

Status of the regulation for safe and secure transport of radioactive materials in Madagascar

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Abstract: Radioactive sources are widely used in medicine, in industrial exploration and development, as well as in basic scientific research and education in Madagascar. The ability to use such radioactive materials in these sectors depends on their safe and secure transport both within and between countries. Transport safety of radioactive materials within the country is regulated. The law n° 97-041 on radiation protection and radioactive waste management in Madagascar promulgated in January 1998 and the decree n° 2735/94 dealing the transport of radioactive materials promulgated in June 1994 govern all activities related to the transport of radioactive material. This law was established to meet the requirements of the International Basic Safety Standards (BSS, IAEA Safety Series 115). It is not fully consistent with current international standards (GS-R-1). Indeed, in order to enhance the security of radioactive sources, Madagascar has implemented the Code of Conduct and the Guidance on the Import and Export of Radioactive Sources. Faced with delays and denials of shipment of radioactive materials issues, the National Focal Point has been appointed to work with ISC members and the regional networks on the global basis.

1. Introduction

Radioactive sources are widely used in medicine, in industrial exploration and development, as well as in basic scientific research and education in Madagascar.

In medicine, sealed sources are used for external beam radiation cancer treatment and being placed inside or next to the tumor requiring treatment. In nuclear medicine, radiopharmaceuticals are used in diagnosis and treatment.

Radioactive sources have routine use in industrial application in radiography and non-destructive testing. In many industrial facilities, they are used in process control for such things as level, moisture or density measurement in soil and in oil well logging.

The acquisition, transport, export and transfer of radioactive material are regulated. All radioactive sources used are imported. Ores containing radioactive materials are exported mostly by sea. Many of these require the reliable, fast and effective transport from manufacturer to end-user. These establish the cooperation between the Technical Body of the Regulatory Authority (Madagascar-INSTN), the Customs and Security Departments, the Police of borders and Carriers. The safety and security of radioactive sources including their transport are two of the major statutory functions of Madagascar-INSTN, which was established in 1994 by the decree n° 2735/94 and in 1998 by the Law 97-041. These functions are carried out through the process of regulations and guidance; authorization; oversight functions; and emergency planning and response. A very effective import/export control has been established through the process of application, control and authorization. A comprehensive inventory of radioactive materials and sources is in progress and has proved to be a necessary condition for an effective regulatory control of radioactive sources in the country, which in turn will enhance safety and security. In Madagascar there is awareness of the situation and determination to join efforts of world nuclear community for increasing global nuclear security, primary by improving it at the national level. Efforts which have been made so far to implement the regulatory infrastructure and should protect radioactive materials, nuclear installations and transport from malicious acts, and should combat illicit trafficking. Faced with delay and denial of shipment of radioactive materials issues, the National Focal Point has been appointed to act as the central and common point of contact with the IAEA, to serve as the interface between the government, the Regional Coordinators and the

denials Secretariat to facilitating and monitoring of shipments of radioactive materials and evaluating the reasons for denials or delays.

2. Legal framework of safe and secure transport of radioactive materials in Madagascar

The decree n° 2735/94 dealing the transport of radioactive materials established to meet the requirements of the International Commission on Radiological Protection (ICRP) and promulgated in June 1994 governs all activities related to the transport of radioactive materials. The law 97-041 on protection against harmful effects of ionizing radiation and radioactive waste management in Madagascar was promulgated on January 1998. Four decrees to implement the law were approved by the government in 2002. The law was established to meet the requirements of the International Basic Safety Standards (IAEA Safety Series 115) and to be commensurate with the use of ionizing radiation in Madagascar. It is not fully consistent with current international standards (GS-R-1). According to this regulation, Madagascar-INSTN is ensuring the provisional functions of the Technical Body.

The Law 2003-012 on Physical Protection of Nuclear Materials, Nuclear Facilities and other Radiation Sources was promulgated in 2003 and amended in 2008.

3. Transport Safety of radioactive materials

The transport safety of radioactive materials is based in the package. The standards for the packages used in the country in the transport of radioactive materials to ensure safety under normal conditions are the International Atomic Energy Agency (IAEA) Regulations for the Safe Transport of Radioactive Materials, TS-R-1. Meanwhile, the Regulations require transport organizations involved to implement Radiation Protection Programmes to control radiation dose exposure to workers and the public. An assessment has been carried out by Madagascar-INSTN of the likely doses to various types of worker and members of the public involved in all materials from ores containing radioactive materials transport operations. The IAEA guidance on Radiation Protection Programmes for Transport of Radioactive Material is used to advise and assist transport operators.

4. Transport Security of radioactive materials

The main concern is malicious acts and terrorist action. Requirements are in place to ensure the physical protection. The properties of the radioactive materials, the robust design of the package to ensure safety combine to reduce the risks due to radiation exposure following malicious acts. International standards and requirements are used to ensure security in the transport of all radioactive materials. In some cases, they are being supplemented by the national requirements.

5. Authorization to transport radioactive materials

According the regulations, transport of radioactive materials or sources should be subjected to the requirements of the safe transport, which is in complete harmony with the IAEA's Regulations for the Safe Transport of Radioactive Materials, TS-R-1. Appropriate packaging, adequate documentation and prior notifications by the manufacturer and consignors are required to assure that the carrier takes necessary precautions and to secure the arrival of the radioactive materials.

6. Import and export of radioactive sources

Radioactive materials or sources will not be shipped to any airport or seaport prior the approval from the seaport or airport Authority, which is based on the issuance of the radioactive materials or sources authorization by the Regulatory Authority. Radioactive materials or sources imported are also subjected to the custom's inspection. In Madagascar, there is a complete coordination between the Custom Department and the Regulatory Authority. Meanwhile, the implementation of the IAEA's Code and Guidance has provided an expanded scope for ensuring the safety and security of

radioactive sources including their transport. Indeed, for the control on import and export of radioactive sources, the Code and the Guidance introduce important requirements for the authorization of import and export of radioactive sources

The following tables summarize type and number of the authorized radioactive materials and sources imported and exported, inventoried, directly concerned by transport.

Table 1. Radioactive sources imported and exported transported from 2009 to 2011 in Madagascar

Year	N° Sources imported	Application	N° Sources exported	Application
2009	152	Gammagraphy Nuclear gauges Nuclear medicine	11	Gammagraphy
2010	37	Gammagraphy Nuclear gauges Nuclear medicine	09	Gammagraphy
2011	05	Gammagraphy Nuclear gauges	07	Gammagraphy

Table2. Amount of ores containing radioactive materials exported

Year	Zirconium	Colombo tantalite
2010	5380 tons	
2011	336 tons	4 tons

Conclusion

The implementation of the Code of Conduct on the Safety and Security of Radioactive Sources and Guidance on the Import and Export of Radioactive Sources has provided a scope for ensuring safety and security of radioactive sources during their life cycle. It is vital that safe and secure transport services for radioactive sources be maintained to allow nations to develop nuclear programmes in order to produce and distribute radioactive products vital to industry and health care.

Madagascar makes efforts to reassure the public that radioactive material and source transport is a necessary, safe and secure operation even under severe accident conditions. The physical properties of the materials coupled with the security provisions required by the IAEA also ensure that the radiation exposures following potential malicious acts are unlikely to be great.

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