

**Overview of radioactive material transport in Japan and Experience gained from IAEA
Transport Safety Appraisal Service (TranSAS) for Japan**

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ABSTRACT

With vast amount of radioactive material packages annually transported, Japan has a high safety record. Such record has been achieved by enforcing safety regulations encompassing comprehensive control process and practice by relevant administrative bodies, as well as close co-ordination through the interagency monthly meeting. In fact such mechanism has enabled the close co-operation needed for the conduct of the TranSAS that took place from 5 to 16 December 2005.

Seeing a value to have an independent comprehensive peer review by international experts for enhanced transparency and further improved safety, Government of Japan has requested IAEA to conduct for TranSAS. The appraisal saw its findings subsequently published by the IAEA on 5 September 2006.

The TranSAS concluded in its report, highly evaluating safety practices in the transport of radioactive materials being implemented in Japan, Japan's comprehensive legal framework provides a sound basis for the implementation of the transport regulations and that Japan's transport regulations are generally implemented in accordance with IAEA requirements.

For the benefit of those States that are considering or due to take TranSAS, Japan is pleased to list the effects through the appraisal. Direct effects include: (1) A review of transport safety measures in place is enabled from a global viewpoint through the appraisal by the independent team; (2) Report, prepared by an independent TranSAS team and presented abroad as well as at home, provides a useful tool to assist our continuous efforts for the enhanced transparency in transport safety regulatory programs and better public acceptance.

Secondary effects have also been identified; (1) Preparation for TranSAS has provided Japan with opportunities to seek further improvements of regulatory framework; and (2) Co-ordination among competent ministries concerned was enhanced, providing overall knowledge on regulatory measures including those under the purview of other ministries.

For areas identified by TranSAS as recommendations or suggestions, Japan intends to take prompt actions, wherever possible, with a view towards further enhanced safety of transport.

1. INTRODUCTION

The IAEA General Conference recognized that “compliance with regulations which take account of the Transport Regulations is providing a high level of safety during the transport of radioactive material”. Based on this Resolution, IAEA has started offering an appraisal service termed Transport Safety Appraisal Service (TranSAS).

The objectives of TranSAS appraisal is to assist any requesting State to achieve a high level of safety in the transport of radioactive material by reviewing its implementation of the Transport Regulations and by making recommendations for improvement where appropriate.

Since TranSAS was established, appraisals have been implemented in 6 countries, Japan’s appraisal is the 7th TranSAS appraisal. This paper presents overview of radioactive material transport in Japan and experience gained from TranSAS for Japan.

2. CURRENT STATUS OF RADIOACTIVE MATERIAL TRANSPORT IN JAPAN

Japan has 55 nuclear power plants, 16 research or test reactors and 11 nuclear fuel facilities, and those activities also need the transport of nuclear materials and wastes, such as natural and enriched UF₆, UO₂, Spent fuels, High level wastes and Low level wastes.

On the other hand, the application of radiation has been widely accepted and expanded in industry, agriculture and medical field, as well, in various ways and means. The uses of radiation or radioisotopes are in the increase and the number reached approximately 5000 business entities in Japan.

Japan has seen a large number of transports of radioactive materials. Annual number of packages is shown Table 1. Currently, industry in Japan transports approximately 707,000 packages per year, and about 9000 packages are subject to the regulator’s confirmation of consignment. As the package of nuclear material, Type B should be subject to confirmation by Japanese regulatory bodies.

Although some of the transports are conducted through international sea- or air-lanes, the geography of Japan, an archipelago, excludes any kind of international land transport. Despite such huge number of transport, Japan has had a high safety record to date without any accident leading to release of nuclear materials, nor extraordinary radiation.

Table 1. Amount of Transportation of Radioactive Materials in 2004

		Type IP	Type L	Type A	Type B	Total
Subject to regulator’s confirmation	Load	106	-	4,890	667	5,663
	Sea	350	-	2,690	149	3,189
	Air	0	-	0	371	371
Not subject to regulator’s confirmation	Pharmaceutical	-	37,563	589,050	-	626,613
	Research	-	49,611	21,649	-	71,260
Total		456	87,174	618,279	1,187	707,096

3. REGULATORY FRAMEWORK IN JAPAN

(Basis for National legislation)

Japan has implemented safety regulations for land transport in compliance with international requirements by incorporating the IAEA Safe Transport Regulations¹ in the 1973, 1985, 1996, 2000, 2003 and 2005 into relevant national legislation in 1978, 1990, 2001, 2003, 2005 and 2007 respectively. For sea and air transport, SOLAS² and ICAO³ Conventions with mandatory status in international instruments, have been incorporated into respective pertinent legislation.

(National legislation)

The legislative framework in Japan is defined on the basis of the following elements:

- Type of material (i.e. nuclear material, radioisotopes, radio-pharmaceuticals);
- Mode of transport (i.e. land, sea, air or post); and

The aforementioned relevant laws are enforced with each competent authority as shown in Table 2.

Table 2. Legislations and Organizations for Transportation of Radioactive Materials.

	Land transport		Sea transport	Air Transport
	Packages	Transport method	Packages/ Transport method	Packages/ Transport method
Nuclear fuel materials	The Law for the Regulations of Nuclear Source Material, Nuclear Fuel Material and Reactors (METI, MEXT)		The Ship Safety Law (MLIT)	The Civil Aeronautics Law (MLIT)
	The Regulations for Transport of Nuclear Fuel Materials, etc. Outside Plants (METI, MEXT)	The Rules for Vehicle Transport of Nuclear Fuel Materials, etc. (MLIT)		
Radioisotopes	The Law Concerning Prevention from Radiation Hazards due to Radioisotopes, etc. (MEXT)			
	The Rules for the Enforcement of the Law Concerning Prevention from Radiation Hazards due to Radioisotopes, etc. (MEXT)	The Rules for Vehicle Transport of Radioisotopes, etc. (MLIT)		
Radiopharmaceuticals	The Pharmaceutical Affairs Law (MHLW)			
	Regulations for Manufacturing and Handling of Radiopharmaceuticals (MHLW)	Standard for Transport of Radioactive Material (MHLW)		

Note: Postal items are transported under the Postal Law, etc. (MIC)

METI : The Ministry of Economy, Trade and Industry

MEXT : The Ministry of Education, Culture, Sports, Science and Technology

MLIT : The Ministry of Land, Infrastructure and Transport

MHLW: The Ministry of Health, Labor and Welfare

MIC : The Ministry of Internal Affairs and Communications

(Land transport)

The Reactor Regulation Law and related laws refer to the transport of nuclear fuel material by conveyance other than ship or aircraft. The Radiation Hazard Prevention Law and related laws refer to the transport of radioisotopes by conveyance other than ship or aircraft. The Pharmaceutical Affairs Law and related legislation provide for the transport of radiopharmaceuticals by conveyance other than ship or aircraft.

(Sea transport)

The Ship Safety Law and related legislation refer to the transport of radioactive material by ships, to which the IMDG Code and, where appropriate, the INF Code are applicable. The same exemption values as those specified in the IMDG Code are defined for radioactive material.

(Air transport)

The Civil Aeronautics Law and related legislation refer to the transport of radioactive material by aircraft. The same exemption values as those specified in the ICAO Technical Instructions in accordance with the Convention on International Civil Aviation (Chicago Convention) are defined for radioactive material.

Although the responsibilities are spread among several authorities, the co-ordination between them are ensured through a Interagency Coordination Meeting for the Safe Transport of Radioactive Material. The meeting, which comprises of Directors of relevant authorities, is convened every month with a view to meeting mandates by those authorities under national legislation.

4. EXPERIENCE GAINED FROM TRANSAS

4-1. PREPARATION FOR TRANSAS

With vast amount of radioactive material packages annually transported with several ministries having responsibilities over safety regulations, exhaustive and high level of safety regulations have been put into practice by enforcing comprehensive safety control process and practice by relevant administrative bodies. Seeing a value to have an independent comprehensive peer review by international experts for enhanced transparency and further improved safety, Government of Japan has requested IAEA to conduct for Japan TranSAS.

The preparatory work for the appraisal inevitably required tremendous efforts due to the relative large number of regulatory bodies that involve close co-ordination and the need to translate almost all the documents for use in the appraisal as it was anticipated that none of the appraisers were able to comprehend Japanese language, which will surely make the mission easier.

The complex legislative structure added an element for concern. Steering Committee has been established for coordination purposes among relevant authorities and it was in charge of all the work that included: Filling out a blank questionnaire, developing an exhaustive list of relevant requirements after picking up relevant requirements from national legislation, and translation of such requirements.

Government of Japan had sent completed questionnaire for sections pertinent to 1) legislation and government responsibilities, 2) organization and activities of regulatory bodies four months in advance of the appraisal and sent the other sections two months prior to commencement of the mission. Such approach was aimed at providing sufficient time for appraisers to comprehend the

overview of complex Japanese regulatory framework as well as a dossier containing more than 900 page translated requirements.

4-2. OVERVIEW ON THE OUTCOME OF TRANSAS FOR JAPAN

A report containing detailed findings by TranSAS was published by the IAEA on September 5 2006⁴. The appraisal concluded in the report, highly evaluating safety practices in the transport of radioactive materials being implemented in Japan, Japan's comprehensive legal framework provides a sound basis for the implementation of the transport regulations and that Japan's transport regulations are generally implemented in accordance with IAEA requirements. Detailed findings include 14 good practices, 8 suggestions and two recommendations. It is noted that the aforementioned two outstanding features were rated as good practices. Some typical appraisal is following.

(Good practice)

- In accordance with the purpose of regulation in general - to protect the public, workers and the environment from the hazards of radiation - it is clear that any transport without exemption is under the jurisdiction and surveillance of the responsible regulatory body.
- The regulatory body for air transport verifies that the exposure limit for workers is not more than 1 mSv in a year, which is the same as the dose limit to members of the public.
- In order to reduce the dose to members of the public, Japan's transport regulations limit the maximum dose rate to 0.1 mSv/h at 1 m from a vehicle, instead of 2 m as set out in the Transport Regulations.

(Suggestion)

- A smaller number of regulations could be useful for daily work in regulatory and operational practice, so it is suggested that the regulatory body could try to reduce or merge them to the extent possible.
- Japan's transport regulations could explicitly incorporate provisions making stowage and segregation applicable not only to transport but also to transit operations for radioisotopes and radiopharmaceuticals.

(Recommendation)

- Each regulatory body should review, and improve if necessary, its arrangements for implementing quality management in order to ensure that all regulatory activities related to radioactive material transport are covered.
- All individual organizations that have not already done so should implement an appropriately defined training program for those staff who are specifically engaged in transport safety activities.

For areas identified by TranSAS as recommendations or suggestions, Japan is currently trying to take actions with a view towards further enhanced safety of transport. For example, regulatory bodies are reviewing their own programs to ensure quality assurance management for transportation, and take an education and training program for personnel.

4-3. BENEFITS GAINED FROM TRANSAS

For the benefit of those States that are considering or due to take TranSAS presumably as part of the Integrated Regulatory Review Service (IRRS), Japan is pleased to list the effects through the appraisal.

Direct effects through the appraisal include:

- (1) A review of transport safety measures in place is enabled from a global viewpoint through the appraisal by the independent team;
- (2) Report, prepared by an independent TranSAS team and presented abroad as well as at home, provides a useful tool to assist our continuous efforts for the enhanced transparency in transport safety regulatory programs and better public acceptance.

Secondary effects have also been identified;

- (1) Preparation for TranSAS has provided Japan with opportunities to seek further improvements of regulatory framework;
- (2) Co-ordination among competent ministries concerned was enhanced, providing overall knowledge on regulatory measures including those under the purview of other ministries; and
- (3) Staff members involved in transport regulatory activities improved their skills.

It was felt that Japan benefited more from the self-assessment of its regulatory framework and the preparatory process than the measures for improvements on the basis of the TranSAS report.

To such an end, continued efforts by IAEA for further improvements of questionnaire and timely dissemination to the beneficiary State seem to be crucial in the light of the importance of such preparatory work.

5. ACKNOWLEDGMENTS

In TranSAS appraisal, the numerous officials of Japan's regulatory authorities (METI, MLIT, MEXT and MHLW etc.) have co-operated each other and contributed to the success of the appraisals. This paper is derived from these co-operation and contribution, we wish to express our appreciation to them.

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