WNTI

World Nuclear Transport Institute

Safety Regulations Governing the Transport of Radioactive Material

fact sheet no.1

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

Safety Regulations Governing the Transport of Radioactive Material

Introduction

Each day thousands of shipments of radioactive materials of all kinds are transported on international and national routes. Radioactive consignments, which are carried by road, rail, sea, air and inland waterways, can range from smoke detectors, cobalt sources for medical and industrial uses, to nuclear fuel cycle materials for electricity generation.

The safety of these shipments is ensured by a stringent regulatory regime that has been continuously revised and updated over the past four decades. The safety measures have been developed to protect people, property and the environment against the hazards posed by the cargoes.

In 1961, the IAEA Regulations for the Safe Transport of Radioactive Material (Safety Series No. 6) were published on the basis of expertise provided by Member States as well as international organisations.

Although they are called Regulations they are, in fact, recommended regulatory standards for international transport activities. It is incumbent on each State or international/regional organisation to decide on their application. By 1969, the IAEA Regulations had been adopted or used as a basis for regulations in many Member States.

Further, the principal international organisations having responsibility for transport by land, sea, air and inland waterways have incorporated the IAEA Regulations into their own regulations. The United Nations Recommendations on the Transport of Dangerous Goods have always referred to the IAEA Regulations, and the latest edition published in 2005 fully integrates them. As a result, the Regulations apply to the transport of radioactive material almost anywhere in the world.


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The IAEA Regulations for the Safe Transport of Radioactive Material

The IAEA Regulations have been revised regularly since their first publication to keep pace with scientific and technological developments; the current version is TS-R-1; 2005 Edition.

The Regulations are based on the fundamental principle that radioactive material being transported should be packaged adequately to provide protection against the various hazards of the material under both normal and potential accident conditions. Safety, therefore, relies primarily on the packaging whatever the transport mode. The prime objective is to protect people, property and the environment against the direct and indirect effects of radiation during transport. The requirements laid down in the Regulations must ensure the containment of the radioactive contents, the control of the external radiation level, the prevention of a chain reaction and the prevention of damage caused by heat.

Because safety depends primarily on the packaging, the Regulations set out several performance standards in this area. They provide for five different primary packages (Excepted, Industrial, Type A, Type B and Type C) and set the criteria for their design according to both the activity and the physical form of the radioactive material they may contain. The IAEA Regulations lay down corresponding test procedures to demonstrate compliance with the required performance standards.

The Regulations also detail marking and labelling provisions, and requirements imposed on packages during transit.

International and regional modal regulations or agreements

The provisions of the IAEA Regulations are not only reflected in the national requirements of Member States, but also in the regulation relative to each mode of transport as issued by international or regional bodies.


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Sea transport

In 1965, the International Maritime Organization (IMO) published a major international instrument known as the International Maritime Dangerous Goods Code (IMDG Code). This Code is for the carriage of dangerous goods of any kind by sea. It addresses matters such as packing and container stowage, with particular reference to the segregation of incompatible substances. The IMO provisions for radioactive material are based on the IAEA Regulations. The IMDG Code offers guidance to those involved in the handling and transport of radioactive material during sea transport.

In 1993, the IMO also established the Code for the Safe Carriage of Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes in Flasks on Board Ships (INF Code) to complement the IAEA Regulations. Although the package design remains the primary safety measure, this Code introduces recommendations for the design of vessels transporting radioactive material. These complementary provisions address such issues as stability after damage, fire protection, and structural resistance. In January 2001, the INF Code was made mandatory and renamed the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Waste on Board Ships.

Air transport

The International Civil Aviation Organization (ICAO) has responsibility for all aspects of international civil aviation. It develops standards and recommended practices through the development of Annexes to the 1944 Convention on International Civil Aviation. In 1981, the ICAO adopted Annex 18 covering the air transport of dangerous goods and, in addition, published a set of Technical Instructions (TI) detailing the requirements for these transports. The TI contain a list of dangerous goods, as well as requirements for packing, marking, labelling and documentation fully consistent with the IAEA Regulations.

The International Air Transport Association (IATA), a trade association representing airlines, publishes annually the Dangerous Goods Regulations (DGR) which are consistent with the ICAO TI as well as the IAEA Regulations.

Land transport

The United Nations Economic Commission for Europe (UN/ECE) publishes the European Agreement concerning the International Carriage of Dangerous Goods by Road (known as ADR). It contains requirements for the listing, classification, marking, labelling and packaging of dangerous goods by road. The IAEA Regulations have been adopted to apply to the transport of radioactive material under the ADR. Currently there are 40 contracting States to this Agreement.

The Intergovernmental Organisation for International Carriage by Rail (OTIF) is responsible for the regulations concerning the International Carriage of Dangerous Goods by Rail (RID). These are included in the convention concerning International Carriage by Rail. Today there are 42 Contracting parties to these Regulations, which apply the IAEA Transport Safety Regulations.

The MERCOSUR/MERCOSUL[1] Agreement of Partial Reach to Facilitate the Transport of Dangerous Goods signed by Brazil, Argentina, Paraguay and Uruguay regulates the road and rail transport of dangerous goods, including radioactive material, between these States and is consistent with the IAEA Transport Safety Regulations.

Other modes of transport

For inland waterways, the UN/ECE has developed the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN), while the Central Commission for the Navigation on the Rhine (CCNR) has promulgated the Provision concerning the Carriage of Dangerous Goods on the Rhine (ADNR). These agreements have adopted the IAEA Regulations as the requirements for the transport of radioactive material.

Transport of radioactive material by post is regulated by the Universal Postal Convention and its detailed regulations, published by the Universal Postal Union. The Convention allows the transport of exempted quantities of radioactive material, within the meaning of the IAEA Regulations, and must conform to IAEA prescriptions.


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Safety Regulations for the Transport of Radioactive Material

Mode of transport	International/ regional organisation	Name of regulation/ agreement/code	Current version	Scope
All	IAEA	Regulations for the Safe Transport of Radioactive Material, TS-R-1	TS-R-1; 2005 Edition	Worldwide
All	UN	Recommendations on the Transport of Dangerous Goods	2005 Edition (14th Revised Edition)	Worldwide
Sea	IMO	International Maritime Dangerous Goods Code (IMDG Code)	2004 Edition (with amendment 32-04)	Worldwide
		International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships (INF Code)	2000 Edition	Worldwide
Air	ICAO	Technical Instructions for the Safe Transport of Dangerous Goods by Air (TI)	2005/06 Edition	Worldwide
	IATA	Dangerous Goods Regulations (DGR)	2006 Edition (47th Edition)	Worldwide
Road	UN/ECE	European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)	2005 Edition	Regional
Rail	OTIF	Regulations Concerning the International Carriage of Dangerous Goods by Rail (RID)	2005 Edition	Regional
Road and rail	MERCOSUR/ MERCOSUL	Agreement of Partial Reach to Facilitate the Transport of Dangerous Goods	1994	Regional
Inland waterways	UN/ECE	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN)	2005 Edition	Regional
	CCNR	Provisions concerning the Carriage of Dangerous Goods on the Rhine (ADNR)	2005 Edition	Rhine navigation
Post	UPU	Universal Postal Convention and its detailed regulations	2005 Edition	Worldwide

References

1 Mercado Comun del Sur (Spanish)/ Mercado Comum do Sul (Portugese): Southern Common Market created by the 1991 Treaty of Asuncio, signed by Argentina, Brazil, Paraguay and Uruguay. Chile and Bolivia have been Associate Members since 1996.

Photographs

1 Tie-down for fresh fuel transport
2 Preparation of Cobalt-60 container for transport
3 Road transport of spent fuel in Japan
4 Cask for MOX fuel
5 INF3 Class ship
6 Unloading operations
7 Drums of uranium ore concentrate
8 Front end transport in France
9 Rail transport of spent fuel in UK

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