially change the existing regulations.</p>	<p>2, 3</p>
<p>Part 71, Appendix A, Table A-2. Revise the entry for krypton-81 (Kr-81) to reflect that it is no longer the first entry for the isotopes of krypton. Revise footnote b to remove the chains for the parent radionuclides cerium-134 (Ce-134), radon-220 (Rn-220), thorium-226 (Th-226), and uranium-240 (U-240) and add a chain for silver-108m (Ag-108m). These changes are minor and corrective in nature and do not substantially change the existing regulations.</p>	<p>2, 3</p>
<p>Part 71, Appendix A, Table A-3. Revise the entries for column 1, “Contents,” and add footnote a to indicate the appropriate value of A_1 for a group containing both alpha emitting radionuclides and beta or gamma emitting radionuclides when groups of radionuclides are based on the total alpha activity and the total beta and gamma activity. These changes are minor and corrective in nature and do not substantially change the existing regulations, because the changes provide additional clarity that is intended to improve compliance with the regulations, but do not change the values or the material to which the values apply.</p>	<p>2, 3</p>

<p>10 CFR 51.22(c)(3) provides a categorical exclusion for amendments in 10 CFR Chapter I (including Part 71) which relate to: (i) procedures for filing and reviewing applications for licenses or construction permits or early site permits or other forms of permission or for amendments to or renewals of licenses, or construction permits or early site permits or other forms of permission; (ii) recordkeeping requirements; (iii) reporting requirements; (iv) education, training, experience, qualification, or other employment suitability requirements; or (v) actions on petitions for rulemaking related to these amendments.</p>	
<p>10 CFR 71.6 paragraph (b). Revise to remove an expired section from the list of information collections and add § 71.106 to the list of information collections. These changes pertain to information collection (reporting and recordkeeping); the removal of the expired section from the list of information collections is also corrective in nature and does not substantially modify the regulations.</p>	<p>2, 3</p>
<p>10 CFR 71.31(b). Revise to correct a reference to another section. This change pertains to the procedures for filing an application for a license or other form of permission. This change is also corrective in nature and does not substantially modify the regulations.</p>	<p>3</p>
<p>10 CFR 71.38. Retitle the section. Revise paragraphs (a), (b), and (c) to remove references to quality assurance program approvals, because the approvals would no longer require renewal. This change pertains to the procedures for filing a renewal application for a license or other form of permission.</p>	<p>3</p>
<p>10 CFR 71.91(a). Revise to correct a reference. This change pertains to recordkeeping requirements. This change is also corrective in nature and does not substantially modify the regulations.</p>	<p>3</p>
<p>10 CFR 71.101(c). Revise to separate the requirements for obtaining approval of a quality assurance program that apply to licensees from those that apply to certificate holders. This change relates to the procedures for filing for a form of permission. This change is also minor in nature and does not significantly modify the regulations, because licensees will not be conducting the fabrication, testing, or modification of the package.</p>	<p>3</p>
<p>10 CFR 71.106. Add the section. This section adds requirements that pertain to the process for making changes to approved quality assurance programs by revising the process for obtaining NRC approval to make changes to an approved quality assurance program. These changes relate to the procedures for filing and reviewing applications for a form of permission. The categorical exclusion also applies to any quality assurance records that would be created in response to the proposed amendments to § 71.106; because amendments are proposed for § 71.135, the proposed amendments to § 71.135 are addressed separately, below.</p>	<p>3</p>
<p>10 CFR 71.135. Revise to include changes made to an approved quality assurance program as a quality assurance record. This change relates to recordkeeping requirements.</p>	<p>3</p>

The proposed action, which corresponds to the changes identified as alternative 3 in the Table 1, also consists of a number of proposed changes that do not fall within the categorical exclusions listed at 10 CFR 51.22, which are evaluated as part of this Environmental Assessment. The following table identifies these changes and the section of the Environmental Assessment where they are described in more detail and their environmental impacts are discussed.

Table 2: Proposed Changes Evaluated in the Environmental Assessment

Section	Subject	Proposed Changes	Alternative(s)	Analysis
71.4	Definitions	Add definition of "contamination". 10 CFR Part 71 does not currently include this definition. It is being added as part of the effort to harmonize with TS-R-1, so adding this definition is considered under Alternatives 2 and 3.	2, 3	See Section III.A.
71.4	Definitions	Revise definition of "Criticality Safety Index (CSI)".	2, 3	See Section III. A.
71.4	Definitions	Revise definition of "Low Specific Activity (LSA) material".	2, 3	See Section III.A.
71.4	Definitions	Revise definition of "special form radioactive material".	2, 3	See Section III.A.
71.4	Definitions	Revise definition of "uranium – natural, depleted, enriched".	2, 3	See Section III. A.
71.14	Exemption for low-level materials	Revise paragraph (a), add paragraph (a)(3).	2, 3	See Section III.B.
71.15	Exemption from classification as fissile material	Revise paragraph (d).	3	See Section III.C.
71.70	Incorporation by reference	Add a section that consolidates incorporation by reference language.	2, 3	See Section III.D.
71.75	Qualification of special form radioactive material	Revise paragraphs (a)(5) and (d).	2, 3	See Section III.D.
Appendix A, Table A-1	A ₁ and A ₂ Values for Radionuclides	Add an entry for Kr-79. Revise the A ₂ value for Cf-252.	2, 3	See Section III.E.
Appendix A, Table A-2	Exempt Material Activity Concentrations and Exempt Consignment Activity Limits for Radionuclides	Revise entry for Te-121m and add entry for Kr-79.	2, 3	See Section III.E.

A. Revised Definitions

Description of the Change: The definition for “contamination” would be added to § 71.4; the definition is consistent with the definition in the DOT transportation regulations at 49 CFR Part 173 and IAEA TS-R-1. The definition of “Criticality Safety Index (CSI)” would be revised to be consistent with the definition in the DOT regulations at 49 CFR Part 173 and IAEA TS-R-1 by addressing overpacks and freight containers in the definition. The definition of “Low Specific Activity (LSA) material” would be revised to be consistent with the definition in the DOT regulations at 49 CFR Part 173 and IAEA TS-R-1 by making the description of LSA-I material apply to material which is intended to be processed for the use of the uranium, thorium, and other naturally occurring radionuclides. The definition of “special form radioactive material” would be revised to allow special form radioactive material that was successfully tested using the current requirements of § 71.75(d) to continue to qualify as special form radioactive material. The definition of “uranium — natural, depleted, enriched”, would be revised by adding “(which may be chemically separated)” to the portion of the definition that describes natural uranium. This portion of the definition would become “[n]atural uranium means uranium (which may be chemically separated) with the naturally occurring distribution of uranium isotopes (approximately 0.711 weight percent uranium-235, and the remainder by weight essentially uranium-238).”

Environmental Impacts of the Change (Alternatives 2 and 3): The proposed changes to the definitions of “Criticality Safety Index (CSI)” and “uranium — natural, depleted, enriched” provide clarifications. Because change to the definition of CSI incorporates overpacks and freight containers, but does not change how the CSI is calculated; this change will not have any environmental impacts. The change to the definition of “natural uranium” does not alter the distributions of uranium isotopes used to describe the “natural uranium” and whether, or not, the

material is chemically processed does not change the scope of material that falls within the definition and does not affect any of the other definitions where “natural uranium” is used.

The proposed change in the definition of “Low Specific Activity (LSA) material” would correct the definition of LSA-I material. Currently, the NRC definition of LSA-I material includes the word “not” which makes the NRC definition inconsistent with the DOT definition of LSA material (which does not include the word “not”). Removal of the word “not” would make the NRC definition for LSA-I material consistent with the DOT definition in 49 CFR 173.403, which has been in effect since October 1, 2004. The DOT definition is consistent with the IAEA’s transportation standards and is the definition that has been used in practice. Thus, there would be no impact (radiological or non-radiological) from this change, because licensees are already using the DOT definition.

The environmental impacts associated with adding the definition of “contamination” would be from the transportation of certain non-radioactive solid objects with radioactive substances present on any surface that would now qualify for the low-level material exemption. These impacts are evaluated in Section III.B., below.

The changes to the definition of special form radioactive material would allow material already tested to continue to qualify as special form radioactive material. Because the proposed changes allow the continued use of special form radioactive material that has been qualified using the current tests and do not change the requirements applicable to this qualified material, there would be no environmental impacts associated with this change. The testing allowed under the International Organization for Standardization (ISO) tests that are proposed to be added to § 71.75(d) are no less stringent than the existing tests. The impacts associated with the changes to the ISO tests are discussed in Section III.D., below.

Environmental Impacts for No Change (No Action Alternative): For the same reasons as discussed above, not making the proposed changes to the definitions of CSI, “uranium – natural, depleted, enriched,” and LSA-I would not result in environmental impacts.

The environmental impacts from not changing the definition of contamination are evaluated in Section III.B., below.

The environmental impacts from not changing the definition of special form radioactive material arise from the tests used and these impacts are discussed in Section III.D., below.

B. Changes to the Exemption for the Shipping of Low-Level Radioactive Material

Description of the Change: The exemption that allows some natural materials and ores containing naturally occurring radionuclides to be transported without being handled as hazardous material would be changed to indicate that such natural material or ore could be in either its natural state or have been processed. The exemption would also be changed to specifically allow non-radioactive solid objects with “contamination” to be transported without being handled as hazardous material.

Environmental Impacts from the Change (Alternatives 2 and 3): The low-level material exemption applies to material that presents a very low hazard and has an activity concentration that does not exceed 10 times the values specified in Part 71, Appendix A, Table A-2 (“Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material: Safety Guide” (TS-G-1.1), IAEA, 2002). The transportation regulations that apply to the material that would be included within the scope of the low-level material exemption for natural materials and ores include requirements on shipping papers, packaging, package marking, labeling, preparation of the shipment of the material, and transport vehicle placarding related to the shipment and transportation. The proposed change would allow some additional material to qualify for the

exemption with activity concentrations 10 times the activity concentration for exempt material, because it explicitly allows material that has been processed to qualify for the exemption. Although material that may qualify for the exemption under the proposed changes would be exempted from these requirements, these requirements do not significantly affect the radiological exposures associated with the shipment and transportation of such low-hazard material.

Under normal conditions of transport, the impacts involve radiation exposure. Although there is a potential for environmental contamination arising from accidents, cargo shifts, package failures, loading, unloading, and handling problems; for the natural materials and ores affected by this change. The dose criteria used in determining the activity concentrations for exempt material ensure that the doses (from either single or multiple sources) do not reach unacceptable levels and would be far below the public dose limits and consider both normal conditions and accident conditions (i.e., an individual effective dose of 10 μ Sv/year (1 mrem/year) for normal conditions and a collective dose of 1 person-Sv/year (100 person-rem/year) of practice for normal conditions, 1 mSv (100 mrem) for an individual effective dose for accident conditions, and 50 mSv (5 rem) for an individual dose to the skin for both normal and accident conditions) (TS-G-1.1)). In addition, the impacts from events that result in releases can be significantly reduced through prompt clean-up.

The low-level material exemption would be amended to allow non-radioactive solid objects with radioactive substances present on any surfaces in quantities that do not exceed the levels in the definition for contamination. The derivation of the limits defining the level of contamination and the potential impacts from contamination are discussed in TS-G-1.1. Non-fixed contamination can contribute to ingestion, inhalation, and spreading hazards, whereas fixed contamination would only contribute to increased exposures, but would be limited

to a low exposure. Contamination below the values in the definition would only contribute to insignificant exposures through inhalation, ingestion or external exposure and the derived values are conservative with respect to transportation and would not cause environmental contamination. So, this change would have small radiological and non-radiological impacts.

Activity concentrations that are 10 times the activity concentration for exempt material were established in TS-R-1 for naturally occurring materials and ores to avoid applying the transport regulations to enormous quantities of material that presents a very low hazard (TS-G-1.1). The factor of 10 is intended to provide a balance between radiological protection concerns and the burden associated with the regulation of very large quantities of material. These activity concentrations would still ensure that the doses for both normal and accident conditions would remain well below the public dose limits for normal and accident conditions.

The exemption, which also appears in the DOT regulations, already covers many types of material from mining and minerals processing, building materials, and other natural materials. Therefore, large quantities of material are currently transported under the current exemption, do not involve activities licensed by the NRC, and would not be subject to the NRC transportation regulations. The regulatory burden associated with these shipments is small and include requirements on shipping papers, packaging, package marking, labeling, preparation of the shipment of the material, and transport vehicle placarding related to the shipment and transportation. The regulations that apply to shipments of radioactive material would not apply to material qualifying for the exemption. Material that is categorized as Class 7 (radioactive) material could incur additional expenses and restrictions that would add to the cost of transportation that could influence the shipping modes and routes used to transport the material. Although the relative savings will depend on the relative value of the material, it is generally less than the monthly variability in the value of the material. Because the reduction in transportation

costs and regulatory burden from the proposed amendment is small, and within the variability of the value of the commodities, relative to the value of the material most likely to qualify under this expanded exemption, the proposed changes are not expected to significantly increase the amount of material that is being shipped.

The IAEA conducted a Coordinated Research Program to inform decisions about the amount of regulatory control that may be appropriate for the transportation of natural material and ore. The preliminary results and conclusions from the Coordinated Research Program are described in "Naturally Occurring Radioactive Material (NORM VI): Proceedings of an International Symposium, Marrakesh, Morocco, 22-26 March 2010," IAEA, 2011. The preliminary results of the Coordinated Research Program included: (1) the most conservative scenario was the exposure to a truck driver and a factor of 15 could be used for the exemption of NORM materials for this scenario, even when there is no shielding between the driver and the radioactive load; (2) doses from exposure to released materials arising from potential accidents were less than 10 $\mu\text{Sv}/\text{year}$ (1 mrem/year) for the shipment of tantalum raw materials; (3) individual loads of some materials, depending on their composition (such as higher activities of radium), could lead to higher doses; and (4) doses to members of the public were at least an order of magnitude lower than for workers. The preliminary results of the Coordinated Research Program were generally consistent with allowing increased activity concentrations for naturally occurring material and ore containing naturally occurring radionuclides. Allowing activity concentration values of 10 times the exemption value would still limit doses (from either single or multiple sources) so that they do not reach unacceptable levels and would be far below the public dose limits when considering both normal conditions and accident conditions.

In summary, the environmental impacts associated with the proposed changes to the low-level material exemption would be small and not significant. Removing the regulatory

controls for transporting this material would not lead to substantially higher radiological exposures, because the applicable regulations do not substantially increase the radiological exposures from these materials and the proposed amendment would not significantly increase the amount of material being transported. The preliminary results of the Coordinated Research Program indicate that radiological exposures would remain small and well below unacceptable levels and public dose limits for both normal conditions and accident conditions. Environmental impacts associated from accidental releases would be very small and amenable to prompt clean-up. The impacts from allowing non-radioactive solid objects with radioactive substances present on surfaces in quantities below that used to define contamination would be small.

Environmental Impacts for No Change (No Action Alternative): The dose criteria used in determining the activity concentrations for exempt material ensure that the doses (from either single or multiple sources) do not reach unacceptable levels and would be far below the public dose limits and consider both normal conditions and accident conditions (i.e., an individual effective dose of 10 μ Sv/year (1 mrem/year) for normal conditions and a collective dose of 1 person-Sv/year (100 person-rem/year) of practice for normal conditions, 1 mSv (100 mrem) for an individual effective dose for accident conditions, and 50 mSv (5 rem) for an individual dose to the skin for both normal and accident conditions) (TS-G-1.1)). Therefore, the low-level material exemption applies to material that would not result in unacceptable high doses (from either single or multiple sources) and the doses would be far below the public dose limits when considering both normal and accident conditions.

There would not be any changes to the material that could qualify for the low-level material exemption, if the proposed changes are not made. Without the changes, the material would not qualify for the exemption and would continue to be transported as Class 7 (radioactive) material. Class 7 (radioactive) material may, depending on the routing and mode

of transport, be subject to fees and restrictions that may change. To avoid fees or other restrictions, the material that would only qualify for the exemption if the changes were made may be transported over longer routes than would similar material is able to qualify for the current low-level material exemption. As a result, not changing the low-level material exemption would result in small impacts from the longer transportation routes. Because the requirements that apply to this material do not significantly affect the radiological exposures, the radiological impacts would be small.

Transporting non-radioactive solid objects with radioactive substances present on any surfaces in quantities that do not exceed the levels in the definition of contamination would only contribute to insignificant exposures through inhalation, ingestion or external exposure and would not cause environmental contamination. The regulations that apply to the transportation of these non-radioactive solid objects do not significantly affect the radiological exposures, which are insignificant, or environmental contamination. Therefore, the impacts for making no change to the treatment of these non-radioactive solid objects would be similar to the impacts if the change were made.

C. Prohibition on Heterogeneous Distribution and Lattice Arrays for Shipping Fissile Material Under a General License

Description of the Change: The NRC is proposing to revise § 71.15(d) criteria that, if satisfied, will exempt the material from being classified as fissile material and from the fissile material package standards in §§ 71.55 and 71.59. The NRC would further restrict the exemption for uranium enriched with uranium-235 to a maximum of 1 percent by weight to fissile material that is homogeneously distributed and does not form a lattice-like arrangement, where

fissile material is concentrated and separated by non-fissile material in a regular, repeating pattern.

Environmental Impacts of the Change (Alternative 3): The proposed change would ensure that material containing uranium enriched in uranium-235 to a maximum of 1 percent by weight and qualifying for the fissile material exemption under § 71.15(d) would be subcritical and criticality would not be a potential hazard for this material during transportation. The fissile material that would no longer qualify for the fissile material exemption would be shipped using the fissile material package standards of §§ 71.55 and 71.59 or, if the requirements for a general license to ship fissile material are met, a Type A package. The requirements for a general license to ship fissile material include (1) the package contents contain no more than a Type A quantity of radioactive material and (2) the package contents contain less than 500 total grams of beryllium, graphite, or hydrogenous material enriched in deuterium. The requirements at §§ 71.55 and 71.59 require that packages and arrays of packages remain subcritical. The restrictions for a general license to ship fissile material also provide a margin of safety with respect to criticality. This change would reduce the likelihood of criticality associated with transporting this material; consequently, the environmental impacts associated with this material becoming critical during transport would be reduced. If criticality occurred, the consequences would include increased heat, increased radiation, and the formation of fission products, leading to increased radiation exposures and possible environmental contamination. Reducing the likelihood of criticality further would decrease the likelihood of increased radiation exposures and environmental contamination from inadvertent criticality of material transported under the fissile material exemption.

Environmental Impacts for No Change (Alternative 2 and No Action Alternative): The restrictions for a general license to ship fissile material provide a margin of safety with respect to

criticality. If criticality occurred, the consequences would include increased heat, increased radiation, and the formation of fission products, leading to increased radiation exposures and possible environmental contamination. Because the fissile material exemption provision would not change, the likelihood of criticality associated with transporting this material would not change. Also, and no other changes, such as uranium enriched in uranium-235 to a maximum of 1 per cent by weight that is not homogeneously distributed or forms a lattice arrangement having to be shipped under a general license rather than under the fissile material exemption would be required. Therefore, there would be no change in the environmental impacts from the fissile material exemption change.

D. Qualification of Special Form Radioactive Material

Description of the Change: The NRC is proposing to allow the Class 5 impact tests prescribed in the 1999 edition of the consensus standard ISO 2919, "Radiation protection – Sealed radioactive sources – General requirements and classification," to be used, for specimens weighing less than 500 grams, as an alternative to the impact and percussion tests prescribed in § 71.75. This would make the NRC requirements consistent with TS-R-1 and the proposed DOT requirements. The NRC is proposing to update the Class 4 impact test and the Class 6 temperature test prescribed in the 1980 edition of the consensus standard ISO 2919, "Sealed Radioactive Sources – Classification," to be used, for specimens weighing less than 200 grams, to the Class 4 impact test and Class 6 temperature test, respectively, prescribed in the 1999 edition. The NRC is proposing to update the alternate leak test method prescribed in the 1979 edition of the consensus standard ISO/TR4826, "Sealed Radioactive Sources – Leak Test Methods," to those leak test methods prescribed in the 1992 edition of the consensus standard ISO 9978 "Radiation protection – Sealed radioactive sources – Leakage test

methods.” The ISO/TR4826 has been withdrawn by the ISO and replaced by ISO 9978. This change would make 10 CFR Part 71 consistent with the DOT requirements at 49 CFR Part 173, which incorporated by reference ISO 9978:1992(E) in 2004. The NRC is proposing to continue to allow sources tested using the allowed tests in ISO/TR4826:1979(E) or ISO 2919:1980(E) to be used.

Environmental Impacts of the Change (Alternatives 2 and 3): Special form radioactive material is resistant to breaking from impacts or bending and resistant to melting or dispersal when subjected to heat and is a minimal contamination hazard. The proposed changes would update the alternate impact, percussion, and leak tests to more current consensus standards, which are more stringent than the existing tests. Material passing the more stringent consensus standard tests may be more robust in the event of an accident than material that may pass the less stringent tests, which would result in smaller environmental impacts. The effect of these changes is expected to be a small reduction in the environmental impacts, because: (1) special form radioactive material is often tested using the tests specified in TS-R-1, which are included in 10 CFR Part 71; (2) existing tests are sufficient to ensure that the special form radioactive material is resistant to breaking from impacts or bending and resistant to melting or dispersal when subjected to heat; and (3) material passing the revised alternate tests would have been more stringently evaluated, and potentially more robust, than material tested using the tests that are being replaced. The Class 5 impact test, if used, would replace other similar and available tests. The Class 5 impact test maintains the requirement that the mass of the hammer used in the test is greater than 10 times the mass of the specimen and would be more stringent than the tests specified in TS-R-1. The proposed change to allow the Class 5 impact test to be used would have a small environmental impact, because material qualified using the Class 5 impact test would still present a minimal contamination hazard.

Environmental Impacts for No Change (No Action Alternative): The tests used to qualify special form radioactive material would not change under the no action alternative. The more stringent tests in ISO 2919:1999(E) and ISO 9978:1992(E) would not be available for use to qualify special form radioactive material. Because the tests in ISO 2919:1980(E) and ISO/TR4826:1979(E) are not recognized as being incorporated by reference, tests in these consensus standards could not be used by NRC licensees without an exemption. The impacts of not making this change would be small, because special form radioactive material is often tested using the tests specified in TS-R-1, which are included in 10 CFR Part 71 and are less stringent than the tests in the consensus standards.

E. Changes to Appendix A, Determination of A_1 and A_2

Description of the Change: The NRC is proposing to add an entry for krypton-79 (Kr-79) in Table A-1, “ A_1 and A_2 Values for Radionuclides,” in Part 71, Appendix A, and Table A-2, “Exempt Material Activity Concentrations and Exempt Consignment Activity Limits for Radionuclides,” in Part 71, Appendix A. The NRC is proposing to discontinue using the A_2 value for californium-252 (Cf-252) in footnote h to Table A-1, “ A_1 and A_2 Values for Radionuclides,” in Part 71, Appendix A, that applies for domestic transportation. The A_2 value for Cf-252 in Table A-1 would be used for domestic transportation. The NRC is proposing to change the total consignment activity limit for exempt consignment for tellurium-121m (Te-121m) from 1×10^5 Bq (2.7×10^{-6} Ci) to 1×10^6 Bq (2.7×10^{-5} Ci) in Table A-2 in Part 71, Appendix A.

Environmental Impacts of the Change (Alternatives 2 and 3): Krypton-79 (Kr-79) is not listed in Table A-1 in Part 71, Appendix A, and the values from Table A-3, “General Values for A_1 and A_2 ,” in Part 71, Appendix A, are used to determine the A_1 and A_2 values of Kr-79. The A_2 value for Cf-252 would change from 1×10^{-3} TBq (2.7×10^{-2} Ci) to 3×10^{-3} TBq (8.1×10^{-2} Ci).

The A_1 and A_2 values are used for determining which type of package must be used for the transportation of radioactive material. The A_1 values are the maximum amount of special form material allowed in a Type A package. The A_2 values are the maximum activity of normal form radioactive material allowed in a Type A package. The A_1 and A_2 values are also used for several other packaging limits throughout TS-R-1, such as specifying Type B package activity leakage limits, low-specific activity limits, and excepted package contents limits. The values of A_1 and A_2 have been adopted in 10 CFR Part 71 and are specified in Appendix A.

The A_1 and A_2 activity concentrations are derived using the radiological consequences of accidents that result in the failure of the package and allow for multiple packages to be transported within the same conveyance. The basic radiological criteria for determining A_1 and A_2 values in TS-R-1 are:

- The effective or committed effective dose to a person exposed in the vicinity of a transport package following an accident should not exceed a reference dose of 50 mSv (5 rem).
- The dose or committed equivalent dose received by individual organs, including the skin, of a person involved in the accident should not exceed 0.5 Sv (50 rem), or in the special case of the lens of the eye, 0.15 Sv (15 rem). It is assumed that a person is unlikely to remain at a distance of 1 meter from the damaged package for more than 30 minutes.

The effective dose is the sum of the products of the dose equivalent to the organs or tissues and the weighting factors applicable to each of the body organs or tissues that are irradiated. The committed effective dose is the sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues. The values of committed effective dose in the IAEA safety standards are based on and consistent with the relevant International Commission on Radiological Protection (ICRP) publications and the committed dose equivalent is the dose to

some specific organ or tissue of reference that will be received from an intake of radioactive material by an individual during the 50-year period — or, for children, 70-year period — following the intake.

The Kr-79 values proposed for Table A-1 are larger than the values derived from using the generic values in Table A-3. This change would allow higher activities of Kr-79 to be shipped in a Type A package than would be allowed if the generic values in Table A-3 were to be used, because the radionuclide-specific hazard is less than that assumed with the generic values. Although the calculated risk is the same, the actual risk per package will increase with the amount of material that is allowed to be shipped. This results from the risk being overestimated when establishing the current values. The A_2 value for Cf-252 that would apply to domestic transportation would increase, which would allow higher activities of normal form Cf-252 to be shipped in a Type A package than would be allowed in if the A_2 value in footnote h to Table A-1 were to be used. The values are derived using the “Q [quantity]-system” (see appendix I of TS-G-1.1), which considers a potential exposure — an exposure that is not expected to occur with certainty, but may result from an accident at a source or from an event or a sequence of events — to develop the quantity values for A_1 and A_2 . For a Type A package, the content limits (A_1 and A_2) are established to ensure that unacceptable radiological consequences do not occur, even in cases where significant damage to the package occurs. In the Q-system, a smaller radionuclide-specific hazard corresponds to a larger quantity that would result in the same potential exposure. Although the generic values for Kr-79 are being replaced by radionuclide-specific values, the dose standards underlying the A_1 and A_2 values for Kr-79 have not changed. The dose standards underlying the A_2 value for Cf-252 are the same as that used for the A_2 values for other radionuclides.

In studies of the performance of Type A packages in transportation in the United States (Finley, N.C., McClure, J.D., Reardon, P.C., Wagler, M., "An analysis of the consequences of accidents involving shipments of multiple Type A radioactive material packages", PATRAM 89 (Proc. Symp. Washington, DC, 1989), Oak Ridge National Laboratory, Oak Ridge, TN (1989)) and the United Kingdom (Gelder, R., Mairs, J.H., Shaw, K.B., "Radiological impact of transport accidents and incidents in the UK over a twenty year period", Packaging and Transportation of Radioactive Materials, PATRAM 86, (proc. Symp. Davos, 1986), (IAEA, Vienna (1986))), there was information on 22 accidents involving consignments of multiple Type A packages. The studies covered about 20 years of data. Of the 22 accidents involving multiple Type A packages, there was a release of material in only 2 of the accidents. In each of these cases, the release was on the order of 10^{-4} times the A_2 value. The likelihood of releases of these radionuclides would not change as a result of these proposed changes. Shipments of Cf-252 and Kr-79 comprise a very small fraction of shipments of radionuclides. Based on the experience documented in the studies above, releases in the event of an accident involving shipments of these radionuclides from a Type A package could be on the order of 10^{-4} times the A_2 value (or 3.0×10^{-7} TBq (8.1×10^{-6} Ci) for Cf-252 or 2.0×10^{-4} TBq (5.4×10^{-3} Ci) for Kr-79)). Uncommon releases of this magnitude would result in small impacts, which would be further reduced through clean-up. The impacts from the changes in the A_1 and A_2 values as a result of the corresponding changes in the other packaging limits that are based on these values would also be small.

The radiological consequences (environmental impacts) of these changes would be small. Krypton is a noble gas and Kr-79 has a half-life of 35 hours, so there would be no long-term impacts or contamination. The primary impacts would be an increase in possible exposures in the vicinity of the package. In cases of an accident, containment, atmospheric

turbulence effects, possible plume rise effects when a fire is involved, and air exchange when the accident occurs indoors will contribute to smaller exposures at further distances from the package. The Q-system assumes doses occur 1 meter from the damaged package over a 30 minute period (see TS-G-1.1).

The exemption values for total activity in TS-R-1 were established for the transportation of small quantities of material which, when transported together, are unlikely to result in any significant radiological exposure consistent with the basis for exemption in the IAEA Basic Safety Standards (i.e., an individual effective dose of 10 μ Sv/year (1 mrem/year) for normal conditions and a collective dose of 1 person-Sv/year (100 person-rem/year) of practice for normal conditions). Krypton-79 is not listed in Table A-2 in Appendix A and the values from Table A-3 in Appendix A are used to determine the activity concentration for exempt material and the activity limit for exempt consignment for Kr-79. The radionuclide-specific exemption values proposed for Kr-79 would replace the generic values in Table A-3 and are consistent with the objectives of the exemption values. The change to the activity level for exempt consignment for Te-121m, which is based on new analyses and information, is consistent with the objectives of the exemption values. Therefore, the environmental impacts from these changes would be small and insignificant, because the changes involve the transportation of small quantities of material which, when transported together, are unlikely to result in any significant radiological exposure (TS-G-1.1).

Environmental Impacts for No Change (No Action Alternative): The proposed changes to the A_1 and A_2 values and the exemption values are small. By not making the changes, the A_1 and A_2 values for Cf-252 and Kr-79 and the exemption values for Te-121m would be different than those used by other nations. This could hinder the international transportation of these materials. Differences in domestic and international regulations can make it more complicated

to ship material internationally because you have to meet both sets of requirements. This generally makes it more expensive to import or export radioactive material. Making no change to the values would have small environmental impacts. The generic values in Table A-3 that are used for Kr-79 are smaller than the proposed A_1 and A_2 values and the A_2 value for Cf-252 that applies to domestic transportation is smaller than the proposed A_2 value. Consequently, smaller quantities of Kr-72 and normal form Cf-252 could be shipped in a Type A package than would be allowed by the proposed change. Under the no action alternative, the maximum quantity of material available for release from a package would be proportionally smaller than the maximum quantity available for release from a package under the proposed action. As discussed above, the releases from the 2 accidents involving a shipment of multiple Type A packages and a release of material over 20 years of data were on the order of 10^{-4} times the A_2 value. Therefore, the environmental impacts from not making this change would be small and would be proportionally smaller under the no action alternative than under the proposed action.

Environmental Impacts Associated with the Proposed Action (Alternative 3)

The environmental impacts associated with the proposed amendments have been evaluated, as described above. The environmental impacts of the changes are small when considering routine conditions of transportation and the effects of transportation accidents. The primary effects from the proposed amendments will be in the form of radiological exposure; however, the changes are small and generally address quantities of materials that pose little risk during either routine conditions of transportation or in cases of accidents. The changes to the risk from contamination that may occur from accidents, cargo shifts, package failures, loading, unloading, and handling problems is limited in scale and impact, infrequent, and generally amenable to clean-up; is small. The proposed changes would affect the alternate tests used to

qualify special form radioactive material; however, the proposed amendments would not result in significant changes to the currently available tests or the number of tests performed.

The proposed changes would affect the costs associated with transporting some material and the routes chosen to ship this material could change, because some material would no longer be classified as Class 7 (radioactive) material. The proposed amendments would not significantly change the amount of transportation of radioactive material. Many of the environmental impacts associated with these amendments coincide with impacts arising from the companion DOT rulemaking and do not significantly change the impacts from previous transportation and packaging rulemakings.

IV. ALTERNATIVES TO THE PROPOSED ACTION

The following alternatives were considered.

Alternative 1: The No-Action Alternative

The NRC would take no action. This would leave in place the current regulations. The environmental impacts associated with the proposed amendments have been evaluated, as described above. The environmental impacts of the changes are small when considering routine conditions of transportation and the effects of transportation accidents.

This alternative does not include changes to the low-level material exemption. Material that, if the changes were made, would qualify for the low-level material exemption would be transported as Class 7 (radioactive) material. This may cause the material to be transported over longer routes to avoid fees or other restrictions, which would involve small impacts. Because the requirements that apply to this material do not significantly affect the radiological exposures, the radiological impacts would be small. The impacts from not making the change

to include non-radioactive solid objects with radioactive substances present on any surfaces in quantities that do not exceed the level in the definition of contamination would be similar to the impacts if the change were made and would be small.

This alternative does not include adding additional restrictions to the fissile material exemption for uranium enriched in uranium-235 to a maximum of 1 percent by weight, which if made would reduce the small likelihood of the material becoming critical during transport and the possible environmental contamination that could result.

This alternative would not change currently available tests. Because the tests in ISO 2919:1980(E) and ISO/TR4826:1979(E) are not recognized as being incorporated by reference, tests in these consensus standards could not be used by NRC licensees without an exemption. The impacts of not making this change would be small, because special form radioactive material is often tested using the tests specified in TS-R-1, which are included in 10 CFR Part 71 and are less stringent than the tests in the consensus standards.

The proposed amendments would not significantly affect the amount of transportation of radioactive material transported domestically. If the NRC and the DOT do not make changes that will maintain consistency between their regulations, it would result in increased regulatory uncertainty as licensees would need to determine what is actually allowed and resolve inconsistencies between the NRC and DOT requirements. This would result in additional costs for domestic transportation of radioactive material. If changes are not made to increase the compatibility with the international transportation standards, international transportation of radioactive material would be more difficult and costly for some materials. Licensees would need to meet both agencies requirements which adds to the cost and places the licensee at a competitive disadvantage.

The NRC rejected this alternative because it would not correct inconsistencies with the IAEA's international transportation standards, would allow inconsistencies to develop between the NRC regulations and DOT regulations that apply to the packaging and transportation of radioactive material, and would not make necessary changes to make 10 CFR Part 71 more consistent and compatible with the IAEA's transportation standards.

Alternative 2: IAEA-DOT Compatibility

The NRC would conduct a rulemaking to make the NRC regulations compatible with the 2009 edition of the IAEA international transportation standards (TS-R-1) and the changes to DOT requirements. The NRC would not make any NRC-initiated, substantive changes. The environmental impacts associated with the proposed amendments have been evaluated, as described above. The environmental impacts of the changes are small when considering routine conditions of transportation and the effects of transportation accidents. The primary effects from the proposed amendments will be in the form of radiological exposure; however, the changes are small and generally address quantities of materials that pose little risk during either routine conditions of transportation or in cases of accidents. The change in risk is small for potential contamination resulting from accidents, cargo shifts, package failures, loading, unloading, and handling problems is limited in scale and impact, infrequent, and generally amenable to clean-up.

The impacts would be the same as those for the proposed action with the following exceptions. This alternative does not include additional changes that qualify for a categorical exclusion, because they fall within a category of actions that neither individually nor cumulatively would have significant impact on the human environment. This alternative does not include adding additional restrictions to the fissile material exemption for uranium enriched in

uranium-235 to a maximum of 1 percent by weight, which if made would reduce the small likelihood of the material becoming critical during transport and the possible environmental contamination that could result.

The proposed amendments would not result in significant changes to currently available tests or the number of tests performed. The proposed amendments would not significantly change the amount of transportation of radioactive material. Many of the environmental impacts associated with these amendments coincide with impacts arising from the companion DOT rulemaking and do not significantly change the impacts from previous transportation and packaging rulemakings. Consequently, the proposed amendments will not involve any significant environmental impacts, including consideration of direct, indirect, and cumulative impacts.

The NRC rejected this alternative because it would not make needed changes to 10 CFR Part 71 — such as the change to the fissile exemption criteria, which is necessary for the continued safe transport of uranium enriched in uranium-235 to a maximum of 1 percent by weight that qualifies for the exemption from being classified as fissile material by increasing the margin of safety for shipments under the fissile material exemption — that would not have a significant environmental impact.

V. ALTERNATIVE USE OF RESOURCES

There are no irreversible commitments of resources determined in this assessment.

VI. AGENCIES AND PERSONS CONTACTED

The NRC consulted with DOT during the preparation of the proposed rule and the preparation of this draft Environmental Assessment, consistent with the memorandum of understanding between the NRC and the DOT (44 FR 38690; July 2, 1979). The NRC sent a copy of the draft Environmental Assessment and the proposed rule to every State Liaison Officer and requested their comments on the Environmental Assessment.

VII. FINDING OF NO SIGNIFICANT IMPACT

The Commission has determined under the National Environmental Policy Act of 1969, as amended, and the Commission's regulations in Subpart A of 10 CFR Part 51, that the issuance of the proposed amendments are not a major federal action significantly affecting the quality of the human environment, and therefore, an environmental impact statement is not required. The proposed amendments would amend the requirements for packaging and transportation of radioactive material. The amendments would make changes to harmonize the NRC regulations with the 2009 edition of the IAEA's transport regulations (TS-R-1)) and the DOT regulations for the transportation of radioactive material; expand the exemption for the domestic shipping of natural materials and ores containing naturally occurring radionuclides; reintroduce a prohibition on the heterogeneously distributed fissile material from being shipped under a general license; and make changes to the regulations that apply to quality assurance programs. The environmental impacts arising from the changes have been evaluated and would not involve any significant environmental impact. This includes consideration of direct,

indirect, and cumulative impacts. The proposed amendments are procedural in nature and of themselves would have no significant impact on the environment.

The determination of this Environmental Assessment is that there will be no significant impact to the public from this action. However, the general public should note that the NRC welcomes public participation. Comments on any aspect of the Environmental Assessment may be submitted to: Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Attn: Rulemakings and Adjudications Staff.