

Effectiveness of the IAEA Transport Regulations – Implementation Issues for Nuclear Fuel Cycle Materials

conference paper

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**Dedicated to the
safe, efficient
and reliable
transport of radioactive
materials**

Abstract

The International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Material (TS-R-1) developed principles to ensure the safety of transport of radioactive materials, which were then included in regulations covering different forms of transport, thus ensuring a uniformity of regulation. TS-R-1 provides for harmonisation of transitional arrangements which allow existing packages to continue for a reasonable time, time schedules for implementation, validation of package designs, harmonising differing national regulations, labelling of packages, test sequencing, criticality safety analyses, and radiation protection programmes. Overall, the experience of operating within TS-R-1 has been positive and this is expected to improve as more experience is accumulated.

1. Introduction

Nuclear power has been providing clean, affordable electricity in many parts of the world for nearly half a century. Nuclear power now generates electricity in 32 countries and supplies over 16% of the world's electricity demand. It will continue to play a major role in meeting the world's increasing need for electricity and reducing carbon dioxide emissions without putting undue stress on the environment. The national and international transport of nuclear fuel cycle materials is essential to support this activity.

The IAEA Regulations for the Safe Transport of Radioactive Material (TS-R-1) developed principles to ensure the safety of the transport of radioactive materials. These regulations are then embodied in the international modal regulations; namely, the International Maritime Dangerous Goods (IMDG) Code for sea transport, the International Civil Aviation Organization (ICAO) Technical Instructions for air transport, and the regional modal regulations, ADR and RID, for road and rail transport in Europe. They also are reflected in the regulations of national authorities. This system provides a uniform basis for regulation, and has ensured the safety of radioactive material transport for many years. The transport of radioactive materials is becoming increasingly international. As a result, the importance of maintaining consistency of interpretation and application of international regulations is also increasing. It is essential to ensuring that transport is safe, efficient and reliable that there is stability in regulations, and that the regulations are clearly understood, interpreted and applied consistently in several jurisdictions, and introduced with harmonised implementation dates.

Consistency and predictability of implementation not only assist in ensuring safety through compliance with the regulations, but also facilitate international movements. Although it is important to preserve the prerogatives and responsibilities of the national and international jurisdictions to implement the IAEA transport safety principles, as deemed appropriate to particular circumstances and requirements, differences in interpretation and implementation can lead to duplication of effort, delays in obtaining approvals and inefficiencies both in the industrial organisations involved in radioactive transport and in national authorities.

To date, industrial transport organisations have generally had good experiences in working with the new IAEA Transport Safety Regulations (TS-R-1). Valuable lessons are being taught by operating within the TS-R-1 regime.

2. Experience with IAEA Regulations for the Safe Transport of Radioactive Material

2.1 Issues arising from the introduction of the 1996 edition of the IAEA Transport Regulations

Classification and labelling of packages

TS-R-1 regulations require that packages are marked with a UN number and a proper shipping name. Implementing these requirements for international transport when some packages have different certificates in different countries can cause complications. For example, one competent authority may approve a package design as a Type B(U), and another may approve it as Type B(M), and it can therefore be necessary to assign different UN numbers. This causes problems at international borders where markings would need to be duplicated or changed.

Radiation Protection Programmes

TS-R-1 requires transport organisations to implement Radiation Protection Programmes (RPPs) to control radiation dose exposure. Analysis of existing data on dose uptake for the transport of nuclear fuel cycle materials carried out by the World Nuclear Transport Institute (WNTI) has shown that it is unlikely that any worker or member of the public will receive annual radiation doses in excess of 1mSv, which is less than one third of the annual dose which most people receive from natural sources. Below this level, no individual dose monitoring will be required. Attention is being given to the preparation of RPPs by organisations in the transport chain. No significant problems have emerged, but transport organisations whose main business is not concerned with nuclear material transport need help and advice which the nuclear industry is providing where necessary.

2.2 Issues arising from the transition between two sets of regulations

Transitional arrangements

The transitional arrangements (grandfathering) provided by TS-R-1, to allow those existing packages which are properly maintained and meet their original design intent to continue to be used for a reasonable period after the new regulations come into force, appear to be working satisfactorily. Stability in package approvals is important to ensuring safe, efficient and reliable transport.

Time schedules for introduction of new regulations

Implementation of the TS-R-1 regulations for sea, air, road and rail transport by the modal organisations did not take place simultaneously and, for some time, both the old and the new regulations were in operation. Efforts by the IAEA and the modal organisations to harmonise implementation dates have been generally welcomed.

2.3 Issues arising from the uniform implementation of the regulations

Validation of package designs

A multilateral package design approval issued in one national jurisdiction is subject to validation in other jurisdictions where the package might also be used. Consistent interpretation of regulatory requirements, and close co-operation between industry and national competent authorities, and between competent authorities in different jurisdictions can help to clarify understandings and approaches, and potentially simplify and expedite the validation process.

Sequencing of tests

It is a basic principle that safety principally resides in the package. The IAEA regulations specify rigorous tests to demonstrate the ability of packages to withstand accident conditions of transport. For example, the mechanical drop tests in the IAEA regulations specify that the order in which the specimen is subjected to the drops shall be such that, on completion, it shall have suffered such damage as will lead to the maximum damage in the thermal test which follows. A standardised understanding of what constitutes the most damaging orientations of the specimen package under test, or a specified sequence of tests, can assist in expediting validation of package approvals from one jurisdiction to another.

Criticality safety analyses

National authorities carry out independent reviews of the criticality safety of packages containing fissile material to ensure that critical excursions cannot occur. A single design may require the preparation of multiple criticality analyses to obtain base approval and foreign validations. Co-operation between and among industry and competent authorities can assist in assuring greater uniformity in criticality safety standards and also allow the development of generic safety cases where this is feasible.

Uniform implementation of regulation

The IAEA regulations have been very successful in ensuring the safety of radioactive material transport, and it is important that they continue to provide the common basis for regional, national and modal regulations. The nuclear transport industry is fully committed to meeting its obligations within the international transport safety

regulatory regime, and is working to ensure it meets all TS-R-1 and related requirements. The safe, efficient and reliable international transport of radioactive materials is enhanced to the extent that the regulations are implemented in a uniform way in all countries.

3. The way forward

The experience of the nuclear transport industry with operating within TS-R-1 has been positive, and this is expected to improve as accumulating experience and continued dialogue between stakeholders allow for improved understandings of requirements. Those issues which have arisen have related principally to differences in interpretation of the regulations by the modal organisations and competent authorities coupled with different time schedules for implementation. Such differences take on added importance in the context of the increased frequency of IAEA regulation review. Accordingly, a holistic strategy to ensure that regulations are implemented in a consistent and predictable fashion can go a long way to enhancing safe, efficient and reliable transport of radioactive materials.

To improve and facilitate this uniformity, the industry is seeking opportunities to increase dialogue with key intergovernmental organisations, including modal organisations and national competent authorities collectively, to encourage further co-operation and co-ordination to reduce differences in the interpretation and implementation of regulations. This is important not only from the point of view of safety, but also to avoid unnecessary duplication of effort for all concerned, and to reduce timescales for approvals which can seriously disrupt international transport operations.

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