Security of Radioactive Sources during Transportation in Nigeria

A Presentation at the IAEA International Conference on the Safety and Security of Radioactive Sources: Maintaining Continuous Global Control of Sources throughout their Life Cycle

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Introduction

- Radioactive sources are put to many beneficial applications in many sectors of the Nigerian economy. These sectors are Petroleum Industry, Health Care Delivery, Manufacturing Industry, Mining, Education, Research, and Agriculture and Water Resources.
- It is pertinent to know that all radioactive sources used in Nigeria are imported and are subject to land and water transportation from their entry into the country, movements around various work sites and final export out of the country.

Introduction Cont'd

- National experience since the inception of the NNRA has shown that radiological incidents and accidents, especially Loss of Control of Radioactive Sources, have occurred during transportation. This thus forms the weakest link in the chain of *Import-Transport-Use-Transport-Export* of Radioactive Sources.

Introduction Cont'd

- It is noteworthy that despite the immense activity going on in the Handling, Clearing and Transportation of Radioactive Sources practice, only few Transporters and licensed Clearing Agents were authorized to deal with Radioactive Sources between 2001 and 2006.
- It is in this regard that the NNRA observed further that all cases of Loss of Control of radioactive Sources during transportation, have involved unlicensed handlers.
- This therefore underscored the urgent need to strengthen the Regulatory Control Programme and the requirements for the authorization of Handling, Clearing and Transportation practices.

Legislative and Regulatory Infrastructure

- The use of sources of ionizing radiation is highly regulated world wide. The Nuclear Safety and Radiation Protection Act No. 19 (the Act) was promulgated in 1995 to provide a legislative framework in Nigeria for the regulation of the application of sources of ionizing radiation.
- The Act provides for the establishment of the Nigerian Nuclear Regulatory Authority (NNRA) which came into operation in 2001

Responsibilities

- The NNRA has as part of its statutory responsibilities under section 4 of the Act which includes but not limited to:
- Regulate the possession and application of radioactive substances and devices emitting ionizing radiation;
- **Ensure protection of life, health, property and the environment from the harmful effects of ionizing radiation while allowing beneficial practices involving exposure to ionizing radiation;**
- Regulate the safe promotion of nuclear research and development and application of nuclear energy for peaceful purposes; and
- Advice the federal government on nuclear security, safety and radiation protection matters

Power

- To discharge these responsibilities, the NNRA is empowered by section 6 of the Act to, amongst others:
- **Categorize and license activities involving exposure to ionizing radiation, in particular, the possession, production, processing, manufacture, purchase, sale, import, export, handling, use, transformation, transfer, trading, assignment, transport, storage and disposal of any radioactive material, nuclear material, radioactive waste, prescribed substances and any apparatus emitting ionizing radiation;**
- Establish appropriate register for each category of sources or practices involving ionizing radiation
- Issue codes of practice which shall be binding on all users of radioactive and prescribed substances and of source of ionizing radiation
- Review and approve safety standards and documentation
- Provide training, information and guidance on nuclear safety and radiation protection;
- Protect the health of all users, handlers and the public from the harmful effects of ionizing radiation

Regulatory Control Programme (RCP)

- NNRA has emplaced regulatory framework within the context of the Act to effectively fulfill its primary regulatory functions namely, radiation protection, safety and security of radioactive sources, safeguard of nuclear materials and the physical protection of nuclear facilities.
- This has been achieved through a system of registration, licensing and inspection of practices involving ionizing radiation and the enforcement of compliance with the Act.

RCP Cont'd

- NNRA activities are guided by the five (5) pillars of the Regulatory Control Program viz:
  - Regulations and Guidance
  - Authorization
  - Oversight Functions
  - Emergency Planning and Response
  - Ancillary Functions

Regulations and Guidance

- The provision of Section 47 of the Act empowers the NNRA to make Regulations.
- Nigeria Basic Ionizing Radiation Regulations (NiBIRR) was gazetted in December 2003. This was the first set of Regulations in the history of the country controlling the use of ionizing radiation. The NNRA further promulgated nine (9).

Regulations & Guidance Cont'd

- Nigerian Safety and Security of Radioactive Sources Regulations, 2006
- *Nigerian Transportation of Radioactive Sources Regulations, 2006*
- An application for licence to transport radioactive material or nuclear material shall contain the date, time and location of any scheduled stop or trans-shipment in Nigeria (Regulation 5.a)
- The Authority shall review, approve, reject applications, and issue, amend, modify, suspend, cancel licenses or authorizations in respect of transportation of radioactive material (Regulation 10)
- Regulations 14 requires that a consignor, carrier and consignee of radioactive materials within Nigeria shall have valid licence from the Authority and shall notify the Authority well in advance and prior to the delivery, transport and receipt of any such materials
- It is required that, for shipment by road, the vehicle must be dedicated for the purpose of transportation of radioactive materials only and all relevant particulars of the vehicle must be submitted to the Authority (Regulation 14.1)
- The regulations also make provisions for packaging, markings, labelling, placarding, segregation

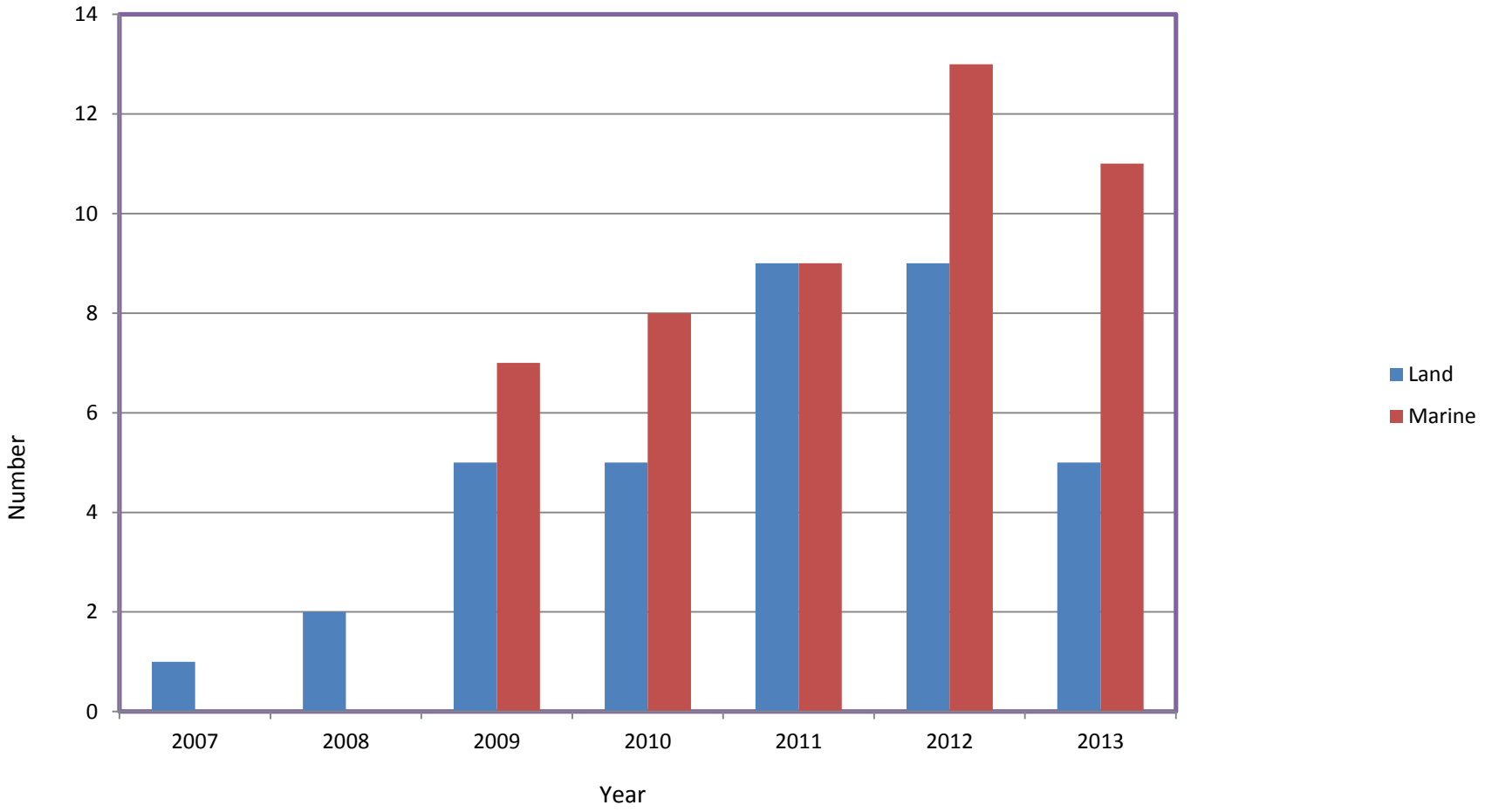
Regulations & Guidance Cont'd

- The Nigerian safety and security of radioactive sources regulations specify that the licensee shall have the responsibility for the safe management of, and the security of radioactive sources involved for which the licensee is authorized and shall emplace and implement programs and procedures for security of radioactive sources within his practice and for the administration of radiation safety (regulation 2.a)

Authorization

- By the powers conferred on it by Sections 6, 18 and 19 of the Act, the NNRA authorized amongst other practices in Industrial Application (Industrial Radiography & Nuclear Well Logging), Medical Applications and transportation of radioactive material.
- There was no licensed transporter between 2001 and 2006
- one Land authorized transporter in 2007
- 5 Land and 11 Marine transporters as at June 2013.

Status of Authorization on Land & Marine Transportation in Nigeria



Terms and Conditions of Licence

- The Licensee is authorized to handle and provide marine transportation of radioactive sources within Nigeria using the Vessel (s) specified (the particulars of the vessel is stated in the licence). The picture below shows a typical vessel used for transporting radioactive sources.
- Physical security of radioactive sources at all stages of transportation is the responsibility of the Licensee until they are delivered to their licensed owners.
- The Licensee shall ensure that sealed sources are locked in shielded positions, the key removed and all required plugs or caps installed and where possible, locked in place.
- The Licensee shall ensure that appropriate transport labels are applied to the outer surfaces of packages based on radiation levels.
- The Licensee shall ensure that all shipments carry appropriate documents including valid leak test certificates, consignor statements and emergency response plans.
- The Licensee shall ensure that licensed vessels are placarded on both sides with radiation or trefoil signs.
- The Licensee shall ensure that every member of its transportation crew including the Captains of the vessels have basic training in radiation protection, handling and safe transportation of radioactive materials and security of radioactive sources.
- There shall be no loading or unloading operations during transportation of radioactive sources.
- The Licensee shall submit to the Authority quarterly log records of movement of radioactive sources and display conspicuously a copy of the licence on dedicated vessels

Emergency Preparedness & Response

- The National Nuclear & Radiological Emergency Response Plan (NNRERP) was drafted in 2006. The NNRERP is being integrated into the National Disaster Response Plan (NDRRP) of the National Emergency Management Agency (NEMA).
- The Nigerian safety and security of radioactive sources states that the transportation of radioactive sources to temporary job sites, including the packaging, marking, labeling and placing of such sources in vehicles, placarding of vehicles, securing the sources during transportation and possessing proper shipping papers and emergency response information (regulation 14.2.j).

Ancillary Functions

- National workshop on security of radiation sources in land and marine transport organized by the NNRA in cooperation with the Federal Ministry of Transport and IAEA in 2008.
- One-day technical meeting with cargo airlines operating in Nigeria organized by NNRA in 2009
- The above national workshop was also organized in 2010 and 2011

Oversight Functions - Inspection

- The objective is to verify claims made on the application form with regard to temporary storage area where radioactive source consignment can be kept when there delay to proceed with the transportation, staff competencies, safety and security plan.
- An inspection report is submitted and reviewed which will lead to the eventual issuance or denial of authorization with specific terms and conditions.



Enforcement

- The greatest challenge faced by the NNRA in the first five years of its existence was unauthorized movement of radioactive sources on land and water.

Enforcement Cont'd

- The period under review recorded the under listed incidents.

❑Mis-Declaration and Illegal Exportation of Radioactive Sources (Ir-192 and Se-75) in 2004

- The consignment escaped the attention of the Nigerian Customs because of the wrong labeling and because there was no portal radiation monitor at this airport. The companies were both convicted.

Enforcement Cont'd

- Loss of Control of Radioactive Sources during Transit
- In October 2006, a nuclear well-logging company reported the loss of Category 5 (cesium 137) sources and one Category 4 (Am-Be) sources while on the premises of a Multinational Oil Company. The Inter-ministerial Nuclear Security Committee established several contraventions of the Act by both companies. In view of the development, both companies were prosecuted.

Enforcement Cont'd

❑ Missing Radioactive Sources

- An indigenous Industrial radiography company reported an incidence of Se-75 source in a Delta 880 Projector contained in a Ford Ranger pick-up got missing following a road accident when it was taken out for work on 24th March 2013
- The RSO initiated a search in conjunction with his radiographers but could not find the source.
- The RSO further initiated a public awareness campaign to the community where the incident occurred and inform them of the danger associated with keeping radioactive source. The public awareness paid off which led to the discovery of the source on 30th March 2013

Strategy to combat unauthorized movement of radioactive sources

- The NNRA is also empowered under section 6 (j) to do everything necessary to ensure that all concerned persons and bodies comply with laid down law and extant Regulations.
- To achieve compliance with requirements and extant laws, the NNRA organized Series of Stakeholders' Meetings and workshop.
- The meetings were to sensitize the Stakeholders in the land and marine transport of radioactive sources in accordance with requirements.

Conclusion

- The regulatory control programme which has been successful implemented by the NNRA over 10 years resulting to compliance with regulatory requirements by operating organization which has given birth to the maintenance of high level of security of radioactive sources through their lifecycle by extension strengthening the weakest link in the chain of *Import-**Transport**-Use-**Transport**-Export* of Radioactive Sources.
- This measure has greatly improved the security of radioactive sources and therefore reduced the incident of loss of control during transportation and transit to the barest minimum

Reference

[1] Nuclear Safety and Radiation Protection Act 1995

[2] S. B. Elegba, Import/Export Control of Radioactive Sources in Nigeria, 2004

[3] Nigerian Transportation of Radioactive Sources Regulations, 2006

[4] Nigerian Safety and Security of Radioactive Sources Regulations, 2006