The Need for a Public Information Program to Promote Understanding of the Validity of the Safety of IAEA Transport Regulations for Shipment of Radioactive Material

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1. History

The International Atomic Energy Agency (IAEA) first published Safety Series No. 6 (1961 Edition) in May 1961 for application to the national and international transport of radioactive materials. Numerous highly-experienced experts in the world attended the technical meetings and panel discussions since that time. Subsequent reviews were carried out in consultation with Member States and the organizations concerned, resulting in comprehensive revisions being published as Safety Series No. 6 (1964 Edition) in 1965. A revised version was published in 1967 in time to help assure safety in the transport of the spent fuels from nuclear power plants and radiation sources etc. that were becoming more frequent and presenting actual problems at that time.

Furthermore, technical and panel revision meetings were held relating to important issues such as test procedures, criticality safety in the transport of spent fuels etc. because of increasing international transport as well as domestic transport of RAM. These meetings were actively joined by representatives from Member States. Safety Series No. 6 (hereinafter: the IAEA Regulations) were published in 1973 and1985 and adapted to each domestic regulations of Member States respectively in 1978 and 1990. Many experts concerned, including those from Member States, have actively taken part in the revision process of the IAEA Regulations. The results from those meetings will be reflected in the next edition of the IAEA regulations. These were reviewed and discussed by the Competent Authorities of Member States.

The IAEA Regulations are not binding to each of the Member States like a treaty but are positioned as "guiding principles" or model regulations. This is evident by the fact that each Member State or each relative international organization such as the IMO, ICAO adapts the regulations fundamentally to each Member State's domestic regulations or each international rule. The regulations have the same effect on the international agreements. Similarly, those regulations are international, although they do not have compelling force like an international treaty. It is very important to adopt the regulations in each country so that transport might be carried out smoothly. The international shipment of materials would be difficult if each country had significantly different regulations.

2. Recent Discussion

In a July 2003 transportation meeting at IAEA in Vienna, there were numerous examples cited of additional requirements being imposed on radioactive material shipments by port authorities and political entities in the mistaken belief that additional measures to assure safety were required. The valuable information presented in meeting indicated that the present regulation has sufficient safety measures to assure low risk transportation.
In the transportation of nuclear fuel materials, most member states apply domestic transport regulations, many of which are modeled on the IAEA transport regulations. These regulations are adopted worldwide to assure safety during transportation. The design and testing requirements in the IAEA transport regulations are applied to the packaging used for transportation. From the experience gained from the numerous impact and thermal tests performed in each country, it is believed that the package testing requirements specified in the IAEA transport regulations provide a sufficient margin of safety for actual accident conditions experienced by nuclear materials in transport.

3. In the case of Japan

[1] International Conference on the Safety of Transport of Radioactive Material, (IEAE CN-101)

In Japan, UF_6, UO_2, fresh fuel assemblies, spent fuel, low-level radioactive waste, high-level radioactive waste, MOX fuel, etc. are transported by ship and land using packagings which meet the IAEA transport regulations. In addition, the transport vehicles and the ocean vessels are escorted for security that further ensures safety in transport. Thus safety als transport in Japan. Organizations and agencies responsible for oversight of radioactive materials transportation in Japan are shown in Figure 1.

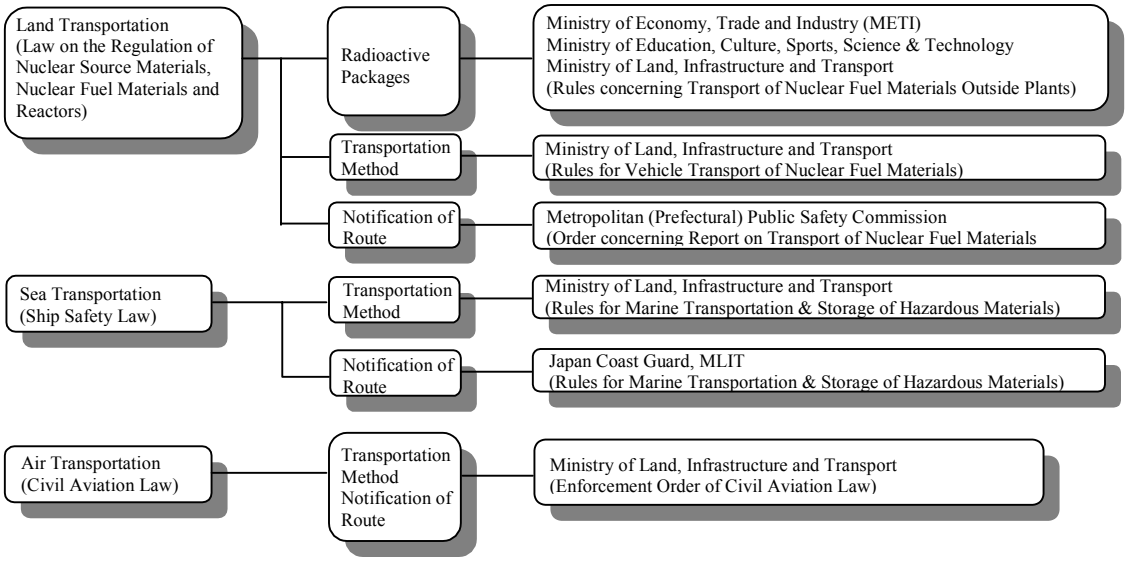

Fig.1 Radioactive Material Transport Mode and Regulation assignment

The relationship of the rules regarding the transport regulations of RAM in Japan is shown in Figure 2.

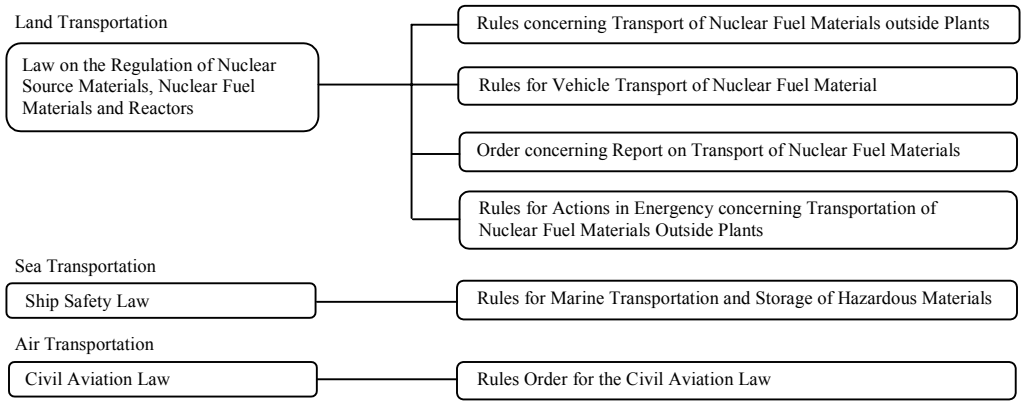

Fig.2 Code System concerning Transportation of Nuclear Fuel Materials

4. Effectiveness of Transport Safety Appraisal Service (TranSAS)

The compliance with regulations that take account of the IAEA Regulations is providing a high level of safety during the transport of radioactive materials. To assure that the regulations are appropriately applied on a national basis, a nation

may request a TranSAS team visit. The IAEA Secretariat may be requested to provide for application of the IAEA Regulations by providing a service, within existing resources, for carrying out, at the request of any State, an appraisal of the implementation of the IAEA Regulations by the State. The objective of a TranSAS mission is to assist the requesting Member State in evaluating and, as necessary, improving RAM transport safety regulatory program by providing:

(1) an appraisal of the State's transport safety regulatory practices with respect to requirements of the IAEA Regulations and related international standards and guidelines; and
(2) recommendations, as appropriate, in areas where the State' transport safety regulatory program might be improved.

This kind of program could make Member States improve application of domestic regulations and enhance the public's recognition of the adequacy of the domestic relative regulations.

5. Invaluable information on experimental data and experience

The IAEA Regulations require the design criterion and the test standards on the transport package of RAM. Their major test requirements of the transport package are described as follows:

(1) 9 meter drop test (Fig.3)
(2) 1 meter puncture test
(3) 800 ℃、30 minutes thermal test (Fig.4)
(4) 15 meter immersion test
(5) 200 meter immersion test

The mechanical tests, the thermal tests, the shielding test containment test, the criticality test and other several tests are performed on to the transport package sequentially or individually.

Fig3. 9 meter drop test

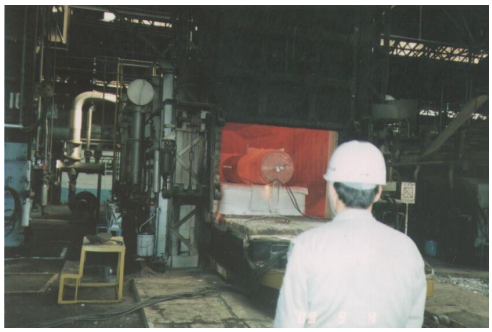

Fig.4 800 ℃ 30 minutes thermal test

The special consideration for land transport in Japan is as follows; the transport convoy consists of a vehicle loaded with RAM with a wagon for escort ahead and behind to provide an even safer transport system for the public. The transport convoy may take a rest at suitable times during the actual shipment, and will investigate and obtain the latest information concerning climate, road condition, traffic situation etc. throughout the transport route. The transport convoy will be equipped with a telecommunication system between an operation center and the transport convoy. An operation representative, radiation monitoring persons and guards are on board the transport convoy. The surveillance for sea transport is carried out by the guard vessel of Japan's Coast Guard in a harbor to protect the transport vessel that is

loaded with a type B package and/or package containing fissile material. The purpose is similar to the case of land transport.
The transport package containing RAM are tied down with the special device to a vehicle of truck during the transport.

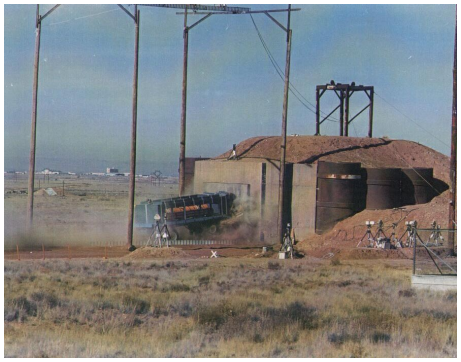

Fig. 5 Full scale collision test of the vehicle system at SNL

Fig.6 Full scale fire test of the vehicle system at SNL

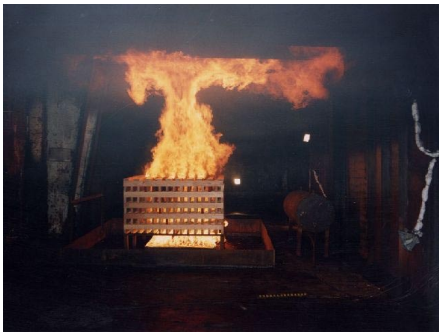

Fig.7 Wood crib fire test in the vessel hold

Fig.8 The test ship, Mayo Lykes in Mobile Bay, Alabama, U.S.

Several full scale tests were performed in the world in the past to demonstrate the safety of the full scale of actual transport system which consist of the transport package and the vehicle not only from the standpoint of the safety of the transport package, but also from the standpoint of the total transport system.

These kinds of full scale tests showed and verified the adequacy of the IAEA Regulations by comparing the results of the test standards of IAEA Regulations to the results of the full scale of the transport system to simulate accident condition during the transport in land and sea.（Fig.7and Fig.8）

6. Conclusion

It is important to convey basic knowledge that demonstrates to the general public and public officials that transport of radioactive materials is safe. Data, analysis, and testing for certification in member states of the IAEA as well as experience with packages involved in accidents demonstrate the margin of safety when radioactive material material is transported. In addition, the experience of TranSAS activity has shown it to be an effective and transparent means to the public people for Member States to demonstrate their commitment to the safe transport of RAM.

Therefore, in the future, the IAEA must continue and expand its public efforts to make the public aware of the very high certainty of safe transport that is the consequence of following the regulations. I would like to ask IAEA to have the transportation specialist groups designated by each Member State. These transportation specialist groups, working with the IAEA transport regulations in each country, should have as a central activity an information program that conveys the margin of safety inherent in the IAEA transport regulations.

Finally I would like to ask IAEA to produce a program relating to public perception of RAM transport for the public throughout the world. And also I would like to ask IAEA to send the transportation specialist groups to Member States and many concerned countries to explain and demonstrate the adequacy of the IAEA Regulations.

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