Harmonization of U.S. Regulations for Type B and Fissile Material Packaging with International Requirements

Authors: Michele Sampson, Jessica Glenny; John Cook

Abstract

Within the United States, the Nuclear Regulatory Commission (NRC) has responsibility for the review and approval of Type B and fissile material transportation packaging. The NRC has periodically updated the domestic regulations in Title 10 Code of Federal Regulations Part 71, Packaging and Transportation of Radioactive Material, to harmonize with the International Atomic Energy Agency (IAEA) "Regulations for the Safe Transport of Radioactive Material." At present, the NRC's regulations for Type B and fissile material packaging reference to the "Regulations for the Safe Transport of Radioactive Material" 1996 Edition as Amended 2000. This paper will describe the NRC's past harmonization efforts, the role of stakeholder involvement, and future plans for harmonization. There is a proposed rulemaking in progress which will consider incorporation of changes to IAEA requirements published in 2003, 2005, and 2009. The paper will provide the status of that proposal and highlight the potential regulatory changes. Additionally, the paper will describe future plans as the NRC begins to evaluate the changes published in the 2012 Edition of IAEA's "Regulations for the Safe Transport of Radioactive Material."

Introduction

The regulation of the transportation of radioactive materials in the United States (U.S.) has long been a shared responsibility, initially between the Interstate Commerce Commission (ICC) and the Atomic Energy Commission (AEC), which later became the Department of Transportation (DOT) and Nuclear Regulatory Commission (NRC). There are other agencies with limited roles, but primary responsibility for developing the regulatory framework rests with these two. In 1958, the AEC published the Title 10 Code of Federal Regulations Part 71 (10 CFR 71), Regulations to Protect Against Accidental Conditions of Criticality in the Shipment of Special Nuclear Material. The regulations for safe transport of radioactive material have been significantly revised since 1958. Harmonization between the U. S. regulations and the International Atomic Energy Agency (IAEA) has been an important part of those changes.

Background

The AEC's regulation at 10 CFR 71, began as limited standards to protect against accidental conditions of criticality for transport of special nuclear material with some limited conditions where small shipments were exempt from the licensing requirements[1]. Those regulations were significantly expanded in 1966. The AEC rulemaking in 1966 included recognition of the dual authorities of the AEC and the ICC. There was also a consideration of how the U.S. regulations compared to the IAEA's regulations published in 1961, and the 1964 revision. The revised 10 CFR Part 71, Packaging of Radioactive Material for Transport[2], expanded the material covered

[1] 23 Federal Register 7666, October 3, 1958.
[2] 31 Federal Register 9941, July 22, 1966.

by the regulation and divided the radionuclides into groups which were determined to have similar potential hazards in transport.

In the early 1970's the AEC completed rulemaking to change the terminology in the regulations from large quantity over to the beginnings of the Type A and Type B system which is still in use to characterize the hazard of the material in transport[3]. The roles and responsibilities of AEC and ICC were further clarified through these rulemaking and by establishment of a Memorandum of Understanding.[4] These regulations were aligned with the IAEA's regulations as revised in 1967. 10 CFR Part 71 was also shaped by domestic policy. In 1973, proposed rules were introduced for double containment of plutonium[5] and to impose specific quality assurance requirements[6] for transportation packaging.

The NRC was created by the Energy Reorganization Act of 1974, with responsibility for the licensing and oversight of commercial uses of radioactive material. Many AEC staff joined the newly created NRC. The transportation regulations in 10 CFR Part 71 continued to be developed by the NRC. In the later 1970's, the requirements related to containment for plutonium[7] and packaging quality assurance[8] were finalized. The memorandum of understanding, originally between AEC and ICC, was updated in 1979 to reflect the dual roles of NRC and DOT. The 1979 memorandum[9] has remained in effect without changes.

In 1983, both NRC and DOT completed a significant rulemaking change to harmonize the U.S. regulations with the IAEA Safety Series No. 6, "Regulations for the Safe Transport of Radioactive Materials" (SS-6, 1973 Edition)[10]. The rulemaking did include some changes that were under consideration at IAEA, for example in the development of the A1/A2 values. These regulations stayed in effect for approximately 10 years.

The next major U.S. rulemaking was completed in 1995[11], to harmonize with the IAEA Safety Series No. 6, "Regulations for the Safe Transport of Radioactive Materials" (SS-6, 1985 Edition). This rulemaking incorporated the designation of packaging to the edition of the IAEA regulations by addition of the "-85" to the package identification number. In the late 1990's, the NRC completed two rulemakings where domestic policy and safety considerations shaped the changes, not harmonization. The NRC staff confirmed that the existing exemptions for fissile materials were not adequately protective. As a result, the NRC issued an immediate change to the regulations to revise the amount of material which could be shipped as exempt from the fissile material packaging requirements. The NRC also completed changes to the regulations for shipment of plutonium by air.

---

[3] 38 Federal Register 10437, April 27, 1973.
[4] 38 Federal Register 8466, April 2, 1973.
[5] 38 Federal Register 20482, August 1, 1973.
[6] 38 Federal Register 35490, December 28, 1973.
[7] 39 Federal Register 20960, June 17, 1974.
[8] 42 Federal Register 39364, August 4, 1977.
[9] 44 Federal Register 38690, July 2, 1979.
[10] 48 Federal Register 35600, August 5, 1983.
[11] 60 Federal Register 50248, September 28, 1995.

NRC's next rulemaking proposed changes to 10 CFR Part 71 to harmonize with the IAEA's "Regulations for the Safe Transport of Radioactive Materials" (TS-R-1, 1996 Edition, Revised 2000). The Commission directed the staff to engage with stakeholders, and a series of public meetings and an opportunity for public comment were provided as the proposed rulemaking text was developed. The rule, finalized in 2004[12], was focused on harmonization but also included discussion of domestic policy which shaped the final rule. One area, a proposal to include a certification for "DP" dual purpose casks reflected the recognition by staff that the regulations for interim storage of spent nuclear fuel would eventually need to interface with the transportation regulations. This proposal was not incorporated into the final rule, but it is an area still under consideration.

Current Rulemaking

In May 2013[13], NRC published a proposed rule, "Revisions to Transportation Safety Requirements and Harmonization With International Atomic Energy Agency Transportation Requirements: Establishing Quality Assurance Programs for Packaging Used in Transport of Radioactive Material." The proposed rule would bring the NRC's transport regulations into general accord with the 2009 edition of IAEA's "Regulations for the Safe Transport of Radioactive Material" (TS-R-1), and further capture other minor changes from the 2003 and 2005 editions of TS-R-1. In addition, NRC-initiated changes were proposed. Those include changes to the requirement NRC approval of quality assurance programs described in 10 CFR Part 71 Subpart H, a re-establishment of restrictions on material that qualifies for fissile material exemption, and clarification of requirements for the general license. To support the proposed changes to the quality assurance program requirements, NRC also issued for public comment Draft Regulatory Guidance (DG) 7009, "Establishing Quality Assurance Programs for Packaging Used in Transport of Radioactive Material." This proposed rule is anticipated to be finalized in early 2014.

Considerations for the Future

At the end of 2012, the IAEA published the 2012 Edition of the "Regulations for the Safe Transport of Radioactive Material, SSR-6." Two of the changes in the revised edition, removal of the "use" clause in paragraph 107(f) and the significant revisions to the fissile material exemptions, both warrant consideration for inclusion into a future revision to 10 CFR Part 71. The removal of the "use" clause addresses an apparent inconsistency in how material with the same level of radioactivity is treated for the purpose of transport based solely on its intended use, processing for extraction of radioisotopes versus processing for extraction of minerals. The revised fissile exemptions are closely related to the changes in fissile exemptions currently contained in 10 CFR Part 71, but there are differences which warrant review. The shipping provisions associated with limited quantities of uranium hexafluoride, as described by the new UN3507 shipping description, should also be considered.

[12] 69 Federal Register 3698, January 26, 2004.
[13] 78 Federal Register 29016, May 16, 2013.

As noted, there have been specific provisions of the IAEA regulations which have not been incorporated into the NRC's transportation regulations over time. Another consideration is for review of areas where the current regulations in 10 CFR Part 71 are not harmonized with the IAEA requirements prior to the 2012 Edition of SSR-6. The IAEA requirements for Type C packaging and the classification of low dispersible material are a clear example of this type of difference. These requirements were considered, but specifically not incorporated into previous revisions of 10 CFR Part 71. International experience with Type C packaging approval is still limited, but there is more information about the potential uses of this packaging type for consideration now than when it was a new IAEA proposal. Additional areas for consideration include: differences in the specific order of the hypothetical accident condition tests; and inclusion of the classification of low specific activity or surface contaminated objects with fissile content, currently described by UN3324, UN3325, and UN3326.

The third area where potential enhancements to 10 CFR Part 71 should be considered is the compatibility of requirements for storage and transportation of spent nuclear fuel. In the current framework, licensing requirements for interim dry cask storage of spent nuclear fuel are contained in 10 CFR Part 72. There is no regulatory requirement for storage systems to be approved for transportation under 10 CFR Part 71 prior to loading and use. The link between these two regulations is the current requirement at 10 CFR 72.236(m), "To the extent practicable in the design of spent fuel storage casks, considerations should be given to compatibility with removal of the stored spent fuel from a reactor site, transportation, and ultimate disposition by the Department of Energy." The intent of 10 CFR Part 72 is for the storage systems approved to provide an interim storage solution until transport for final disposal. While many designs in the current generation of cask technologies are intended for use in both storage and transport, the vendor must obtain independent storage and transportation certificates. Specific areas where these certification requirements differ include: length of the certification term (5 years for transport and up to 40 years for storage); in the use of operating and maintenance instructions versus technical specifications and aging management planning; and the flexibility to make changes in the dry storage cask under the provisions of 10 CFR 72.48, "Changes, tests, and experiments" which has no equivalent provision in the transportation regulations. The periodic revision to transportation regulations and grandfathering provisions which phase out older packaging designs is also a factor for consideration given the need for regulatory stability over the expected extended storage periods of 60 or more years for interim storage of spent nuclear fuel. The NRC has taken some initial steps in this area with the publication of a request for public input on "Retrievability, Cladding Integrity and Safe Handling of Spent Fuel at an Independent Spent Fuel Storage Installation and During Transportation" published in January 2013.[14]

Summary

The transport of radioactive material takes place between and across nations. Harmonization with the IAEA's "Regulations for the Safe Transport of Radioactive Material" helps to ensure safe and efficient movement of these materials. The NRC's regulations for transport of

[14] 78 Federal Register 3853, January 17, 2013.

radioactive material incorporate the IAEA's requirements through harmonization rulemakings. There are also many domestic policy issues and programmatic needs which shape the NRC's regulatory requirements. Looking forward, there are both harmonization and programmatic issues which may warrant a future revision of 10 CFR Part 71. It is expected that the NRC will continue to evaluate these various issues. The current proposed rulemaking change to 10 CFR Part 71 is expected to be final in calendar year 2014. There will be a need to allow those changes to be implemented for some period of time, but at least one year, before any additional changes are proposed. Given the myriad of issues to be evaluated, calendar year 2016 is the earliest that staff could develop the proposal for a new rulemaking to incorporate the 2012 Edition of SSR-6 or any of the other areas of consideration for change to 10 CFR Part 71.