ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT FOR THE FINAL 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 U.S. Nuclear Regulatory Commission (NRC), in consultation with the U.S. Department of Transportation (DOT), is amending its requirements for the packaging and transportation of radioactive material in Part 71 of Title 10 of the *Code of Federal Regulations* (10 CFR). Some of the amendments will make conforming changes to the NRC's regulations based on the International Atomic Energy Agency's (IAEA) regulations for the international transportation of radioactive material. More specifically, these changes will make the NRC's regulations compatible with the 2009 edition of the IAEA's transportation standard, "Regulations for the Safe Transport of Radioactive Material" (TS-R-1), and maintain consistency with changes that the DOT has made in its regulations in response to TS-R-1. This part of the rulemaking harmonizes the NRC's regulations with the IAEA's transportation standards in TS-R-1, and aligns with the DOT's regulations, as revised in July 2014.

Other amendments, initiated by the NRC, will:

1. Revise a provision that exempts some shipments of fissile material from transportation package requirements. For shipments of uranium enriched to a maximum of 1.0 weight percent U-235, the exemption is revised to require that this fissile material be distributed

homogeneously within its transportation package and not form a lattice arrangement.

2. Clarify the responsibilities of certificate holders and licensees when making preliminary determinations.

3. Revise quality assurance program regulations to a) 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 b) implement a change in practice where quality assurance program approvals would not expire.

II. THE NEED FOR THE PROPOSED ACTION

The IAEA is chartered to establish safety standards to protect public health and safety and to minimize the danger to life and property and has developed international safety standards for the safe transport of radioactive material in TS-R-1. By providing a global framework for the consistent regulation of the transport of radioactive material, TS-R-1 facilitates international commerce and contributes to the safe conduct of international trade involving that material.

Periodically, the IAEA revises its standards related to transportation of radioactive material. The NRC evaluated changes in the 2009 edition of the IAEA's TS-R-1 and identified a number of areas in 10 CFR Part 71 that needed to be revised to maintain compatibility with the IAEA standards.

Historically, the NRC has coordinated its revisions to 10 CFR Part 71 with the DOT, because the DOT and the NRC co-regulate transport of radioactive materials in the United States. The roles of the DOT and the NRC in the co-regulation of the transportation of radioactive materials are documented in a memorandum of understanding (MOU) (44 FR 38690; July 2, 1979). Consistent with this MOU, the NRC has coordinated its efforts with the

DOT during this rulemaking, and representatives from the NRC and DOT have advised and consulted with one another. This final rule has been coordinated with DOT to ensure that consistent regulatory standards are maintained between NRC and DOT radioactive material transportation regulations, and to ensure coordinated publication of the final rules by both agencies. On July 11, 2014, the DOT published its final rule titled, "Hazardous Materials: Compatibility with the Regulations of the International Atomic Energy Agency" in the *Federal Register* (79 FR 40590) with an effective date of October 1, 2014, and a mandatory compliance date of July 13, 2015.

As indicated above, another set of amendments, initiated by the NRC, revise 10 CFR Part 71 to: 1) update administrative procedures for the quality assurance program requirements described in subpart H of 10 CFR Part 71; 2) re-establish restrictions on material that qualifies for the fissile material exemption; 3) clarify the requirements for a general license; 4) clarify the responsibilities of certificate holders and licensees when making preliminary determinations; and 5) make editorial revisions to correct and clarify certain other requirements.

III. ENVIRONMENTAL IMPACTS OF PROPOSED ACTION

The proposed action consists of a number of changes to 10 CFR Part 71. Many of these changes fall within the categorical exclusions listed in § 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 proposed action consists of a number of 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 in which they are described in more detail and their environmental impacts are discussed.

Table 1: Proposed Changes Evaluated in the Environmental Assessment

Section	Subject	Proposed Changes	Analysis
71.4	Definitions	Add definition of "contamination."	See Section III.A.
71.4	Definitions	Revise definition of "Criticality Safety Index (CSI)."	See Section III. A.
71.4	Definitions	Revise definition of "Low Specific Activity (LSA) material."	See Section III.A.
71.4	Definitions	Revise definition of "special form radioactive material."	See Section III.A.
71.4	Definitions	Revise definition of "uranium – natural, depleted, enriched."	See Section III. A.
71.14	Exemption for low-level materials	Revise paragraph (a), add paragraph (a) (3).	See Section III.B.
71.15	Exemption from classification as fissile material	Revise paragraph (d).	See Section III.C.
71.70	Incorporation by reference	Add a section that consolidates incorporation by reference language.	See Section III.D.
71.75	Qualification of special form radioactive material	Revise paragraphs (a) (5) and (d).	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.	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.	See Section III.E.

A. Revised Definitions

Description of the Change: The definition for "Contamination" is added to § 71.4 to be consistent with the definition in the DOT transportation regulations at 49 CFR Part 173 and IAEA's TS-R-1. The definition of "Criticality Safety Index (CSI)" is revised to be consistent with the definition in the DOT's 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" is revised to be consistent with the definition in the DOT's regulations at 49 CFR Part 173 and IAEA's TS-R-1 by making the description of LSA 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" is 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" is revised by adding "(which may be chemically separated)" to the portion of the definition that describes natural uranium. This portion of the definition becomes "[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 (included in the Proposed Action and Alternative 2): The changes to the definitions of "Criticality Safety Index (CSI)" and "Uranium — natural, depleted, enriched" provide clarifications. Because the 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 "Uranium -- natural, depleted, enriched" does not alter the distributions of uranium isotopes used to describe the "Uranium—natural, depleted, enriched." Also, 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 “Uranium—natural, depleted, enriched” is used.

The change in the definition of “Low Specific Activity (LSA) material” corrects the “LSA-I” component of this definition. Specifically, existing subsection (1)(i) of the “Low Specific Activity (LSA) material” definition includes the word “not.” This makes the NRC definition inconsistent with the DOT definition of LSA material (which does not include the word “not”). Removal of the word “not” makes the NRC definition for LSA 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 will 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.

The changes to the definition of “Special form radioactive material” allow material already tested to continue to qualify as special form radioactive material. Because the changes allow the continued use of Special form radioactive material that has been qualified using current tests and do not change the requirements applicable to this qualified material, there are 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.

Environmental Impacts for No Change (No Action Alternative): There are no environmental impacts associated with the no-action alternative. Not making the changes to the definitions of CSI, "Uranium ─ natural, depleted, enriched," and LSA would not result in environmental impacts.

The environmental impacts from not changing the definition of "Contamination" are evaluated in Section III.B.

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.

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 is changed to indicate that such natural material or ore could be in either its natural state or have been processed. The exemption is also changed to specifically allow non-radioactive solid objects with "contamination" to be transported without being handled as hazardous material.

Environmental Impacts from the Change (included in the Proposed Action and Alternative 2): 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 10 CFR 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 are 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 change will allow

some additional material to qualify for the exemption, because the change explicitly allows material that has been processed to qualify for the exemption. Although material that qualifies for the exemption under the change is 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 primarily involve radiation exposure. However, 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 will be far below the public dose limits. The dose criteria consider both normal conditions and accident conditions (i.e., an individual effective dose of 10 μSv/year (1 mrem/year) for normal conditions and a collective dose of 1 person-Sv/year (100 person-rem/year) 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 is 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 external, ingestion and inhalation exposures, and can spread, whereas fixed contamination would only contribute to external exposures. Contamination below the values in the definition would only contribute to insignificant exposures through inhalation, ingestion, or external exposure. The derived values are conservative with respect to transportation. As a

result, this change would have, at the most, 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 present 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 ensure that the doses for both normal and accident conditions remain well below the public dose limits for normal and accident conditions.

The exemption, which also appears in the DOT's regulations, already covers many types of material from mining and minerals processing, building materials, and other natural materials. Large quantities of these materials are currently transported under the current exemption. Because they do not involve activities licensed by the NRC, they are not subject to the NRC's 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. Material that is categorized by the DOT 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 relative to the value of the material most likely to qualify under this expanded exemption, the 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 results and conclusions from the Coordinated Research Program are described in the IAEA published final report IAEA-TECDOC-1728, "Regulatory Control for the Safe Transport of Naturally Occurring Radioactive Material (NORM), Report of a Coordinated Research Project 2007-2010" published in December 2013. At the time the proposed rule was published, the preliminary results of the Coordinated Research Program were available and 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 μSv/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. The final report published in 2013 confirmed these preliminary results. The recommendation of the final report was to propose a revision to IAEA regulations to apply 10 times exemption value to all NORM materials. Allowing activity concentration values of 10 times the exemption value will limit doses (from either single or multiple sources) so that they do not reach unacceptable levels and remain 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 are expected to be small and not significant. Removing the regulatory controls for transporting this material will 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 is not expected to significantly

increase the amount of material being transported. The preliminary results of the Coordinated Research Program indicate that radiological exposures will remain small and well below unacceptable levels and public dose limits for both normal conditions and accident conditions. Environmental impacts associated from accidental releases are expected to 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 are expected to be small.

Environmental Impacts for No Change (No Action Alternative): The dose criteria used in determining the activity concentrations for exempt material under the existing exemption ensures that the doses (from either single or multiple sources) do not reach unacceptable levels and would be far below the public dose limits. These criteria consider both normal conditions and accident conditions (i.e., an individual effective dose of 10 μSv/year (1 mrem/year) for normal conditions and a collective dose of 1 person-Sv/year (100 person-rem/year) 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 existing 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 changes are not made. Without the changes, the material would not qualify for the exemption and would continue to be transported as the DOT Class 7 (radioactive) material. Class 7 (radioactive) material may, depending on the routing and mode of transport, be subject to additional fees and restrictions. To avoid these additional fees or other restrictions, the Class 7 material may be transported over longer routes than similar material that does qualify for the current low-level material exemption. As a result, not changing the low-

level material exemption may result in small impacts from the longer transportation routes.

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 the Exemption in § 71.15(d)

Description of the Change: The NRC is revising § 71.15(d) criteria that, if satisfied, will exempt certain material from being classified as fissile material and from the fissile material package standards in §§ 71.55 and 71.59. The NRC is further restricting the exemption for uranium enriched with uranium-235 to a maximum of one percent by weight to fissile material that is homogeneously distributed and does not form a lattice-like arrangement (i.e., is not in a fixed, repeating configuration such as found in a nuclear fuel assembly).

Environmental Impacts of the Change (Included in the Proposed Action): The change would ensure that material containing uranium enriched in uranium-235 to a maximum of one percent by weight and qualifying for the fissile material exemption under § 71.15(d) is subcritical and criticality is not a potential hazard for this material during transportation. The fissile material that no longer qualifies for the fissile material exemption would be shipped using the fissile material package standards of §§ 71.55 and 71.59. The 10 CFR 71.15(d) exemption language continues to exclude large quantities (less than five percent of the uranium mass) of

low-absorbing moderators (beryllium, graphite, or hydrogenous material enriched in deuterium). Restricting the exemption's scope will reduce the likelihood of criticality associated with transporting this material; consequently, the environmental impacts associated with this material becoming critical during transport are reduced. If a 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 decreases 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 (No Action Alternative): Similar to the proposed action, under the no-action alternative there would be a smaller margin on 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 remain the same, as would the consequences.

D. Incorporation by Reference and Qualification of Special Form Radioactive Material

Description of the Change: The NRC is allowing 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 will make the NRC requirements consistent with TS-R-1 and the proposed DOT requirements. The NRC is also updating 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 updating 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 will make 10 CFR Part 71 consistent with the DOT requirements at 49 CFR Part 173, which incorporated by reference ISO 9978:1992(E). The NRC is continuing 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 (Included in the Proposed Action and Alternative 2): 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 changes 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 passes 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 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. There could be small negative impacts if these changes are not made because special form radioactive material tests that are included in the current 10 CFR Part 71 are less stringent than the tests in the updated consensus standards.

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

Description of the Change: The NRC is adding 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 discontinuing the use of an 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 will instead be used for domestic transportation. The NRC is changing the total consignment activity limit for exempt consignment for tellurium-121m (Te-121m) from $1x10^5$ Bq ($2.7x10^{-6}$ Ci) to $1x10^6$ Bq ($2.7x10^{-5}$ Ci) in Table A-2 in Part 71, Appendix A.

Environmental Impacts of the Change (Included in the Proposed Alternative and Alternative 2):

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 currently used to determine the A_1 and A_2 values of Kr-79. In Appendix A to Part 71, Table A-1, the A_2 value in the table for Cf-252 is updated to $3x10^{-3}$ TBq ($8.1x10^{-2}$ Ci) to be consistent with the IAEA's values in TS-R-1.

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 area irradiated and the committed dose equivalent to these organs or tissues. The values of committed effective dose in the IAEA's 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 added to Table A-1 are larger than the values derived 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 using the generic values in Table A-3 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 generic values. The A_2 value for Cf-252 that would apply to domestic transportation is increasing, which allows for higher activities of normal form Cf-252 to be shipped in a Type A package than are allowed in the A_2 value in the current footnote h to Table A-1. The new values are derived using the "Q [quantity]-system" described in 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 a short-term 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's Basic Safety Standards[1] (i.e., an individual effective dose of 10 μSv/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 currently 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 will 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 will 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 inconsistent with those used by other nations. This could hinder the international transportation

[1] (http://www-pub.iaea.org/MTCD/publications/PDF/p1531interim_web.pdf)

of these materials. Differences in domestic and international regulations can make it more complicated to ship material internationally because both sets of requirements must be met. This generally makes it more expensive to import or export radioactive material. Making no change to the values would have no environmental impacts. The generic values in Table A-3 that are currently 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 currently can be shipped in a Type A package than is allowed by the change. Under the no action alternative, the maximum quantity of material available for release from a package is proportionally smaller than the maximum quantity available for release from a package under the proposed action. As discussed above, the releases from the two 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.

F. Summary of Environmental Impacts Associated with the Proposed Action

The environmental impacts associated with the proposed action 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 action 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 changes would affect the alternate tests used to qualify special form

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

The proposed action 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 action is not expected to significantly change the quantity or volume of radioactive material transported. Many of the environmental impacts associated with these amendments coincide with impacts arising from the companion DOT rulemaking and will 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

Under this alternative, the NRC would take no action. This would leave in place the current regulations. The environmental impacts associated with this alternative have been evaluated, as described in Section III. 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 instead continue to 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 one 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 adopt more up to date 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. There could be small negative impacts from not making this change, because the tests specified in TS-R-1, which are currently included in 10 CFR Part 71, are less stringent than the tests in the consensus standards.

If the NRC and the DOT do not make changes that maintain consistency between their regulations, there could be increased regulatory uncertainty as licensees would need to determine what is actually allowed and resolve inconsistencies between the NRC and DOT requirements. This may 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 could be more difficult and costly for some materials. Licensees would need to meet both agencies' requirements which could add to the cost and may place 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's regulations and DOT's 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

Under this alternative, the NRC would conduct a rulemaking that was limited to making the NRC's regulations compatible with the 2009 edition of the IAEA's international transportation standards (TS-R-1) and the changes to DOT's requirements. The NRC would not make any NRC-initiated, substantive changes. The environmental impacts associated with this alternative have been evaluated, as described in Sections III.A, III.B, III.D, and III.E. The environmental impacts of the changes are small when considering routine conditions of transportation and the effects of transportation accidents. The primary effects from this alternative 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 adding additional restrictions to the fissile material exemption for uranium enriched in Uranium-235 to a maximum of one 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 result in significant changes to currently available tests or the number of tests performed. 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 additional needed changes to 10 CFR Part 71. For example, this alternative would not change the fissile exemption criteria.

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 the DOT during the preparation of the final rule and the preparation of this Environmental Assessment, consistent with the memorandum of understanding between the NRC and the DOT (44 FR 38690; July 2, 1979). The NRC requested the views of the Agreement States on the Environmental Assessment for this rule. The NRC did not receive any comments from the Agreement States.

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 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 amendments would change the requirements for packaging and transportation of radioactive

material. The amendments would make changes to harmonize the NRC's regulations with the 2009 edition of the IAEA's transport regulations (TS-R-1) and the DOT's regulations for the transportation of radioactive material; expand the exemption for the domestic shipping of natural materials and ores containing naturally occurring radionuclides; reduce the scope of the 10 CFR 71.15(d) exemption; 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 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.