Proceedings of the 18th International Symposium on the Packaging and Transportation of Radioactive Materials
PATRAM 2016
September 18-23, 2016, Kobe, Japan

Paper No. 4061

Establishing and Sustaining a Compliance Assurance Regime for Transport Safety in IAEA Member States

Vangeline K. Parami, Ph. D.
Head, Licensing Review and Evaluation Section
Philippine Nuclear Research Institute
Quezon City, Philippines

Shazia Fayyaz
Principal Scientific Officer
Transport & Waste Safety Directorate
Pakistan Nuclear Regulatory Authority
Islamabad, Pakistan

Meherun Nahar, Ph.D
Principal Scientific Officer
Bangladesh Atomic Energy Regulatory Authority
Dhaka, Bangladesh

Mykola Kurylchyk
Programme Management Officer
International Atomic Energy Agency
Vienna, Austria

Christopher Bajwa
Transport Safety Specialist
International Atomic Energy Agency
Vienna, Austria

Abstract

1. Background

With the increasing volume of domestic and international transport of radioactive material, each State should establish appropriate regulatory infrastructure for Safety based on the IAEA *Transport Regulations*[1]. To help the Member States in establishing an effective Compliance Assurance Programme[2] the IAEA embarked upon the Technical Cooperation (TC) Project RAS 9/067-*Strengthening an effective compliance assurance regime for transport safety* for States in the Asia/Pacific region.

2. Initial status of compliance assurance regime

The Project was commenced with response of the participating States to the Self-Assessment of Regulatory Infrastructure for Safety (SARIS) questionnaire for Transport of Radioactive Material. Initially –

- Many States had neither a basic nuclear legislation nor transport regulations nor a source inventory
- Operators were more visible than regulators in IAEA Workshops

[1] International Atomic Energy Agency Regulations for the Safe Transport of Radioactive Material, IAEA Safety Requirements No. SSR-6, IAEA, Vienna, (2012)

[2] International Atomic Energy Agency Compliance Assurance for the Safe Transport of Radioactive Material, IAEA Safety Standards, Safety Guide No.TS-G-1.5, IAEA, Vienna, 2009

- All States required training programmes
- In many States transport was regulated through an import /export control regime.

3. Results

Under the RAS 9/067 project, 12 training courses/meetings/workshops were conducted in the region. Over 170 representatives from 36 countries participated. Now many States have initiated promulgation of basic nuclear legislation; some have issued transport regulations while some are updating them. Inspections are being undertaken more regularly. Local expertise for training transport workers is being developed. Some States have made impressive strides in establishing a compliance assurance programme. Some States are prepared to be "resource States" for the region. A regional network has been created to help sustain compliance assurance effectively.

4. Conclusions

While much has been accomplished in the Region to improve the safety of radioactive material transport, there are still significant needs in many of the countries in the Region. Going forward, a general lack of resources will present significant challenges to countries that are at the beginning of their efforts to develop their infrastructure for transport safety. The Agency must be prepared to provide continued support to countries in the Region for progress to continue.

Introduction

With the increase in the applications of radioactive material, the number and variety of radioactive consignments is on the rise. This increase in the volume of transport of radioactive material warrants implementation of regulations for safe transport of radioactive material[1]. The International Atomic Energy Agency embarked on a regional Technical Cooperation (TC) Project (RAS 9/067) for the region of Asia-and the Pacific in this regard. The countries participating in the project include IAEA Member States from the Middle East, South East Asia and South Pacific Islands[2]. The objective of the project is to *strengthen an effective compliance assurance regime for transport safety* for States in the Asia Pacific region. For this purpose it was necessary for each participating Member State to make a self-assessment of the current regulatory infrastructure for transport safety and its implementation in their country.

Through the provision of regional workshops, meetings, and training courses, the project addressed multiple transport issues in the region. Through self-assessment and peer review exercises it identified strengths and weaknesses, supported development of national and regional action plans, facilitated networking and resource mobilization mechanisms as well as assisted in the improved alignment of national transport safety frameworks with IAEA Safety Standards in a sustainable manner, thus improving regional harmonization.

Self-Assessment Questionnaire

Assessment of the regulatory framework for safety with respect to the IAEA safety standards can be made either through an external review or through internal self-assessment. Self-assessment offers a

mechanism by which an organization can assess its performance against established standards and models and thereby identify areas for improvement. The IAEA has developed a methodology and tool for Self-Assessment of the Regulatory Infrastructure for Safety (SARIS), to assist States in undertaking self-assessment of their national regulatory framework for safety in accordance with the IAEA safety standards[1,3], and to develop an action plan for improvement. The IAEA self-assessment methodology and the associated tools are fully compatible with the IAEA safety standards and are also used in the preparation for regulatory review missions, such as the Integrated Regulatory Review Service (IRRS) and advisory missions.[4] The SARIS for transport safety needs periodic review and updating to reflect latest publications of IAEA safety standards.

Answers to the SARIS questionnaire on safe transport of radioactive material developed by the Agency would help identify the gaps and strengths in the regulatory infrastructure of the Member State in question.

Initial condition

At the beginning of the project the Agency conducted workshops in Amman, Jordan (2012) and Beijing, China (2013) to familiarize the participants with compliance assurance and the SARIS software. The participating Member States were encouraged (Vienna, March 2014) to provide answers in the SARIS questionnaire, assess the regulatory compliance regime in their respective countries and identify the areas that required strengthening. The following picture emerged:

- Some countries had a well-defined nuclear legislation and transport regulations.
- Many countries had nuclear legislation but no regulations specifically addressing transport of radioactive material. In these countries transport of radioactive material was generally regulated through import-export control.
- Many countries did not have basic nuclear legislation.
- Some countries did not have a source inventory.
- Most of the countries were party to the IAEA Code of Conduct on the Safety and Security of Radioactive Sources.
- All countries required training programmes on specific topics (but did not necessarily have the resources to carry out the training).

In the initial meetings and workshops of the project, participating Member States were represented by more transport operators than regulators.

National and Regional Action Plans

The initial assessment resulted in each Member States developing their respective specific National Action Plan to close identified gaps. Upon assessing the regulatory infrastructure in the participating Member States (Kuala Lumpur, Malaysia 2014) participants identified 7 priority areas out of the 12 areas of compliance assurance [Figure 1].The next logical step was to determine an action plan for the region, in order to close the identified gaps.

Figure 1

During deliberations it emerged that some States were strong in certain areas while some had strengths in other areas. At that point it was conceivable that the States could provide support to one another except that there were certain areas identified in the national action plans where the Agency's support was required by all. This enabled the development of a preliminary Regional Action Plan (Table 1).

The Regional Action Plan was reviewed and refined (Vienna November 2014). Some of the support actions that were to be provided by the Agency, e.g. procedure for forwarding a radioactive consignment and emergency preparedness and response for transport, were completed through practical demonstrations, sharing of experiences, and exercises.

First Peer Review meeting

At this point a peer review of the regulatory infrastructure was organized (Amman, Jordan, 2015). The participants make a critical evaluation of the regulatory infrastructure existing in the other countries. This exercise revealed that in some States some progress had been registered, in particular:

- Draft transport regulations were being prepared
- Emergency preparedness and response actions were being initiated
- Procedures for packaging, collection and transport of disused sources and other radioactive wastes were being made available
- Inspections were being scheduled

Training programmes required by the States were identified. Agency's role in this area was identified. Two aspects appeared prominent, viz., security in the transport of radioactive material and developing trainers in each State so that the training needs of the State could be addressed without depending on external assistance.

Security and train the trainers

The participating States actively participated in a workshop on Safety and Security of Transport of Radioactive Material (Bangkok, Thailand, 2015)[5] where the security perceptions of the States were deliberated upon. It was evident that because of the Code of Conduct on Safety and Security of Radioactive Material, many States had established procedure for ensuring security of sources, particularly of Categories 1 and 2, in all stages including receipt, transport, storage, handling and disposal. Exercises on security in transport coupled with a technical visit to a local company frequently transporting Category 2 sources helped in placing the issue in proper perspective.

To meet the need for developing local trainers who would train the professionals in their States in Safe Transport of Radioactive Material, the Agency organized a 'Train the Trainers' course (Quezon City, Philippines, 2015). Professional trainers were engaged for demonstrating the art of training. The participants selected some topics relevant to compliance assurance for the safe transport of radioactive material and delivered lectures. This programme infused considerable confidence in the participants who are now in a position to conduct training programmes on the various aspects of safe transport of radioactive material.

Second peer review

All along, the Member States were implementing the National Action Plans and it was felt that a second peer review would help. During the peer review (Jakarta, Indonesia, 2015), the participants were formed into groups of two where each participant was provided with an abbreviated version of the SARIS questionnaire. From the answers provided each participant assessed the responses of the other member of the group and made a detailed peer review. Following the review which recorded the progress made by the participating States, the regional action plan was finalized. A regional network was created so that each State could stay in contact with all the other States in the region. This would help in keeping up-to-date on all matters relating the transport of radioactive material in the region, providing support to one another in the event of an emergency and also in addressing issues relating to delay and denial of shipment. A coordinator of the network has been identified. The network is functioning effectively with the support of the Agency.

IAEA SharePoint websites[6] are created for each event wherein contents of the events, participants' information, country reports, lecture materials, references and other relevant information are posted. The websites also serve as points of contact for networking among participants.

Management Systems and Risk Assessment

A Regional workshop on Management Systems and Transport Risk Assessments, was held in Daejeon, Korea, (May-June 2016). In the workshop, the participants were made familiar with the various

important elements of management systems as applicable to the safe transport of radioactive material and they appreciated the importance of management systems in the context of assurance of compliance with regulations for the safe transport of radioactive material, actively taking part in discussions and exercises. This workshop provided the first opportunity to the participants under the project to be introduced to transport risk assessment. The exposure pathways during normal and accident conditions of transport and methods of calculating the dose to transport workers and public under the postulated scenarios were explained. The workshop clearly aroused considerable interest in transport risk assessment from the participants.

Drafting school for regulations

The only major action that was required was to develop transport regulations for each State. For this purpose, a drafting school was conducted (Vienna, April 2016) in which participants from the various regions of the world were present. Under guidance provided by experts from Australia, France, Germany, Greece, India, Ireland, Spain, United Kingdom and United States of America the participants successfully drafted transport regulations under the enabling provisions of their respective national laws. The participants were encouraged to present these draft regulations to their respective governments so that they may be duly promulgated.

Voices from the Field

In order to provide some firsthand knowledge of the outcomes of the project, several participating Member States have provided direct feedback below.

Bangladesh

The Bangladesh Atomic Energy Regulatory Authority (BAERA) was formed on 12 February 2013 after the enacting of the Bangladesh Atomic Energy Regulatory Act 2012 (Act No 19 of 2012). The act confers all necessary powers to the BAERA to designate as national Competent Authority in implementing the IAEA regulations for safe transport of radioactive material inside and outside the country.

After joining IAEA regional TC project RAS/9/067 in 2014 and participating through 2016, regulatory compliance in this country was enhanced for transport of radioactive material. Previously safety in transport of radioactive material was ensured through an export/import control regime and authorization was made only for handling transport activities. From 2014 BAERA began routine inspection and enforcement activities in some specific fields of activity involving radioactive material and enhanced authorization activities in different stages of transport of radioactive material. Among the 7 identified priority areas of compliance assurance for this project, Bangladesh made remarkable improvements in the areas of ‘regulatory review and maintenance of effective legal framework’, ‘monitoring and inspection’ and ‘training and distribution of information’. Bangladesh continues to work on the other priority areas.

Philippines

The Philippines has benefitted from RAS 0/9/67 with 20 participants in 11 meetings, workshops and training courses and supplied an expert who served as a technical consultant on the Project for a total of 14 months. This resulted in the following: identification of strengths and gaps reflected in a National Action Plan; closer and stronger coordination of transport regulatory agencies thus reducing delay of shipments; improvement of conduct of assessment and inspections on transport safety; revision and update of transport regulations based on SSR-6 and experience feedbacks; need for harmonization of PNRI transport safety requirements with other governmental modal agencies; need for full implementation of Security Requirements in the Transport of Radioactive Material[7] for Category 1 and 2 sources; availability of increased number of competent transport safety trainers and experts, both from the side of operator and regulator to conduct more basic and function specific training courses.

Pakistan

Pakistan has independent regulatory authority, Pakistan Nuclear Regulatory Authority (PNRA), for regulating the matters associated with the nuclear safety and radiation protection. PNRA has a well-developed regulatory framework in the areas of nuclear safety, waste safety, transport safety and radiation protection. The transport operations associated with the radioactive material are well regulated in the country. Under the RAS/9/067, PNRA performed self assessment for transport safety keeping in view the lesson learned and experience feedback. This evaluation provided basis for the improvement in all areas of compliance assurance with special focus on key priority areas of the project. This includes revision and update of transport regulations to enhance administrative controls, review of the existing inspection program, enhancement of inspections; development of licensing application forms and procedure for approvals of Type B packages and development/revision of procedures to address current transport requirements during import/export of radioactive materials. Further, a comprehensive compliance assurance program to address design, manufacturing of packages and enhance liaison with other organizations is being developed. The knowledge/skills gained through various workshops arranged under the project was imparted to various national stakeholders like operators, designers, concerned government bodies by arranging specific courses on transport safety.

Conclusions

As one looks at the current state of regulatory infrastructure for the safe transport of radioactive material, the participating States have made considerable progress. From the initial assessments of SARIS responses, the participating States can be grouped as follows: priority areas almost fully met (5); priority areas partially met (10); and priority areas not met but actions undertaken (the rest of participating States). Many States have initiated measures to issue their basic nuclear legislation and transport regulations. Training programmes are being conducted. Emergency response systems are being established. The Asian network established as an output of this project has sufficient capability to assist other states in the priority areas of the project. However, capabilities in other areas of compliance assurance need to be developed or enhanced, for which continued Agency support is

required. IAEA can also play a vital role to share the expertise of other regional networks on transport safety with the newly established network under the project

Acknowledgments

The authors have great pleasure in acknowledging the support provided by the International Atomic Energy Agency, Vienna to the Member States in the region and the significant contribution of the European Commission sharing funding of the TC project activities. Special thanks go to Mr. Nandakumar Nagarajan Arungunram (India), an IAEA external expert, for the technical support he provided throughout this project.

References

1. INTERNATIONAL ATOMIC ENERGY AGENCY, Regulations for the Safe Transport of Radioactive Material, IAEA Safety Requirements No. SSR-6, IAEA, Vienna, (2012)
2. Ardouin, C. et. Al. *The beginnings of a Pacific Islands Regional Network for developing a common approach to safe transport of radioactive materials*, Paper No. 4059, Proceedings of the 18th International Symposium on the Packaging and Transportation of Radioactive Materials PATRAM 2016 September 18-23, 2016, Kobe, Japan
3. INTERNATIONAL ATOMIC ENERGY AGENCY, Compliance Assurance for the Safe Transport of Radioactive Material, IAEA Safety Standards, Safety Guide No.TS-G-1.5, IAEA, Vienna, 2009
4. INTERNATIONAL ATOMIC ENERGY AGENCY, SARIS guidelines 2014 edition, IAEA SERVICES SERIES No. 27, Vienna, 2014.
5. Duhamel, D. et. Al. *The Interface of Safety and Security in Transport: A Regional Perspective*, Paper No. 4062, Proceedings of the 18th International Symposium on the Packaging and Transportation of Radioactive Materials PATRAM 2016 September 18-23, 2016, Kobe, Japan
6. https://gnssn.iaea.org/Pages/TransportNetworks.aspx
7. PHILIPPINE NUCLEAR RESEARCH INSTITUTE, Code of PNRI Regulations, Part 27, Security Requirements in the Transport of Radioactive Material, Official Gazette, Vol. 109 No. 47, 2013.

Table 1
Regional Action Plan for the Priority Areas

Priority Area	Actions/Assistance needed
Regulatory review and maintenance of effectivelegal framework	Development of Regulations specific to transport of radioactive material
	Review of regulations
	Training programme on regulations
	Training programme on Compliance Assurance for relevant Competent Authority personnel
	Witnessing of Maintenance/Manufacture/Testing (held in a country where this is occurring)
	Issuance of approval certificate (Competent Authority personnel)
Enforcement actions and investigations of incidents	Training of competent authority staff on investigation techniques
	Training of transporters on compliance
Monitoring and inspections of transport operations	Development of regulatory measures for monitoring and inspection
	Training of Competent Authority inspectors: Inspection and observation
	Guidance on the equipment required for monitoring and inspection for the safe transport of radioactive material
	Expert mission to evaluate and review monitoring and inspection procedure
Emergency planning and exercises	Expert mission to develop / review emergency response procedure
	Expert mission to evaluate emergency exercise
	Training for emergency response personnel
	Training on Dose Assessment (Radiological assessors)
	Guidance for emergency response equipment/ facilities
	Training on Communication systems during Transport Emergencies for the command and control (scenarios)
Training and distribution of information	Comprehensive training on safe transport of radioactive material for Competent Authority personnel
	Review of training programme
	Train the trainers

	Radiation Protection Programme for all transport operators (consignor, carrier and consignee)
	Practical Exercises on Transport –preparation, handling and Safe Storage of packages in transit and Actual transport scenario - (for workers engaged in activities relating to transporting process).
	Training on design and testing
	Training on Management System
	Training on transport of radioactive waste including disused sources and contaminated objects (users of sources).
	Training on Public information.
International and Inter-departmental co-operation	Training programme for Competent Authority personnel and officials from other interfacing agencies (e.g. Customs officials, Border Security, etc.) including measures for prevention of delay and denial of shipment.
Design assessment	Establishment of a package testing facility