

NRCREP - Submission of Proposed Issues with IAEA (July 10-07 FR)

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Date: 08/12/2007 5:10 PM  
Subject: Submission of Proposed Issues with IAEA (July 10-07 FR)

7/10/07  
72 FR 37471

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Dear NRC,

Please find the attached in response to the July 10, 2007 Federal Register notice concern the solicitation of proposed issues or identified problems with the IAEA regulations.

Thank you,  
Wade Winters

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August 12, 2007

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

Dear Mr. Lesar,

Regulatory Resources, Inc. (RRI) is a consulting and training company serving clients subject to the Department of Transportation (DOT) Hazardous Materials Regulations (HMRs) and the Environmental Protection Agency (EPA) solid and hazardous waste management regulation. One of our specialty areas covers the regulations for the safe transport of radioactive materials. We are submitting this in response to the July 10, 2007 Federal Register notice, "Solicitation of Proposed Issues or Identified Problems with the International Atomic Energy Agency Regulations". Our only comment is directed specifically at ¶619 in the International Atomic Energy Agency (IAEA) TS-R-1, *Regulations for the Safe Transport of Radioactive Materials*.

#### Synopsis

It is our opinion, based on historical application and relevant data, that the requirement that all Class 7 radioactive material packages intended for air be capable of withstanding, without leakage, an internal pressure which produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa has a two-fold application: (1) With regard to designed pressure capable containment systems, the requirement of 'no leakage' applies to the containment system; and (2) with regard to packaging systems designed to operate at equilibrium with atmospheric pressures, the requirement of 'no leakage' applies to no loss of radioactive content from the package.

#### Concern

The general packaging requirement for Class 7 radioactive material by air includes a requirement that "[p]ackages containing radioactive materials ....be capable of withstanding, without leakage, an internal pressure which produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa."<sup>1</sup> The term "without leakage" is not specified and has led to confusion of its applicability: Is it applicable to the package containment system or the loss of content from the package?

#### Background

The International Atomic Energy Agency (IAEA) Safety Series No. 6, *Regulations for the Safe Transport of Radioactive Materials*, 1985 Edition (As Amended 1990), heretofore SS-6, stated in ¶517 the requirement that:

"Packages containing liquid radioactive materials ...shall be capable of withstanding without leakage an internal pressure which produces a pressure differential of not less than 95 kPa..."

Advisory guidance for meeting this requirements was provided in SS-37, *Advisory material for the IAEA Regulations for the Safe Transport of Radioactive Material (1985 Edition) (As Amended 1990)*, paragraphs A-527.1 through A-537.5 as referenced by ¶A-517. The advisory guidance provided references the "no loss of content" requirement for Type A packages.

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<sup>1</sup> IAEA TS-R-1, ¶619

Mr. Michael T. Lesar  
August 12, 2007  
Page 2

In the publication of the 1990 IAEA *Regulations for the Safe Transport of Radioactive Material*, ST-1 (now TS-R-1), ¶619, the IAEA revised the general packaging requirement for air to read:

"Packages containing radioactive material ...shall have a containment system able to withstand without leakage a reduction in ambient pressure of 5 kPa."

The pressure test change made between SS-6 and 1996 TS-R-1 had two impacts. The first is that it takes into consideration that internal pressures within the packaging may exist. Packages containing radioactive material can have internal pressures ranging from below 14.7 psig to multiple atmospheres. The original pressure differential of 95 kPa did not account for potential internal pressure. Hence, the revised text to an ambient pressure of 5 kPa accounted for any potential internal pressures within the containment system. The second impact is that the absolute ambient pressure fails to make any allowance for expansion of thin-walled packagings. These thin-walled packages may be confined on all surfaces by other goods during transport and constrain their ability to expand.

The International Civil Aviation Organization (ICAO), responsible for the internationally adopted Technical Instructions for the Safe Transport of Dangerous Goods by Air (TI)<sup>2</sup> did not approve of the change in 1996 TS-R-1. As a result, ¶619 in the 2005 Edition of the TS-R-1 was revised to state:

"Packages containing radioactive materials ....be capable of withstanding, without leakage, an internal pressure which produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa."

The additional requirement for consideration of the maximum normal operating pressure (MNOP) plus 95 kPa fulfills the needs of both the IAEA and ICAO.

#### Applicability

The guidance document to the TS-R-1 IAEA regulations, TS-G-1.1, *Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material*, 2002 Edition, states in ¶619.1 that the 95 kPa pressure differential general packaging requirement is:

"...a similar provision to that required by the [ICAO] for packages containing certain liquid hazardous materials intended for transport by air."

This statement must be qualified in two respects. First, the ICAO TI requirement is based on packagings designed for non-radioactive liquid content. In ICAO TI 4-1.1.6, the requirement for the 95 kPa applies to packagings for which retention of liquid is a basic function; a designed containment system is required. In the Introductory Notes of ICAO TI Part 4, *Note 3 – Pressure variations* states that pressure reductions will tend to cause discharge of liquid contents or bursting of the receptacles or packagings during flight unless each receptacle or packaging and its closures be designed to withstand pressures differentials in the order of 68 kPa. Once again, the emphasis is on packaging systems that act as the containment barrier or as a pressure-tight system. Lastly, in the ICAO TI, General Packaging Requirements (for all dangerous goods packagings), section 4-1.1.1, ICAO states that packagings must be constructed and closed so as to prevent any loss of contents taking into account normal conditions of transport (including pressure differentials). This last requirement encompasses all physical states and sets the requirement to prevent "loss of content" from the packaging.

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<sup>2</sup> International Civil Aviation Organization, Doc 9284, AN/905

Mr. Michael T. Lesar  
August 12, 2007  
Page 3

The second important qualifier in the TS-G-1.1 language is the phrase, "a similar provision". As stated above, the ICAO II provision applies specifically to packagings for which retention of liquid is a basic function. In application to Class 7 materials, this requirement is dual function.

In the former IAEA SS-37 advisory guidance publication, ¶A-517 referred all advisory guidance concerning the 95 kPa pressure differential without leakage requirements to paragraphs A-537.1 through A-537.5. These specific paragraphs contained the advisory guidance for the qualification criteria to indicate the ability of the package to prevent loss or dispersal of radioactive content when subjected to Type A package performance tests. In the guidance ¶A-537.2 the IAEA states that the purpose of ¶517 (now TS-R-1, ¶619):

"...is to ensure that under normal transport conditions *the radioactive content of the package cannot escape* in sufficient quantities to create a radiological or contamination hazard."  
[emphasis added]

It is clear that the understanding of "without leakage" is intended to mean loss of material and may include the radioactive content itself. Furthermore, the IAEA states:

"A qualitative approach, *dependent upon the packaging under consideration and its radioactive contents*, may be employed." [emphasis added] SS-37 ¶A-537.3; TS-G-1:1 ¶646.3

"In the case of packages *where containment of the radioactive contents is achieved by means of special form radioactive material...*" [emphasis added] TS-G-1.1 ¶640.1

Lastly, in SS-37, ¶A-537.4 and A-537.5, the leakage concern is specific to the loss of the radioactive content.

The guidance offered by the IAEA in the SS-37 and TS-G-1.1 advisory guidance publications indicates that the ability of the package to retain the radioactive content is the critical factor in determining "without leakage". For package designs which incorporate a pressure containment system, failure of this system will cause "loss of content". However, for packaging systems that are designed to maintain equilibrium with atmospheric conditions, the "without leakage" criteria can only be based on loss of radioactive content. Hence, the general packaging requirements for Class 7 packages intended for transport by air provide a similar provision to that required by ICAO.

### Conclusion

Industries and consumers worldwide use radioactive materials daily. The majority of these materials are Type A activities or less: special form sealed sources, instruments of various types, support materials for nuclear operations, and specialized equipment for the medical and nuclear industries. In conferring with some of the suppliers and shippers of radioactive materials in support of these activities, I have determined that many do not apply the "without leakage" to mean in the strict sense that the packaging system itself be capable of retaining such pressure, but rather, that the packaging system together with the radioactive content be capable of retaining the radioactive content under such conditions. The 40 plus year safety record of these shipments, domestically and internationally, must stand as a testament to the validity of their argument. To employ this as an absolute packaging system requirement is completely unfounded and will immediately curtail countless radioactive materials shipments. The end result will be significant economic burdens to industry and consumers worldwide.

Mr. Michael T. Lesar  
August 12, 2007  
Page 4

We believe the requirement of TS-R-1 ¶619 is a single requirement with double fulfillment. The requirement for the package to survive, without loss of radioactive content, an internal pressure which produces a pressure differential of not less than maximum normal operating pressure plus 95 kPa must be met in all Class 7 material package designs. The "without leakage" is the single requirement with dual application that must factor in both the design of the packaging containment system and the radioactive content.

Regulatory Resources, Inc. thanks you for your attention in this matter. This issue is a concern that affects continuity of operations for numerous national and international shippers. We appreciate in advance your support in this effort.

For Regulatory Resources, Inc.,



Wade A. Winters, CET, CHMM  
President

WAW/lom