ARRANGEMENTS FOR TRANSITION FROM THE 1985 EDITION TO THE 1996 EDITION OF THE IAEA TRANSPORT REGULATIONS

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ABSTRACT

The International Atomic Energy Agency's *Regulations for the Safe Transport of Radioactive Material* are periodically updated to take account of the latest safety information, practices and technologies related to packaging and transport of radioactive material. In December 1996 the IAEA published the 1996 Edition of the *Regulations for the Safe Transport of Radioactive Material*. Originally, a world-wide adoption date of 1 January 2001 was recommended for incorporation of this edition into international modal and IAEA Member State (country) requirements. Despite efforts at an international level to support a uniform implementation date for the various international modal requirements, 1 January 2001 proved to be impractical. It was ultimately agreed that adoption would occur during 2001 with different modes applying varying adoption and transition dates. Individual Member State intentions remain less defined. It was further recognized during 2000 that difficulties could arise during 2001 and beyond during the transition from the 1985 edition to the 1996 Edition of the Regulations. These difficulties come mainly from the many differences between the two sets of regulations. To address these potential difficulties, the IAEA published in late 2000 a technical document (TECDOC) on *"Arrangements for Transition from the 1985 Edition (as Amended 1990) to the 1996 Edition of the IAEA Transport Regulations*". This TECDOC, which was developed with the assistance of experts from a number of countries and international organizations, was issued in recognition of the importance of a harmonized transition, to facilitate maintaining safety and avoiding unnecessary interruptions to commerce. This paper presents notable differences between the two sets of regulations and discusses the recommendations that are made regarding how to comply with regulatory requirements during and after the transition period.

INTRODUCTION

The International Atomic Energy Agency's *Regulations for the Safe Transport of Radioactive Material* are periodically updated to take account of the latest safety information, practices and technologies related to packaging and transport of radioactive material. The edition of the Transport Regulations on which international modal organizations and many of the IAEA Member States (countries) based their regulations during the latter part of the 1990s and in 2000 was the 1985 edition (As Amended 1990) of the IAEA Transport Regulations identified as Safety Series No. 6 [1]. In December 1996 the IAEA published its latest edition of the "*Regulations for the Safe Transport of Radioactive Material*" identified as Safety Standards Series ST-1 [2]. In 2000, the IAEA issued an errata to ST-1 in English, and the Transport Regulations were re-issued in English incorporating the errata. This re-issued document is identified as Safety Standards Series TS-R-1 (ST-1, Revised) [3].

With the publication of this new edition of the Transport Regulations, steps were taken by the United Nations Economic and Social Council's Committee of experts on the Transport of Dangerous Goods, working with the IAEA Secretariat, to fully incorporate ST-1 into its newly formatted "Model Regulations" [4]. These Model Regulations were issued in 1999.

Similar steps were taken by the involved international modal organizations:

- the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA) for air transport,
- the International Maritime Organization (IMO) for sea transport, and
- the United Nations Economic Commission for Europe's Inland Transport Committee (UN/ECE/ITC) for regional road and rail

to implement this new model and the IAEA Transport Regulation requirements into their regulatory documents which were issued in 2000/2001. However, since adoption by all international organizations and countries on a uniform schedule proved to be impossible, actions were required to provide guidance during the transition from the old to the new Transport Regulations.

This paper discusses the current adoption schedule by international modal organizations, summarizes notable differences between the 1985 and 1996 editions of the IAEA Transport Regulations, and reviews recommendations that have been made in a technical document recently issued by the IAEA providing guidance on how to comply with the various regulatory requirements during the transition.

ADOPTION AND IMPLEMENTATION SCHEDULES

Originally, a world-wide adoption date of 1 January 2001 was targeted for incorporation of the requirements set forth in the 1996 edition of the Transport Regulations into international modal and IAEA Member State (country) requirements. Despite major efforts at an international level to support the uniform implementation date for the various international modal requirements, this date proved to be impractical. The schedule eventually agreed to by the international regulatory bodies is summarized in Table 1. This clearly illustrates that the times for adoption of the new requirements vary over a six month period in 2001 and the period for transition from the old to the new requirements vary from zero to 12 months during 2001 depending upon the mode of transport. However, it is noteworthy that the adoption and period of transition will be fully completed by all of the international modal organizations noted by the end of 2001.

Individual Member State intentions regarding adoption remain less defined. The timing and extent of incorporation of ST-1 at the State level may be governed by national legislative procedures and other considerations, and may extend well beyond the dates shown in Table 1. The current state of knowledge concerning the actions being taken by individual Member States is summarized in a companion paper in this symposium [5].

Table 1. Modal organization agreed adoption and implementation dates for the 1996 edition of the IAEA Transport Regulations

Mode of transport	International modal organization	Dangerous goods regulatory document	TS-R-1 starting	Safety Series No. 6 ending	Transition Period
Air	ICAO	Technical Instructions for the Safe Transport of Dangerous Goods by Air	01 Jul 2001	30 Jun 2001	0
Air	IATA	Dangerous Goods Regulations	01 Jul 2001	30 Jun 2001	0
Sea	IMO	International Maritime Dangerous Goods Code	01 Jan 2001	31 Dec 2001	12 months
Regional, Road	UN/ECE/ ITC	European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)	01 Jul 2001	31 Dec 2001	6 months*
Regional, Rail	UN/ECE/ ITC	Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID)	01 Jul 2001	31 Dec 2001	6 months*

* The transition period of 6-months applies only to radioactive material. The transition period for all other dangerous goods is 18-months.

DEVELOPMENT OF TECHNICAL GUIDANCE

Because it became clear in the late 1990s that the goal of a uniform adoption and implementation date by the international modal authorities would not be possible, and because it was recognized that individual Member States would not be adopting on a harmonized schedule, the IAEA working with experts from Member States and the international organizations took steps to provide guidance to assist in overcoming difficulties that were likely to arise during the transition from the requirements of the 1985 edition to the 1996 Edition of the Transport Regulations.

The result of this effort was a technical document (TECDOC), "*Arrangements for Transition from the 1985 Edition (as Amended 1990) to the 1996 Edition of the IAEA Transport Regulations*" [6], which

was published at the end of 2000. The main purpose of the TECDOC is to provide guidance to national competent authorities (CAs). Principles used in developing this guidance included:

(1) facilitating the maintaining of safety,
(2) providing for an efficient and smooth transition;
(3) increasing the awareness of important changes and their potential impacts, and
(4) providing pragmatic guidance useful to a broad audience.

The recommendations in the TECDOC are designed to lessen the burden of the regulatory transition and continue to facilitate safe transport practices. In addition, notable differences between SS6 and TS-R-1 are highlighted. It also includes a table showing the correspondence between each paragraph of Safety Series No. 6 with those of TS-R-1, and a table comparing the A_1 and A_2 radionuclide-specific values from the two documents. Although the TECDOC is primarily intended to assist CAs in facilitating compliance during and after transition from the requirements of the 1985 edition to those of the 1996 edition, it may also prove useful to other users of the IAEA's transport regulations such as consignors, carriers, consignees, owners and designers and fabricators of radioactive material and package designers and fabricators.

In addition to being available in hardcopy, the TECDOC is also available on the IAEA Transport Safety Unit web site at

http://www.iaea.or.at/ns/rasanet/programme/radiationsafety/transportsafety/adoptionoftransportregs.htm

NOTABLE DIFFERENCES

The notable differences between Safety Series No. 6 and TS-R-1 concern mainly the materials, the packagings, the loading, the labelling, the placarding and the Radiation Protection Program.

Materials

- Radioactive material has been redefined: radionuclide dependent material specific activity exemption limits and exempt consignment activity limits are introduced in TS-R-1. As a result of the definition of radioactive material changing, with radionuclide dependent material specific activity exemption limits and exempt consignment activity in TS-R-1, materials which were previously not defined as radioactive under Safety Series No. 6 may be defined as radioactive under TS-R-1, and vice versa.
- TS-R-1 contains revised A_1 and A_2 values. Not all have changed, but some of the changes are significant.
- The consequences of revised A values for materials are new LSA values and new release limits for the immersion test for LSA-III. Materials that exceed the exempt activity concentration by more than 10 times, but less than 30 times, by consignment may be transported as LSA-I.
- Low Dispersible Radioactive Material (LDM) is introduced in TS-R-1. LDM must be of a limited radiological hazard and meet a range of specified impact, thermal and leaching tests. Multilateral CA approval is required, with a new approval certificate type code "LD".

Packaging

- The consequences of revised "A" values for packages include new activity limits for excepted packages and new release limits for Type B packages after testing.
- The alternative requirements for IP-2 and IP-3 packages allowed in TS-R-1 are more stringent.
- Package contents limitations for Industrial & Type B packages by air have been introduced in TS-R-1.
- Type C Packages for shipment of high activity radioactive material by air have been introduced in TS-R-1.
- For all packagings the design shall take into account ambient temperatures and pressures likely to be encountered in routine conditions of transport and the containment system shall retain the radioactive contents under a reduction in ambient pressure to 60 kPa.
- The enhanced water immersion test (200m for one hour) previously reserved for packages containing irradiated nuclear fuel has been extended to all Type B packages containing $>10^5$ A_2, and all Type C packages in TS-R-1.

Loading and segregation

- In TS-R-1, the Transport Index is used solely for radiation safety control whereas in the 1985 edition it was used for both radiation safety control and criticality safety control.. A new index, the criticality safety index (CSI) is used for criticality control. The CSI effectively replaces the TI for criticality safety control that was used in Safety Series No. 6. There is now no requirement in TS-R-1 for separation distances based on TI. The TI is used to define categories and to establish limits on the quantities of materials that can be placed in freight containers and conveyances. Separation distances are now provided in the TS-R-1 CSI table. The limit on the sum of Transport Index, and the limit on the sum of CSI and the spacing requirement for groups of packages, overpacks and freight containers containing fissile material are therefore different.

Labelling and marking

- The package must be legibly and durably marked with an identification of the consignor or consignee, or both.
- TS-R-1 presents 25 new or revised UN numbers, proper shipping names and descriptions. All proper shipping names begin with "RADIOACTIVE MATERIAL". Where UN numbers have been retained, the actual scope may be different from Safety Series No. 6.
- For fissile packages, Safety Series No. 6 required that the category label show the higher of the transport index for radiation exposure control and the transport index for nuclear criticality control. TS-R-1 effectively splits this into two separate labels. The Transport Index (formerly the transport index for radiation exposure control) continues to be marked on the category label (II Yellow or III Yellow, as appropriate). Packages containing fissile material must also be labelled with a criticality safety index (CSI) label.
- TS-R-1 allows the trefoil symbol on category labels to be slightly smaller than under Safety Series No. 6.

Placarding

- TS-R-1 allows smaller placards to be used where vehicles have insufficient area to allow the fixing of larger placards, and allows the trefoil symbol on placards to be slightly smaller than under Safety Series No. 6.

Radiation protection programme

- Radiation protection programmes are explicitly required by TS-R-1 for the transport of radioactive materials.

SUMMARY OF RECOMMENDATIONS

The TECDOC also presents guidance in the form of recommendations to CAs. The guidance focuses on actions that should become necessary as a result of the world-wide transition from Safety Series No. 6 requirements to those of TS-R-1 at different times.

The principles used in making the recommendations are:

(1) that safety is not compromised as a result of transition regulations;
(2) that a given shipment is made all the way from consignor to consignee under (i.e., in compliance with) a single set of regulations (based on SS6 or based on TS-R-1), regardless of whether the shipment is domestic, international or multi-modal;
(3) that any guidance, if followed, does not lead to non-compliance with the regulations in any state or mode with authority over the shipment; and
(4) that guidance express preference for the most practical solution, provided an equivalent level of safety is retained.

The document provides three types of recommendations as outlined in Fig. 1.

Fig. 1. Outline of recommendations in TECDOC – 1194 [5].

Primary recommendations
- Permissive use of TS-R-1
- Communication and training
- Compliance assurance

Potential safety issues
- Potential for improper package accumulation (separation of CSI from the TI
- Potential for inadequate emergency response due to unfamiliar hazard communications (UN Number and proper shipping names)

Potential compliance issues
- New flux/dose equivalent rate conversion factors
- Development and introduction of radiation protection programme
- Changes in “A” values

- Packages containing uranium hexafluoride
- Fissile material shipments by air
- Hazard communications
- Quality assurance requirements for 'grandfathered' packages and special form radioactive materials
- Exempt shipments
- Material restrictions on air shipments

The primary recommendations are as follows:

Permissive use of TS-R-1

- CAs should act to permit use of TS-R-1, at least for certain shipments, by 1 July 2001.
- CAs should assess its TS-R-1 adoption date (and transition period, if one is planned) against the dates to be employed in the modal regulations that concern shipment to, from, and within that CA's nation.
- Where CAs determine that TS-R-1 will not be incorporated by the date to be used by an applicable modal organisation, CAs are strongly encouraged to provide an alternative solution such as the use of regulatory substitutions or multilateral agreements.
- CAs should permit the use of TS-R-1 itself or TS-R-1 based modal requirements, for import, export and transboundary movement of Class 7 materials. This can be achieved, for example, through a change to its national regulatory infrastructure or exemption process. This guidance presumes that such changes might be accomplished in a more timely manner than complete harmonization of domestic requirements with TS-R-1.

Communication and training

- To the extent practicable, CAs are strongly recommended to take proactive steps to inform its users (including consignors, carriers, consignees, package designers, fabricators, emergency responders) of the pending changes in regulations, paying particular attention to safety issues.
- It is recommended that emergency response guides for first responders be updated or supplemented to incorporate current UN identification numbers and proper shipping names.
- It is recommended that if shipments are expected that utilize regulations based on TS-R-1, training be given to transport workers and emergency responders prior to the introduction of TS-R-1 based regulations.
- CAs should also attempt to identify methods to notify previously non-regulated bodies, which may become subject to the regulations based on TS-R-1, as a result of the changes to the exempt concentrations and consignment limits and the changes in scope.

Compliance assurance

- CAs should further focus their compliance assurance efforts on safety issues, immediately after transition to TS-R-1.
- Successfully implementing and complying with the changes implemented in TS-R-1 is likely to involve a learning process by both the regulators and the users of the regulations.

- Immediately after the transition to TS-R-1, it is recommended that CAs take steps in applying compliance assurance measures to be particularly mindful of the possible implications to transport safety of practices that are adopted (including but not limited to violations of the requirements).
- It is recommended that safety issues that are identified be promptly communicated to IAEA to support additional dissemination of that information.
- In addition, it is recommended that CAs tailor their enforcement strategy to acknowledge the regulatory familiarization period. This approach would recognize that many issues with complying with TS-R-1 as compared to SS6 are of very little or no safety significance.
- Users should be assisted (to the extent appropriate) and encouraged to promptly institute corrective actions of violations or weaknesses.

CONCLUSION

The TECDOC that was prepared by the IAEA Secretariat with the assistance of experts from its Member States and involved international organizations provides a valuable tool for both national competent authorities and other users of the IAEA's transport regulations such as consignors, carriers, consignees, owners and designers and fabricators of radioactive material and package designers and fabricators. Although the focus of the document was to provide guidance on the transition from old to new regulations that is occurring with international modal authorities during 2001, it will continue to provide valuable guidance beyond 2001

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