**RADIOACTIVE WASTE MANAGEMENT FRAMEWORK IN NIGERIA**

 **1.0 BACKGROUND**

 Radioactive wastes may be generated from the use of radioactive materials and other sources of ionizing radiation. The amount and type of waste generated vary depending on the radionuclides involved and their application. When use of radioactive material is planned, it is important to also define a system for the predisposal management of waste arising. Predisposal management includes all steps or activities involved with management of radioactive waste from its generation to ultimate discharge or disposal. Characteristics of selected predisposal waste management systems strongly depend on the type as well as on the quantity of waste generated.

 So far the IAEA has provided guidance on management of relatively large amounts of waste generated in countries with extensive use of radiation sources in a large number of different institutions. The overall goal of predisposal management of radioactive waste is to minimize the hazards posed by the waste prior to discharge/disposal.

Radioactive waste is generated not only by the nuclear power industry, but also by hospitals, universities and non-nuclear industries. All the regulations applying to waste in general also apply to radioactive waste. However, radioactive waste emits radiation, which makes it a particular hazard for human health and the environment. It must therefore be managed with special care, from production to final disposal. Finding suitable waste disposal solutions is a major challenge for all stakeholders, industry, regulatory authorities, public authorities, local communities and the population. Radioactive waste is the term used to describe radioactive substances for which no further use is planned or considered.

A radioactive substance is one that contains naturally occurring or man-made radio nuclides, the radioactive level or concentration of which calls for radiation protection control. According to the French Environmental Code (Art. L 542.1-1), final radioactive waste means radioactive waste for which no further treatment is possible under existing technical and economic conditions. Treatment particularly entails extracting any part of the waste that can be recycled or reducing any pollutants or hazardous substances it contains. The radio nuclides contained in radioactive waste may be manmade, such as caesium-137, or found in nature, such as radium-226.

The radioactive properties of this waste are: the type of radio nuclides contained and the radiation emitted (alpha, beta, gamma), the activity (number of atomic nuclei which spontaneously disintegrate per unit time - expressed in Becquerel); the radioactive half-life (the time it takes for a radioactive sample to lose half of its activity). Most radioactive waste comes from the nuclear industry. The remainder comes from the use of radioactive elements in hospitals, universities, and some non-nuclear industries and defense-related activities.

* 1. **OBJECTIVE**

The main objective of this presentation is to provide practical guidance primarily to developing Member States on the predisposal management of radioactive waste arising from hospitals, laboratories, industries, institutions, research reactors and research centres.

**2.0 NATIONAL RADIOACTIVE WASTE MANAGEMENT FRAMEWORK**

 The radioactive waste management policy should be in accordance with the national objectives for radioactive waste management and with internationally agreed upon principles on waste management, and should define goals of waste management. A national radioactive waste management framework is one component required in order to protect human health and the environment both now and in the future without imposing undue burdens on future generations. The national framework for radioactive waste management should include the following components: policy, strategies, and systems.

 The radioactive waste management strategy should be developed to implement the national policies and should take into account both current and future requirements. National radioactive waste strategies will vary from country to country and will depend on administrative, legal and governmental control; circumstances and priorities; and the amount and type of waste generated. In the context of this presentation, there are essentially three different waste management strategies, depending on the extent of use of radio nuclides within a country:

* Local waste management (at the users' premises);
* Centralized waste management (at a centralized facility serving more users);
* A combination of local and centralized waste management.

In all cases, it will be required to apply some local waste management operations. These should be consistent with the national waste management strategy and, if applicable, with the requirements of the centralized waste management facility. The waste management system should be based on laws and regulations and enforced by a regulatory body. The organization and role of the regulatory body should be clearly defined. The basic requirements of a radioactive waste management system should be adequately provided in accordance with the scope of the national programme. Legislation should be formulated in accordance with international recommendations. The national radioactive waste management system should include legislation for the management of wastes which may contain a combination of radioactive and other hazardous materials.

* 1. **RESPONSIBILITIES**

 The responsibilities within a national waste management framework are distributed among the State, the regulatory body, the waste generators and the operators of waste management facilities.

**THE STATE SHOULD BE RESPONSIBLE FOR:**

* Establishing and implementing a legal framework;
* Establishing a regulatory body;
* Defining responsibilities of waste generators and operators of radioactive waste management facilities;
* Providing for adequate resources.

**THE REGULATORY BODY SHOULD BE RESPONSIBLE FOR:**

* Enforcing compliance with legal requirements; implementing the licensing process;
* Advising the government.

**THE WASTE GENERATORS AND OPERATORS OF RADIOACTIVE WASTE MANAGEMENT FACILITIES SHOULD BE RESPONSIBLE FOR:**

* Managing radioactive waste safety;
* Identifying an acceptable destination for the radioactive waste;
* Complying with legal requirements.

Roles and responsibilities are defined in tune with the adopted Waste Management Framework. A national framework is developed after social and economic factors and technical capabilities have been taken into account.

1. **HIGHLIGHTS OF THE REGULATONS**
* Licence: No person or organisation shall generate or manage radioactive waste without an appropriate licence from the Authority.
* Waste Coordinator: Each waste generator shall appoint a technically competent person with the appropriate independence and authority to be a Radioactive Waste Co-ordinator in order to assist persons using radioactive materials in safe and efficient on-site radioactive waste management
* Return of Source to Manufacturer: A person or organisation that proposes to import or acquire a device containing a sealed radioactive source shall require the supplier, as a condition of any contract for the purchase or transfer, to receive the source back after its useful lifetime
* Prohibition of importation of radioactive waste: On no condition, for whatever purpose or under any guise at all, shall any person or organisation import a radioactive waste into any part of Nigeria
* Labelling A licensee shall ensure that each container containing radioactive waste bears a durable, clearly visible label bearing the radiation symbol. The label shall be legible for the whole period of storage and must provide the following information.
* Storage: A licensee shall provide for interim storage of radioactive waste prior to its clearance, discharge or disposal. The interim storage facility shall be properly designed and constructed with at least one physical barrier between the radioactive waste and other material in the store.
* Physical Protection: Waste generators and the Designated Radioactive Waste Management Facilities shall ensure adequate physical protection measures to prevent any unauthorised access to the radioactive waste. The Authority shall approve of such physical security arrangements.
* Emergency Preparedness: written procedure and have equipment to deal with emergency, including information to the NNRA without delay of any emergency.

 **4.0 IMPLEMENTATION AND ENFORCEMENT**

No matter how perfect the regulations may appear on paper, it is worthless if it is not properly implemented and enforced

* Right of Entry and Inspection: Any person appointed by the NNRA to be Inspector to control the safety of radioactive waste management may enter at any reasonable time the premises of any licensee, and any other premises where he has reason to suspect that radioactive waste is present, carry out inspections and tests, take samples and photographs, bring in equipment or other experts if he/she has a reason to believe waste may endanger human health or environment.
* Offences and Penalties: The person or body corporate who, being a holder of authorisation under this regulations, who commits an offence shall be liable to prosecution in the court of law and upon conviction be liable to pay fines up to N1, 000,000 for an individual and up to N10, 000,000 for a corporate body or be given a jail term of up to ten years or both
* Appeals: Any person or organisation may appeal to the Board of the Authority against any decision made by the Authority pursuant to these regulations.

**5.0 PROVISION OF ADEQUATE FACILITIES, INSTRUMENTATION AND EQUIPMENT**

Facilities include:

* Buildings
* Laboratories
* Waste treatment and storage installations

Instrumentation and Equipment include:

* Different types of radiation detectors (α, β and γ detectors)
* Calibration Sources

Both the Waste Generators and the Government have their roles and responsibilities in the provision of facilities:

1. **ADEQUATE FACILITIES**
* There must be adequate facilities for radioactive waste processing and disposal and measures to encourage their use.

Radioactive Waste Generators are to provide facilities for:

* Proper Recycling, on the site segregation, pretreatment, in-house storage or safe shipment back to the manufacturer,
* Emergency Preparedness
* Communication facilities
* Record maintenance.

Government is to provide facilities for:

* Effective Regulatory Control (State of the art detectors)
* Emergency Preparedness (Orphan Sources)
* Communication and quick response
* National Data Base (IAEA)
* Designated Radioactive Waste Management Facility (DRWMF) adequately equipped with facilities for treatment, conditioning, interim storage and safe transport
* Final repository.

**7.0 TRAINING AND RETRAINING**

 There are provisions for the introduction of training schemes for:

* Regulatory Inspectors
* Government enforcement officers,
* Plant operators,
* Managers,
* Public awareness educational programs

There are well designed training packages by the IAEA for each category of people involved in radioactive waste management as well as for public awareness.

**8.0 CONCLUTION**

To ensure the protection of human health and the environment now and in future, it is important for the Government to do the needful for the safe management of radioactive waste in question.