

NRCREP - Comments to Federal Register/Vol.72, No.131, Page 37471, July 10, 2007

From: "Payton, Maria" <Maria.Payton@hq.doe.gov>
To: <nrcprep@nrc.gov>
Date: 08/15/2007 1:08 PM
Subject: Comments to Federal Register/Vol.72, No.131, Page 37471, July 10, 2007
CC: "Kapoor, Ashok" <ASHOK.KAPOOR@em.doe.gov>

Attached are comments from DOE to NRC Solicitation of Proposed Issues Federal Register/Vol 72 No 131, July 10 2007

Thank you,

Maria

Maria da Luz Payton
 Environmental Management, EM- 63
 Office of Transportation
 Phone: 301-903-0189
 Fax: 301-903-1431



Email: Maria.Payton@hq.doe.gov

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Created By: Maria.Payton@hq.doe.gov

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Department of Energy
Washington, DC 20585

AUG 16 2007

Michael T. Lesar
Chief, Rulemaking, Directives and Editing Branch
Mail Stop T6-D59
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Subject: Solicitation of Proposed Issues or Identified Problems with the
International Atomic Energy Agency Regulations, Federal Register/Vol.72,
No.131, Page 37471, July 10, 2007

Dear Mr. Lesar:

The purpose of this letter is to provide comments and submit an identified problem with the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material (referred to as TS-R-1).

Identified Problem:

During our review of basic radionuclide values listed in Table 1 in Section IV of TS-R-1 (2005 Edition), we identified some inconsistencies in accounting for daughter products in A_1/A_2 values that may result in inaccurate and inconsistent implementation of the regulations, both by individuals and between individuals and organizations. This problem (*see attachment*) is described in the format requested by you in the federal register notice published on July 10, 2007.

An appropriate resolution of this problem would prevent misclassification of packages of radioactive material and would improve implementation of IAEA regulations.

Comments on need for new non-fixed package surface contamination limits in TS-R-1:

Based on our review of the IAEA TECDOC-1449, "*Radiological aspects of non-fixed contamination of packages and conveyances*, June 2005", we agree that there is a need for change in the current limits for non-fixed surface contamination on packages and conveyances. The current limits were developed in 1961 using very conservative assumptions and an outdated simple model of worker exposure. TECDOC suggested other alternative methods for specifying contamination limits including dose-based radionuclide specific limits. However, this approach must also be reconciled with the ease of detection and measurement by available instruments.

In general, DOE supports a dose-base radionuclide specific approach to specify removable surface contamination limits provided values could be grouped into 3-



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4 radionuclide categories. It is observed that all radionuclides that give the most restrictive surface concentrations are alpha emitters and the ones that give the least restrictive surface concentrations are low energy beta gamma emitters. Similarly, beta emitters can be grouped in two or three groups and dose coefficients could be used as one criterion in the grouping.

DOE has used the following four radionuclide groups (per DOE Order 5400.5, *Radiation Protection of the Public and the Environment*, 2-8-90, modified on November 17, 1995) to establish removable surface contamination guidelines for radioactive material handled at its facilities. The present guidelines are not dose based; however, sites at least have the capability to detect and measure removable contamination at these levels. The radionuclide groupings are:

- Group 1 - Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, Pa-231
- Group 2 - Th-natural, Sr-90, I-126, I-131, I-133, Ra-223, Ra-224, U-232, Th-232
- Group 3 - U-natural, U-235, U-238, associated decay products, alpha emitters
- Group 4 - Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above (*This category of radionuclides includes mixed fission products, including Sr-90 that is present in them. It does not apply to Sr-90 that has been separated from the other fission products or mixtures in which the Sr-90 has been enriched.*)

The DOE removable surface contamination guideline for the Group 4 radionuclides is more relaxed (factor of 50) than the guideline for Group 1 radionuclides.

We also support the consideration of package type in determining dose base removable surface contamination limits as discussed in the TECDOC. The basic model used in the TECDOC covers all main types of the transportation operation including four packaging types (*e.g., small manually handled packages, small remotely handled packages, large remotely handled packages, and irradiated nuclear fuel casks*). The basic model was developed and used to determine annual doses for a package surface activity of 1Bq/cm² for workers and the public. However, TECDOC did not recommend any dose base limits.

Therefore, development of non-fixed surface contamination limits based on four radionuclide grouping with due consideration of package types and handling methods, would be more realistic and in sync with the current radiation protection philosophy and associated dosimetry than the limits derived previously using conservative assumptions and the now outdated Fairbairn model.

Thank you for the opportunity to provide comments. If you have any questions regarding these comments, please contact me at (301) 903-7284 or Ashok Kapoor of my office at (202) 586-8307.

Sincerely,

A handwritten signature in black ink, reading "Ella McNeil". The signature is fluid and cursive, with the first name "Ella" and last name "McNeil" clearly distinguishable.

Ella McNeil, Acting Director
Office of Transportation
Office of Environmental Management

cc:

R. Boyle, DOT
D. Chung, EM-60
A. Kapoor, EM-63

Attachment**Proposed issues or identified problems**

(Federal Register: July 10, 2007, Vol.72, No. 131, Page 37471)

Name: Ashok Kapoor

Address: Office of Transportation, U.S. Department of Energy, 1000
Independence Ave. SW Washington DC 20585

Telephone No.: 202-586-8307

E-mail address: Ashok.kapoor@hq.doe.gov

Principal objective of issue or identified problem:

Needed to improve implementation of the Transport Regulations

Topic of issue or identified problem:

Inconsistencies in accounting for daughter products in A_1/A_2 and exempt values in Table 1 in Section IV of TS-R-1 may result in inaccurate and inconsistent implementation of the regulations, both by individuals and between individuals and organizations.

Justification for proposed change:

The U.S. Department of Energy (DOE) ships radioactive materials in support of its research and development, environmental restoration and cleanup, and National defense activities. Similar to other shippers, DOE follows the necessary and applicable International, Federal, State, and local government requirements. The Radcalc software program was developed to assist DOE sites' packaging and transportation personnel in packaging and transportation determinations. One of the principal design requirements for Radcalc is the ability to classify packages of radioactive material based on A_1 or A_2 limits of radioactive isotopes. During the revision of the Radcalc program, we identified these inconsistencies in Table 1 that needs to be corrected.

Another function of Radcalc is to evaluate whether the package content is classified as "radioactive" using the exempt values in Table I. During the revision of the Radcalc program, questions surfaced regarding inconsistencies between the parent/daughter isotopes identified in footnote "b" of Table 1 for the exempt values, and those identified in footnote "a" of Table 1 and Table I.3 of TS-G-1.1.

An assessment of the benefits and impacts of the proposed Change:

Prevent misclassification of packages of radioactive material and to improve implementation of regulations.

Paragraphs affected and proposed text change to regulatory text in TS-R-1:

TS-R-1 Section IV Table 1

Paragraphs affected and proposed text change to IAEA advisory material in TS-G-1.1:

None

A listing of any applicable reference documents:

49 CFR 173.435

Firestone, Richard B., et al., 1999, *Table of Isotopes*, 8th Edition, John Wiley & Sons, Inc., New York, New York.

<http://www.wiley.com/legacy/products/subject/physics/toi/>

Description of issue or identified problem to be addressed:

Review of IAEA requirements and guidance documents, and decay chain data from the *Table of Isotopes* (Firestone 1999) has identified inconsistencies in the basis of footnote (a) to Table 1 in Section IV of TS-R-1 "Table of A_1 and A_2 values for radionuclides." These regulations identify daughter nuclides with half-lives less than 10 days accounted for in the published A_1/A_2 values for the parent nuclide. Inconsistencies are both internal to specific sources and between sources. The inconsistencies may lead to either double-counting daughter products already included in the parent (potentially resulting in use of a more expensive shipping package than necessary) or failing to account for some daughter products (potentially resulting in a misclassification of package contents). Examples include the following:

- Footnote (a) to Table 1 in Section IV of TS-R-1 identifies ^{42}Ar and ^{118}Te as isotopes that include contributions from daughter isotopes with half-lives less than 10 days; however, neither isotope is listed in TS-R-1 or 49 CFR 174.435.
- ^{92}Sr and $^{96\text{m}}\text{Tc}$ are both marked with footnote (a); however, the half-lives of these parents are less than that of their daughters.
- Parent-daughter pairs with low branching ratios are not handled consistently; for instance, compare ^{77}As - $^{77\text{m}}\text{Se}$ (with a branching ratio of 0.002), which is not footnoted in the regulations, with ^{210}Pb - ^{206}Hg (with a branching ratio of $1.9\text{E-}08$), which is included in the regulations.
- ^{105}Ru , ^{109}Cd , ^{109}Pd and ^{239}Pu all exhibit parent-daughter equilibrium with less than 10-day half-lives of their daughters and large branching ratios, but are not flagged with footnote (a).

Regarding the exempt values in Table 1, a comparison between the parent/daughter isotopes listed in footnote "b" of Table 1 for the exempt values and those identified in Table I.3 of TS-G-1.1 for A_1/A_2 values indicate several differences, as delineated below. To promote consistency and accuracy among shippers in the DOE community when determining whether a shipment is "radioactive" or not, we are asking for clarification why these parent-daughter relationships are different.

- 57 of the 75 parent isotopes identified in Table 1 with footnote "a" are not identified in Table 1 with footnote "b".
- 11 of the 31 parent isotopes identified in Table 1 with footnote "b" are not identified in Table 1 with footnote "a".

For those isotopes with footnote "a" and "b", some parent-progeny are not consistent between footnote "b" and those identified in Table I.3 of TS-G-1.1. For example there are differences for the following parent isotopes: Zr-97, Ce-144, Rn-222, Ra-226. Note that there are other parent isotopes with differences, and that most differences are in 1 or at most 2 of the daughter isotopes.

Summary of proposed solution to the issue or identified problem:

An appropriate correction of Table 1

Expected cost of implementation (negligible, low, medium or high):