



**RWANDA UTILITIES REGULATORY AUTHORITY**  
**P.O BOX 7289 KIGALI, Tel: +250 584562, Fax: +250 584563**

**Email: [info@rura.rw](mailto:info@rura.rw)**

**Web-site: [www.rura.rw](http://www.rura.rw)**

**REGULATION N°..../.../RURA/20... OF..../..../20... ON  
MANAGEMENT OF RADIOACTIVE WASTE**

## **CHAPTER I: GENERAL PROVISIONS**

### **Article 1: Purpose**

The purpose of this Regulation is to set up regulatory framework for the safe management of radioactive waste with the goal to protect people and the environment.

### **Article 2: Scope**

This regulation applies to licensed facilities or individuals using radioactive materials that produce waste and licensed Operators of radioactive waste management facilities accepting waste from other licensees for processing and storage until the waste can either be disposed of safely into the environment or in some cases, the material will need to be in long-term storage.

### **Article 3: Objective**

Objective of this regulation is to:

1. establish the requirements which shall be fulfilled for the safe management of radioactive waste in any physical state from generation to any type of disposal;
2. ensure the protection of human health and the environment from the hazards associated with radioactive waste.

### **Article 4: Exclusion**

This regulation does not apply to radioactive waste with activity levels less than the clearance levels specified in the ANNEX II of this regulation.

### **Article 5: Definition of terms**

For the purpose of this regulation, the terms below have the following meaning:

- a) **Biosphere:** part of the environment normally inhabited by living organisms.
- b) **Clearance:** Removal of regulatory control by the regulatory Authority from radioactive material or radioactive objects within notified or authorized facilities and activities after ascertaining that the radiation level of that material or object is within the clearance levels stated in Annex II of this regulation.

- c) **Closure:** administrative and technical actions conducted at a disposal facility at the end of its operating lifetime.
- d) **Commissioning:** The process by means of which systems and components of facilities, having been constructed, are made operational and verified to be in accordance with the design and to have met the required performance criteria.
- e) **Conditioning:** those operations that produce a waste package suitable for handling, transport, storage and disposal
- f) **Decommissioning:** Administrative and technical actions taken to allow the removal of some or all of the regulatory controls from a facility
- g) **Discharge:** a planned and controlled release of radioactive material to the environment.
- h) **Disposal:** Emplacement of waste in an appropriate Long-Term Storage Facility
- i) **Disused sealed radioactive source:** A radioactive source, comprising radioactive material that is permanently sealed in a capsule or closely bonded and in a solid form (excluding reactor fuel elements), that is no longer used, and is not intended to be used, for the practice for which an authorization was granted.
- j) **Effluent:** Any waste discharged into the environment from a facility, either in the form of liquid or gas.
- k) **Emergency Plan:** A description of the objectives, policy and concept of operations for the response to an emergency and of the structure, authorities and responsibilities for a systematic, coordinated and effective response.
- l) **Exempt Waste:** Waste from which regulatory control is waived in accordance with exemption principles
- m) **Licence:** A legal document issued by the regulatory body granting authorization to perform specified activities relating to radioactive waste management.
- n) **Licensee:** a person to whom license has been issued to carry out activities relating to radioactive waste management
- o) **Physical Protection:** Measures for the protection of nuclear material or authorized facilities, designed to prevent unauthorized access or removal of fissile material or sabotage.
- p) **Predisposal:** Any waste management steps carried out prior to disposal, such as pre-treatment, treatment, conditioning, storage and transport activities.
- q) **Pretreatment:** Any or all of the operations prior to waste treatment, such as collection, segregation, chemical adjustment and decontamination.
- r) **Radiation protection:** The protection of people from harmful effects of exposure to ionizing radiation, and the means for achieving this.

- s) **Radioactive waste management:** All administrative and operational activities involved in the handling, pre-treatment, treatment, conditioning, transport, storage and disposal of radioactive waste.
- t) **Radionuclides:** An unstable form of a chemical element that releases radiation as it breaks down and becomes more stable.
- u) **Radioactive waste:** waste that contains or contaminated with radionuclides at activity concentrations greater than the levels as established by the Regulatory Authority;
- v) **Safety case:** A collection of arguments and evidence in support of the safety of radioactive waste management facility.
- w) **Safety Assessment:** A review of the aspects of design and operation of a source which are relevant to the protection of persons or the safety of the source, including the analysis of the provisions for safety and protection established in the design and operation of the source and the analysis of risks associated both with normal conditions and accident situations
- x) **Segregation:** An activity where types of waste or material (radioactive or exempt) are separated or are kept separate on the basis of radiological, chemical and/or physical properties, to facilitate waste handling and/or processing.
- y) **Storage:** The holding of radioactive waste in a facility that provides for safety and security of containment, with the intention of disposal
- z) **Treatment:** Operations intended to benefit safety and/or economy by changing the characteristics of the waste.
- aa) **Waste acceptance criteria:** Quantitative or qualitative criteria specified by the regulatory body, or specified by an operator and approved by the regulatory body, for the waste form and waste package to be accepted by the operator of a waste management facility.
- bb) **Radiation Protection officer:** A person technically competent in radiation protection matters relevant for radioactive waste management who is designated by the licensee or employer to and approved by the Regulatory Authority to oversee the application of regulatory requirements.

## **CHAPTER II: RESPONSIBILITIES ASSOCIATED WITH THE PREDISPOSAL MANAGEMENT OF RADIOACTIVE WASTE**

### **Article 6: General Licensee Responsibilities**

Licensee shall be responsible for the safety of predisposal radioactive waste management facilities or activities. Licensee shall carry out safety assessments and shall develop a safety case, and shall ensure

that the necessary activities for siting, design, construction, commissioning, operation, shutdown and decommissioning are carried out in compliance with regulatory requirements.

The safety assessment has to be reviewed periodically to confirm that any input assumptions that need to be complied with remain adequately controlled within the overall safety management controls.

In addition to such predefined periodic reviews, the safety assessment has to be reviewed and updated:

- a) When there is any significant change that may affect the safety of the facility or activity;
- b) When there are significant developments in knowledge and understanding (such as developments arising from research or operational experience feedback);
- c) When there is an emerging safety issue owing to a regulatory concern or an incident;
- d) When there have been significant improvements in assessment techniques such as computer codes or input data used in the safety analysis.

The operator has to ensure an adequate level of protection and safety by various means, including:

- a) Demonstration of safety by means of the safety case, and for an existing facility or activity by means of periodic safety reviews.
- b) Derivation of operational limits, conditions and controls, including waste acceptance criteria, to assist with ensuring that the predisposal radioactive waste management facility is operated in accordance with the safety case;
- c) Preparation and implementation of appropriate operating procedures, including monitoring;
- d) Application of good engineering practice at various steps in the management of radioactive waste;
- e) Ensuring that staff are trained, qualified and competent, and, where applicable, licensed by the Regulatory Authority;
- f) Establishment and implementation of a management system;
- g) Maintenance of records and reporting as required by the regulatory authority, including those records and reports necessary to guarantee the accountability for and traceability of radioactive waste throughout the different processes of radioactive waste management;
- h) Establishment and maintenance of a mechanism to provide and ensure adequate financial resources to discharge its responsibilities;
- i) Development of an emergency preparedness and response plan;
- j) Ensure that radioactive waste is managed by appropriate segregation, characterization, classification, treatment, conditioning, storage and disposal;
- k) Consideration of non-radiological hazards and conventional health and safety issues.

- l) Ensure that generation of radioactive waste is kept to the minimum practicable and that radioactive waste is managed by appropriate classification, segregation, treatment, conditioning, storage and disposal;

Licensee shall take all necessary measures to ensure that:

- a) Generation of the activity and volume of radioactive waste are kept to the minimum practicable by suitable design, operation and decommissioning of its facilities;
- b) Reporting is made to the regulatory authority of required information at intervals including those related to the changes of ownership of waste.

#### **Article 7: Management system for management of radioactive waste**

The licensee shall establish and implement a management system which commensurate with the hazard of the waste management activities and shall be approved by the Regulatory Authority and contains at least the following elements:

- a) Policies and procedures that identify safety as being of the highest priority;
- b) Clear lines of authority for decisions on safety and compliance with procedures and processes;
- c) Organizational arrangements and lines of communications that result in an appropriate flow of information on safety at and between the various levels in the entire organization of the licensee;
- d) Clear specification of safety responsibilities for each individual;
- e) Responsibilities for compliance with program requirements;
- f) Clear requirement that problems affecting safety must be promptly identified and corrected in a manner to commensurate with their importance;
- g) Provision that each individual is suitably trained and qualified;
- h) A quality assurance program that provides information on the performance of the radioactive waste management program and equipment and establishes a review regime of the program. This program shall ensure that all necessary records are maintained and are readily retrievable when required;
- i) Provisions to ensure that the confidentiality of information that is received in confidence from another party is protected, and only provided to a third party with the consent of the first party.

The management system shall provide:

- a) Adequate assurance that the established requirements for safety and environmental Protections are being met.
- b) Assurance that the components of the safety systems are quality sufficient for their tasks.

The licensee shall promote and maintain a strong safety culture.

### **Article 8: Radioactive Waste Management Officer**

The licensee shall appoint a technical competent person with the appropriate independence and authority to be a radioactive waste management officer in order to assist him in the safe and efficient on-site management of radioactive waste.

### **Article 9: Control of Radioactive Waste Generation**

The licensee is obliged to implement measures to reduce the generation of radioactive waste and to avoid their accumulation in a non-processed form on the site.

Licensees shall ensure that steps are taken to keep generation of radioactive waste and its environmental impact and cost to the minimum practicable by:

- a) minimizing the activity of waste by using the minimum quantity of radioactive material needed;
- b) using short lived radionuclides where possible;
- c) minimizing the amount of waste by preventing unnecessary contamination of materials;
- d) maintaining consistency with the management strategy and systems.
- e) apply technologies and methods, appropriate to maintain the generation of radioactive waste to the reasonably achievable minimum in terms of their activity and volume;
- f) prevent the spreading of radioactive contamination in the facility;
- g) prevent the mixing of radioactive with non-radioactive waste;
- h) classify and sort the waste according to their radiological, physical and chemical characteristics and taking into account the provided options for further processing;
- i) implement processing technologies to reduce the volume of radioactive waste;
- j) Provide appropriate conditions for storage of radioactive waste subject to subsequent treatment, release from regulatory control or disposal.

## **Article 10: Waste packages**

The licensee shall use engineered waste packages to contain radioactive waste that conform with applicable safety requirements.

## **Article 11: Records, Reports and Documentations**

The licensee shall develop a suitable and comprehensive recording system for radioactive waste management activities under its responsibility. That recording system shall include discharges and shall allow for traceability of radioactive waste from the point of its collection through to its long term storage and its disposal.

All records related to radioactive waste inventory and radioactive waste management activities shall be:

- a) Maintained up-to-date such as changes to waste characteristics during processing;
- b) Retained in such a way as to ensure that relevant information is accessible in the future, as necessary.

Licensee shall maintain the following types of records:

- (a) site plans, engineering drawings, specifications and process descriptions;
- (b) authorization of the facility including testing, commissioning, operation and modifications, if any;
- (c) inventory of radioactive waste, including origin, location, physical and chemical characteristics of radioactive waste transferred or disposed from a facility;
- (d) effluent discharges and environmental monitoring;
- (e) safety and environmental assessment methods and associated computer codes;
- (f) results of safety and environmental assessments;
- (g) data pertaining to quality Assurance, audits and quality Control;
- (h) records of personnel radiation exposure and health history of occupational workers;
- (i) incident/accident report and their remedial actions;
- (j) training and qualification of personnel related to all processes, stages and phases;
- (k) Surveillance data of the repository during pre-operational, operational and post-closure phases including active and passive institutional control.

A record of radioactive waste shall contain at least the following information pertaining to the waste:



- a) The source or origin;
- b) The physical and chemical form;
- c) The amount (volume and/or mass);
- d) The radiological characteristics including:
  - i the activity concentration,
  - ii the total activity,
  - iii the radionuclides present and their relative proportions;
- e) Any chemical, pathogenic or other hazards associated with the waste and the concentrations of hazardous material;

### **Article 12: Interdependencies in the predisposal management of radioactive waste**

The licensee shall consider interdependences among all steps in the predisposal management of radioactive waste as well as the impact of the anticipated disposal option.

All activities from the generation of radioactive waste up to its disposal, including its processing shall be considered as part of a larger entity, and the management elements of each step shall be selected so as to be compatible with those of the other steps.

### **Article 13: Emergency Preparedness**

Licensee shall ensure that their emergency plans include arrangements for their radioactive waste management activities and inventory. The effectiveness of the plans shall be in accordance requirements on emergency preparedness and response and verified to the satisfaction of the Regulatory Authority.

Licensee shall ensure that the emergency plans define on-site responsibilities and take account of off-site responsibilities of other intervening organizations appropriate for implementation of the emergency plan. Such emergency plans shall, as appropriate:

- a) Characterize the content, features and extent of a potential emergency considering the results of any accident analysis and any lessons learned from operating experience and from accidents that have occurred with sources of a similar type;
- b) Identify the various operating and other conditions of radioactive waste inventory which could lead to the need for intervention;

- c) Describe the methods and instruments for assessing the accident and its consequences on and off the site;
- d) Provide for protective actions and mitigation actions, and assignment of responsibilities for initiating and discharging such actions;
- e) Provide for rapid and continuous assessment of the accident as it proceeds and determining the need for protective actions;
- f) Allocate responsibilities for notifying the relevant authorities and for initiating intervention;
- g) Provide procedures, including communication arrangements for contacting any relevant intervening organization (e.g. civil defence) and for obtaining assistance from firefighting, medical, police and other relevant organizations;
- h) Provide for training personnel involved in implementing emergency plans and be rehearsed at suitable intervals;
- i) Provide for periodic review and updating of the plan.

#### **Article 14: Physical Protection and Security**

The licensee shall adopt appropriate measures to ensure the physical protection and security at waste management facilities in accordance with Regulation on physical protection of nuclear materials and installations in order to prevent the unauthorized access of individuals and the unauthorized removal of radioactive materials.

### **CHAPTER III: STEPS IN THE PREDISPOSAL MANAGEMENT OF RADIOACTIVE WASTE**

#### **Article 15: Minimization of Radioactive Waste**

Licensees generating radioactive waste shall ensure that appropriate measures are taken to keep generation of radioactive waste to the minimum practicable.

This can be accomplished by:

- a) Applying careful planning to the design, construction, administration, operation and decommissioning planning of facilities so that the generation of radioactive waste is kept to the minimum practicable in terms of activity and volume;
- b) Applying to the extent possible the reuse and recycling of materials;

- c) The authorized discharge of effluent and clearance of materials from regulatory control, after some appropriate processing and/or a sufficiently long period of storage, to reduce the amount of radioactive waste that needs further processing or storage;
- d) Minimizing the activity and volume of waste by using the minimum quantity of radioactive material needed;
- e) Wherever possible, when purchasing sealed sources, establishing contractual
- f) arrangements for the return of sources to the manufacturer or predetermined waste manager following use;
- g) Implementing a comprehensive management system for all activities potentially
- h) generating radioactive waste;
- i) Maintaining consistency with the radioactive management policy and strategy.

#### **Article 16: Radioactive Waste Characterization and Classification**

In order to provide information relevant to process control and assurance that the waste or waste package will meet the acceptance criteria for processing, storage and disposal of the waste, the licensee, at the various steps in the management of radioactive waste, shall:

- a) Characterize the radioactive waste in terms of its physical, mechanical, chemical, radiological and biological properties; and
- b) Classify the radioactive waste under its responsibility according to the activity concentration and half-lives of the radionuclides keeping in view the perspective of its future disposal as given in ANNEX I and submit the classification scheme to the Authority for approval.

#### **Article 17: Processing of radioactive waste from collection up to treatment**

The processing of radioactive waste shall be based on appropriate consideration of the characteristics of the waste and of the demands imposed by different steps in its management including pretreatment, treatment, conditioning, transport, storage and disposal.

The licensee shall ensure that:

- a) processing of radioactive waste is consistent with the type of waste, the possible need for its storage, the anticipated disposal option, and the limits, conditions and controls.
- b) radioactive waste is segregated at the point of origin and that the treatment and conditioning of radioactive waste is carried out in accordance with the waste acceptance requirements.

Radioactive waste shall be processed in such a way that the resulting waste form can be safely stored and retrieved from the storage facility whenever required.

Waste packages shall be designed and produced such that radionuclides are confined under both normal operations and the accident conditions assumed to occur in handling, storage, transport and disposal.

Consideration shall be given to the consequences of dealing with any secondary waste that may be created during processing.

### **Article 18: Conditioning**

In selecting a conditioning process, the licensee shall consider the following aspects:

- a) Whether safety would be improved from the use of a matrix material;
- b) Compatibility of the radioactive waste with the selected materials and processes;
- c) The minimization of the generation of secondary radioactive waste.

Licensees shall ensure that the waste packages are designed and produced so that radionuclides are confined under both normal conditions and accident conditions that may occur during handling, storage, and disposal.

Licensees shall ensure that each package of conditioned waste is provided with a durable label bearing the identification number and relevant information and that a proper record of each package is kept under the management system.

### **Article 19: Storage of Radioactive Waste**

Radioactive waste shall be stored in a manner that ensures proper segregation, and protection of the workers, the public and the environment, and enables its subsequent inspection, monitoring, retrieval and preservation in a condition suitable for movement, handling, transport or disposal.

Operational limits and conditions for the storage of radioactive waste shall include, as appropriate:

- a) Specifications for waste packages such as waste form, radionuclide content and container characteristics consistent type of the storage facility;

- b) Requirements for safety systems including requirements for ventilation, heat removal, tank agitation and radiation monitoring, including requirements for the availability of these features in normal and abnormal conditions;
- c) Periodic testing of equipment, especially backup systems that need to be available in emergency conditions;
- d) Maximum radiation dose rates, especially on container surfaces;
- e) Maximum levels of surface contamination for containers;
- f) Requirements for training and qualification of personnel and minimum staffing levels; and
- g) Limits on the cumulative radionuclide inventory.

Storage facilities or areas must be clearly demarcated, with controlled access with possibility of separation of untreated and treated and conditioned waste.

The licensee shall ensure that:

- a) the integrity of waste packages in storage is maintained until it is retrieved for further treatment, conditioning or disposal.
- b) the waste package container provides integrity throughout the storage period and permits:
  - i. Retrieval at the end of the storage period;
  - ii. Enclosure in an overpack, if necessary;
  - iii. Transport to and handling at a disposal facility;
  - iv. Compliance with relevant waste acceptance criteria

The adequacy of the storage capacity has to be periodically reviewed, with account taken of the predicted waste arising, both from normal operation and from possible incidents, of the expected lifetime of the storage facility and of the availability of disposal Options.

### **Article 20: Characteristic of the waste storage facility**

Storage facilities or area shall have the following features:

- a) Sufficient capacity to buffer the waste arising before discharge, treatment and transportation;
- b) Simple construction provided with non-combustible and easily decontaminated walls and floors;
- c) Impermeable floor covering with a containment edge and slight slope to central collection area;
- d) Air sampling and radiation alarms where applicable;
- e) Fire detection/protection;

- f) Fire resistant door(s) that can be locked;
- g) Compartments in order to separate different kinds of waste;
- h) Be demarcated as radiologically controlled areas;
- i) Availability of log book system to list the number of containers, entry date, waste type, activity, etc.
- j) Means of protection from the environment including temperature extremes;
- k) means protection from human or animal intrusion; and
- l) Availability of movable radiation shielding where applicable.

### **Article 21: Management of Disused sealed Radioactive Sources**

Licensees shall review their radioactive source inventory at least annually to identify any sources that have become disused. Disused sources shall be included on the inventory of radioactive material and reported promptly to the Regulatory Authority.

Once the radioactive sources have become disused, the licensee shall ensure the maintenance of continuity of control and periodically review the status of control of such sources.

### **Article 22: Discharge of Radioactive Materials to the Environment**

Before initiating the discharge to the environment, licensees in applying for an Authorization for discharges shall:

- a) determine the characteristics and activity of the material to be discharged, and the possible points and methods of discharge;
- b) determine by an appropriate pre-operational study all significant exposure pathway by which discharged radionuclides could give rise to exposure of members of the public;
- c) consider the radiological environmental impacts in an integrated manner with features of the system of protection and safety, as required by the regulatory body;
- d) submit to the regulatory body the findings of (a) to (c) above as an input to the establishment by the regulatory body of authorized limits on discharges and conditions on their implementation.

Licensees shall ensure that radioactive materials from authorized practices are not discharged to the environment unless such discharges are within the limits and conditions on their implementation specified by the regulatory Authority.

In the case of land disposal, the licensee shall ensure that

- a) Land disposal facilities are sited, designed, operated, closed, and controlled after closure so that reasonable assurance exists that exposures to humans are within the limits;
- b) Areas are avoided having known natural resources;
- c) The disposal site is generally well drained and free of areas of flooding or frequent ponding;
- d) Upstream drainage areas are minimized to decrease the amount of runoff which could erode or inundate waste disposal units;
- e) The disposal provides sufficient depth to the water table that groundwater intrusion, perennial or otherwise, into the waste will not occur;
- f) The hydrogeologic unit used for disposal shall not discharge groundwater to the surface within the disposal site;
- g) Areas are avoided where tectonic processes such as faulting, folding, seismic activity, or volcanism may occur.

### **Article 23: Clearance and its Control**

In an application for authorization, the applicant shall declare its intention to clear materials from regulatory framework during the operational phase.

In regard to clearance and its control, the licensee shall adopt provisions to ensure that:

- a) The clearance of radioactive waste complies with clearance levels approved by the
- b) Regulatory Authority;
- c) A formal mechanism is in place, including rigorous control measures, to demonstrate
- d) compliance with regulatory requirements in respect of clearance;
- e) Any radiation markings will be removed from any material of which regulatory controls no longer apply.

Information on material which has been removed from regulatory control shall be recorded, retained within a management system and reported to the regulatory Authority as required.

## **CHAPTER IV: DEVELOPMENT AND OPERATION OF PREDISPOSAL RADIOACTIVE WASTE FACILITIES**

### **Article 24: Siting and Location**

Predisposal radioactive waste management facilities shall be located and designed so as to ensure safety for the expected operating lifetime under both normal and possible accident conditions, and for their decommissioning.

The site on which the radioactive waste facility is to be built shall be determined by taking into account potential interaction between the facility and the environment as well as applicability of emergency plans. The selection of a site for a facility for processing and/or storage of radioactive waste is carried out based on an assessment of the following, namely:

- a) quantity, characteristics and location of the existing radioactive waste as well as the forecasts for the generation of radioactive waste;
- b) specific characteristics of the site relevant to migration and accumulation of radioactive substances;
- c) influence of the factors of natural and anthropogenic character on the safety of the facility;
- d) radiological impact of the facility on the population and the environment;
- e) possibilities for the application of protective measures for the population in case of an accident in the facility.

### **Article 25: Design**

The radioactive waste facility shall be designed in such a way that the waste can be retrieved whenever required. Measures for achieving this aim shall include the appropriate design and construction of openings, passages and handling systems and the incorporation of appropriate stacking systems or spacing for waste packages

Radioactive waste facilities shall be designed such that radiation protection of personnel, public and the environment is provided during operating and accident conditions and that the facility is safely be decommissioned and closed.

Structures, systems and components shall be designed taking into consideration the environmental factors and facility lifetime and in a way to prevent interaction between materials and the environment that may pose a risk to the facility.



The licensee shall design the radioactive waste storage facility to fulfill the applicable safety functions during normal operation and postulated initiation events, as follows:

- a) control of sub-criticality
- b) removal of heat
- c) radiation shielding
- d) confinement of radioactive waste
- e) retrievability

The design of a facility for management of radioactive waste shall respect the following internal and external events, namely:

- a) fire and/or explosion;
- b) impact upon structures, systems and components as a result of the fall of heavy objects, shocks and others;
- c) failure of structures, systems and components as a result of internal processes;
- d) human errors, leading to loss of control over the technological process;
- e) internal flooding due to ruptures and leaks of pipelines, pumps and valves; other possible initiating events leading to disruption of the function of safety;
- f) extreme weather conditions;
- g) earthquakes;
- h) external flooding;
- i) demarcation of the working premises according to their classification as controlled areas or supervised areas;
- j) falling down of an average airliner;
- k) industrial and transport activities in the vicinity of the site.
- l) Surfaces that can be easily decontaminated;
- m) Adequate drainage and ventilation systems
- n) The normal electrical supply and an emergency electrical supply;
- o) Premises for storing emergency equipment;

Structures, systems and components shall be designed to facilitate maintenance, repair, radiation monitoring, inspection and tests.

## **Article 26: Construction and Commissioning of Radioactive Waste Management Facilities**

Predisposal radioactive waste management facilities shall be constructed in accordance with the design and using accepted technical methods and procedures as approved by the regulatory Authority and the design shall never be modified without regulatory authority approval.

During commissioning, operating personnel shall be provided with specific trainings for the facility and Commissioning tests shall be carried out with the participation of personnel planned to be tasked with operation of the facility.

Upon the completion of commissioning, a final commissioning report shall be produced by the licensee and submitted to the Regulatory Authority.

## **Article 27: Operation**

Licensee shall define Operating limits and conditions outlining safe operation in all operational conditions of radioactive waste facility. All necessary measures shall be taken to ensure that the facility is operated within operating limits and conditions.

The facility shall be operated by sufficient number of qualified personnel of the operating organisation who have been adequately trained.

The licensee shall periodically review and assess the adequacy of the storage capacity, with account taken of the predicted waste arising, the expected lifetime of the facility and the availability of disposal options.

Provisions shall be made for the regular monitoring, inspection and maintenance of the radioactive waste and of the storage facility to ensure their continued integrity.

Arrangements for monitoring the radiological conditions in the waste storage facility shall be provided. Such arrangements for monitoring shall include, as necessary, measurements of radiation dose rates, concentrations of airborne radioactive material, levels of both fixed and loose surface contamination and neutron flux rates.

## **Article 28: Decommissioning**

A decommissioning programme shall be developed and put into practice, which ensures to meet safety objectives for decommissioning activities and licensee shall be responsible for the following during the decommissioning of facilities:

- a) Ensure the safety of workers and the public, and the protection of the environment during and after decommissioning activities;
- b) Establish a decommissioning strategy, preparing and maintaining a decommissioning plan; Establish a waste management strategy for decommissioning facilities including the identification of an acceptable destination for all waste arising from decommissioning;
- c) Perform safety assessments and environmental impact assessments related to decommissioning;
- d) Prepare and implement appropriate safety procedures, including emergency preparedness, and apply good engineering practices;
- e) Ensure that properly trained, qualified and competent staff are available for the decommissioning project;
- f) Perform appropriate radiological surveys in support of decommissioning;
- g) Establish a management system including organization and administrative controls, staffing and qualification, project management, documentation and recordkeeping, subcontractor's involvement, and safety management;
- h) Ensure that end state criteria have been met by performing a final survey;
- i) Notify the regulatory body prior to shutdown of the facilities permanently or terminating the activity.

## **Article 29: Completion of decommissioning**

Upon completion of decommissioning, the licensee shall demonstrate that the end-state criteria specified in the decommissioning plan have been met.

The licensee shall submit an end-state report to the Regulatory Authority for approval. The end-state report should be submitted no more than two years after completing the execution of decommissioning activities.

Where decommissioning of the facility will take place in discrete stages, an interim end-state report shall be prepared when each planned interim end state is achieved. This report describes the decommissioning

work undertaken, the physical condition of the facility, the remaining hazards, the interim end state achieved, the results of surveys, the hazards and physical condition of the facility, and the remaining decommissioning tasks or work packages to be completed.

The licensee shall perform radiological and non-radiological surveys throughout the various phases in the lifecycle to support decommissioning.

## **CHAPTER V: REQUIREMENTS FOR THE DEVELOPMENT, OPERATION AND CLOSURE OF A DISPOSAL FACILITY**

### **Article 30: Principal Responsibility of operator**

The operator of a disposal facility for radioactive waste shall be responsible for its safety. The operator shall carry out safety assessment and develop and maintain a safety case, and shall carry out all the necessary activities for site selection and evaluation, design, construction, operation, closure and, if necessary, surveillance after closure, in compliance with the regulatory requirements and within the legal and regulatory infrastructure.

### **Article 31: Scope of the safety case and safety assessment**

The safety case for a disposal facility shall describe all safety relevant aspects of the site, the design of the facility and the managerial control measures and regulatory controls. The safety case and supporting safety assessment shall demonstrate the level of protection of people and the environment provided and shall provide assurance to the regulatory authority and other interested parties that safety requirements will be met.

### **Article 32: Environmental management plan**

An environmental management plan approved by the Regulatory authority shall be established for the disposal site prior to the commencement of its construction and operations in order to set out management objectives and practices which will provide for the safe and environmentally sound management of the facility during its construction, operational and post-operational stages.

### **Article 33: Site selection**

The disposal facility shall be sited, designed and operated to provide features that are aimed at isolation of the radioactive waste from people and from the accessible biosphere. The features shall aim to provide isolation for several hundreds of years for short lived waste and at least several thousand years for intermediate and high-level waste.

The licensee shall evaluate the site the disposal facility in such a way that safety is ensured by passive means to the fullest extent possible and the need for actions to be taken, after closure of the facility, is minimized.

The site for a disposal facility shall be characterized at a level of detail sufficient to support a general understanding of both the characteristics of the site and how the site will evolve over time. This shall include its present condition, its probable natural evolution and possible natural events, and also human plans and actions in the vicinity that may affect the safety of the facility over the period of interest.

Licensee shall select a suitable site exhibits salient characteristics to:

- a) host radioactive waste matrix in the engineered system for a desired time period;
- b) retain radionuclides within the system under all foreseen conditions; and
- c) limit radionuclides release or migration to the biosphere.

The site selection criteria have to demonstrate that there is adequate geological, geomorphological or topographical stability as appropriate to the type of facility, and features and processes that contribute to safety and security.

A graded approach has to be adopted, depending on the hazard potential of the waste and the complexity of the site and disposal facility design.

### **Article 34: Isolation of radioactive waste**

The disposal facility shall be sited and designed to provide features that are aimed at isolation of the radioactive waste from people and from the accessible biosphere. The features shall aim to provide isolation for several hundreds of years for short lived waste and at least several thousand years for intermediate and high-level waste. In so doing, consideration shall be given to both the natural evolution of the disposal system and events causing disturbance of the facility.

### **Article 35: Design**

The disposal facility shall be designed to contain the waste with its associated hazard, to be physically and chemically compatible with the host geological formation and/or surface environment, and to provide safety features after closure that complement those features afforded by the host environment.

Design shall consider waste and waste form characteristics, package characteristics, land requirements, layout, size of the disposal facility, engineered barriers, biological shields, backfill material, post-operational sealing and water proofing, monitoring provisions, auxiliary services systems and anticipated institutional controls.

Barriers, by means of their safety functions, shall be selected and designed to be physically and chemically different and complementary to one another such that post closure safety of the facility is ensured that passive safety measures including limitations on site use and barriers are sufficient to ensure safety.

### **Article 36: Construction**

The disposal facility shall be constructed in accordance with the design supporting safety assessment. The facility shall be constructed in such a way as to preserve the safety functions of the host environment that have been shown by the safety case to be important for safety after closure.

### **Article 37: Commissioning**

Prior to normal and routine operations of the waste disposal facility, the licensee shall establish operating steps and procedures for safe operation. These procedures shall cover normal and anticipated operational occurrences during waste disposal activities.

Licensee shall formulate a commissioning programme approved by the regulatory body prior to regular operation of the facility to ensure that the disposal facility and its installed equipment function as envisaged in the approved design.

The commissioning activities shall include:

- a) equipment test;
- b) engineered barrier integrity test; and
- c) experimental or trial operation.

- d) Any other test when deemed necessary

### **Article 38: Surveillance, Monitoring and emergency preparedness**

To verify the integrity of disposal facility, a periodic sampling and monitoring shall be carried out on soil, water, air, and vegetation and radiation field in and around the facility. The periodicity of sampling and the methodology of analysis shall be established to ensure compliance with regulatory requirements.

Approved emergency plan of the facility shall be in place to ensure an emergency preparedness of the facility.

The plan shall:

- a) cover spillage of waste due to anticipated operational occurrences;
- b) have the procedure to mitigate abnormal releases from the disposal facility;
- c) provide remedial measures to prevent or minimise spread of contamination;
- d) limit occupational/public exposures in the event of unusual occurrences; and
- e) include procedures of handling and disposal of waste generated from anticipated operational occurrences.

### **Article 39: Responsibilities for developing the safety case and safety assessment**

A safety case and supporting safety assessment shall be prepared and updated by the operator, as necessary, at each step in the development of a disposal facility from site selection and evaluation, design, construction, operation, closure and after closure. The safety case and supporting safety assessment shall be submitted to the regulatory Authority for approval. The safety case and supporting safety assessment shall be sufficiently detailed and comprehensive to provide the necessary technical input for informing the regulatory Authority and for informing the decisions necessary at each step.

### **Article 40: Construction and commissioning**

The licensee shall:

- a) construct the radioactive waste disposal facility in accordance with the approved design and ensure that any changes to design during construction or that any unplanned disturbances to the host environment are subject to a change-control process.
- b) verify that the design meets specifications

- c) perform commissioning activities and produces a final commissioning report upon completion of commissioning which provide assurance that all applicable regulatory requirements and performance criteria have been met.

#### **Article 41: Operation**

Operation of the facility shall be consistent with the design intent and the consent granted by the Regulatory Authority. Licensee shall ensure an operating staff with clearly defined duties and responsibilities.

The licensee shall establish and document operational limits and conditions derived from safety assessments in order to maintain and operate the radioactive waste disposal facility in a safe state.

The licensee shall operate the radioactive waste disposal facility in accordance with documented procedures developed for managing and operating a radioactive waste disposal facility under normal conditions and postulated initiating events.

A program of monitoring shall be carried out during operation of a disposal facility and after its closure. This program shall be designed to collect and update information necessary for the purpose of protection and safety. Information shall be obtained to confirm the conditions necessary for the safety of the workers and members of the public and protection of the environment during the period of operation of the facility.

The adequacy of the storage capacity shall be periodically reviewed, with account taken of the predicted radioactive waste arising, both from normal operation and from possible incidents, of the expected lifetime of the storage facility and of the availability of disposal options.

The need for remote handling shall be considered in cases where the waste package is a source of radiation at high dose rates, where there is a risk that radioactive aerosols or gases could be released to the working environment, or where the waste might pose a significant non-radiological hazard such as chemical toxicity.

#### **Article 42: Decommissioning**

Decommissioning plan shall be developed for each nuclear and radiation facility at the design stage to show that the decommissioning can be accomplished safely after shutdown and closure of the facility. The decommissioning plan shall consider residual activity characterization, decontamination and



dismantling needs, waste management requirements, safety assessment, adequately trained staff and necessary funding. Decommissioning of the facility shall be carried out after approval from the Regulatory Authority.

**Article 43: Closure of a disposal facility**

The licensee shall close the radioactive waste disposal facility while maintaining the integrity of those Structures, System and Components that perform safety functions and that have been shown to be important to safety in the post-closure phases. The licensee shall ensure that plans for closure, including the transition from active management of the facility, are well defined and practicable so that closure can be carried out safely at an appropriate time.

**Article 44: Final Closure**

Final closure of the disposal facility shall be carried out only after prior approval from the regulatory Authority and using Approved plan and procedure. The closure plan shall include an updated safety assessment based on the site and waste disposal data and describes control measures intended for the post-closure phase, including monitoring and surveillance programme and record keeping system.

**Article 45: Post-closure period of a radioactive waste disposal facility and institutional controls**

The licensee shall prepare plans to address the period following closure of the radioactive waste disposal facility to address institutional controls. These plans shall be consistent with passive safety features for the disposal facility.

Licensee shall carry out the following actions during the post-closure period:

- a) implementation of a visual inspection plan for periodic examination of the site to look for signs of deterioration of the facility or erosion of the surface;
- b) implementation and maintenance of a monitoring and surveillance plan to ensure that the post-closure objectives set out in the safety case continue to be met;
- c) implementation of active controls, where required, to prevent unauthorized access to the site.

**Article 46: Record keeping**

The licensee shall retain all the information relevant to the disposal facility and shall retain the inspection records that demonstrate compliance with regulatory requirements. Such information and records shall

be retained, at least up until the time when the information is shown to be superseded, or until responsibility for the disposal facility is passed on to another organization.

#### **Article 47: Safety assessment Disposal of Radioactive Waste**

The applicant for a license for a radioactive waste disposal facility shall prepare a safety case and safety assessment, as necessary, at each step in the design, construction, operation and closure of the disposal facility, with the due attention being paid to the operational and long-term safety implications. The characteristics and quantities of the radioactive waste to be disposed off shall be considered in the design.

### **CHAPTER VI: WASTE MANAGEMNT OPERATIONS AND PROCEDURES**

#### **Article 48: Segregation, collection and characterization**

The generator shall keep control on waste generation to the minimum practicable

The waste generator shall segregate, collect and characterize waste as far as practicable at the point of origin in accordance with the categories specified in ANNEX I of this regulation in order to facilitate subsequent treatment, conditioning, storage and disposal. Each waste category after segregation shall be kept separately in a suitable container. Sufficient number of containers shall be available where radioactive waste is generated.

The waste containers shall:

- a) be easy to handle;
- b) be strong enough to withstand normal handling;
- c) not be affected by the waste content

#### **Article 49: Container labeling**

The 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:

- a) Nature of the waste generated
- b) Date of waste generations;

- c) Commencement date of storage;
- d) Content of major radiological significant radionuclides;
- e) External surface dose rate;
- f) Waste category;
- g) Biological, chemical or other hazardous materials if they exist;
- h) Name of a person or organization responsible for the waste generation;
- i) Identification number; and
- j) Any other particular information that may be required by the Regulatory Authority.

A licensee shall remove labels from containers holding waste if the concentration is below the clearance levels specified in Annex II of this Regulation prior to their disposal.

**Article 50: Procedures for discharge of radioactive substance to the environment**

A licensee shall ensure that radioactive waste is not to be discharged or released to the environment unless:

1. The waste activity or concentration has been confirmed to be below clearance levels.
2. Discharge of liquid or gaseous effluents is within the limits authorized by the Regulatory Authority.
3. Additionally, the licensee shall take into consideration the following:
  - i. Acidic waste to be neutralized and, if necessary, filtered before they are discharged into the sewage system;
  - ii. On each release occasion flushing shall be carried out with considerable quantities of water;
  - iii. Release of radioactive waste shall be confined to one release point for each laboratory. The release point shall be marked by a visible sign showing that radioactive waste may be released into the sewage system;
  - iv. Patients who have been administered radionuclides in connection with diagnosis or treatment shall use a separate toilet marked and identified for that purpose, and that flushing to be adequate after each use.
  - v. Non-aqueous waste or immiscible liquid waste shall not be discharged into sewers.

The licensee before initiating the discharge to the environment of any solid, or gaseous radioactive waste considered to be within discharge limits, shall appropriate:

- i. Determined characteristics and activity of the material to be discharge and the potential points and methods of discharge;
- ii. Determined by an appropriate preoperational model study, significant exposure pathways by which discharge radionuclides shall deliver public exposure;
- iii. Assess the doses to the critical groups due to the planned discharges;
- iv. Submit this information to the Regulatory Authority as an input to the establishment of authorized discharge limits and conditions for their implementation.

The licensee during the operational stages of radioactive waste management shall:

- a) Keep all radioactive waste discharge below authorized discharge limits;
- b) Monitor the discharges of radionuclides with sufficient detail and accuracy to demonstrate compliance with the authorized discharge limits and to permit estimation of the exposure of critical groups;
- c) Record the monitoring results;
- d) Report promptly to the Regulatory Authority any discharges exceeding the authorized discharge limits in accordance with reporting criteria established by the Regulatory Authority.

#### **Article 51: Discharge of exempt waste**

The waste category that is expected to decay below clearance levels within one year from its generation, shall be safety stored on-site and after confirmation by measurements or other means that the clearance levels have been reached, shall be appropriately discharged or released by the licensee.

The licensee may discharge the exempt liquid effluent into sanitary sewer only if the material is readily soluble or is readily dispersible in water.

A licensee may release the exempt solid waste into a waste incinerator or local dump site and exempt gaseous waste into the atmosphere.

#### **Article 52: Treatment**

The Authority of the Central Radioactive Waste Management Facility shall treat the radioactive waste received from the waste generators in order to reduce its volume and to facilitate further conditioning. The treatment method shall be suitably selected for the radioactive waste received depending on such factors as the volume and type of the radioactive waste, the discharge requirements for liquid effluent and additional conditioning requirements.

### **Article 53: Conditioning**

The radioactive waste to be accepted for long term storage, transportation and disposal shall be properly conditioned by facility operators.

Waste packages produced by a conditioning process shall be fully characterized with regard to important physical, chemical, radiological, properties specified by the Regulatory Authority.

The waste packages to be transported off-site shall comply with requirements of safe transport of radioactive materials in Rwanda and shall meet waste acceptance requirements for disposal.

### **Article 54: Return of sealed sources to manufacturer**

An authorized person or organisation that intends to purchase, lease or rent generators of radionuclides, or if such generators are donated, shall make contractual arrangements with the supplier or donor, to return the waste resulting from the use of radionuclides, if such waste cannot be cleared after decay or storage.

### **Article 55: Quality assurance**

The licensee shall ensure that all Radioactive Waste Management operations are carried out in accordance with a suitable quality assurance programme commensurate with the scope of activities and approved by the Regulatory Authority.

Each licensee shall develop and maintain an accurate and complete documentation system to cover all stages of Radioactive Waste Management from its generation to disposal. The quality assurance programme shall provide for controlled approval, receipt, retention, distribution and disposition of all records important for safety in accordance with the Regulatory Authority requirements.

An authorised person shall submit a quality assurance programme to the Regulatory Authority for approval as part of the authorisation application for covering all aspects of the radioactive waste management, especially those features important to safety such as facilities, activities and waste which shall be commensurate with the scale of operations.

The effectiveness of the quality assurance programme shall be verified by independent audits to ensure that radioactive waste management activities are carried out to meet the requirement to protect human health and the environment.

Quality assurance documentation shall include:

- a) an inventory of radioactive waste, including origin, location, physical and chemical characteristics, and, as appropriate, a record of radioactive waste removed or discharged from the facility;
- b) site plans, engineering drawings, specifications and process descriptions;
- c) data resulting from quality assurance and quality control procedures and from operating activities;
- d) safety and environmental assessment methods and computer codes;
- e) results of safety and environmental assessments;
- f) effluent and environmental impact monitoring results;
- g) radioactive waste package identification;
- h) a detailed facility closure plan.

#### **Article 56: Physical protection**

Waste generators shall ensure adequate Physical protection measures to prevent any unauthorized access to the Radioactive Waste Management Facilities.

### **CHAPTER VII: RADIATION PROTECTION AND ENVIRONMENTAL SAFETY**

#### **Article 57: General responsibility of the Licensee**

Licensee shall ensure that radioactive waste is managed in a manner that complies with the fundamental principles of radiation protection and environmental safety.

#### **Article 58: Protection of Human Health**

Radiation exposure to workers and the public from radioactive waste shall be kept as low as reasonably achievable, with respect of radiation exposure limits to workers and members of the public as it is

prescribed by regulatory authority, social and economic factors being taken into account. A well-defined radiation protection programme shall be established.

Radiation exposures to workers and the members of public shall not exceed the limits prescribed in ANNEX I of General regulation of governing radiation safety in Rwanda.

#### **Article 59: Environmental Monitoring and Surveillance**

The facility shall implement approved environmental monitoring and surveillance programme for the identified exposure pathways. The programme shall include preoperational, operational, closure and post-closure monitoring and surveillance.

### **CHAPTER VIII: LICENSING REGIME FOR THE MANAGEMENT OF RADIOACTIVE WASTE**

#### **Article 60: Types of licenses and Authorization issued in radioactive waste management field**

Authorizations issued in waste management activities are classified in four types as follow:

1. Authorization for Site Assessment;
2. Authorization for Design and construction of a waste management facility;
3. Authorization to export radioactive Waste;
4. Authorization for modification and/or Decommissioning.

The Regulatory Authority issues also license to operate a Waste management facility.

#### **Article 61: Application for License or Authorization**

Any person who intends to perform any radioactive waste management activity applies for a license or authorization to the Regulatory Authority.

#### **Article 62: Criteria for license or authorization issuance in Waste management field**

Depending on the nature of activity performed in Waste management field, the Regulatory Authority issues licenses or authorizations to applicants who:

1. Fulfils all technical, administrative, operational, safety criteria and other conditions in accordance with applicable laws, Regulations and standards;

2. Has an approved radiation risk assessment by the Regulatory Authority;
3. Has sufficient economic resources to meet the radioactive waste management activity, ability and the professional skills needed with regard to the special nature of the radioactive waste management activity he plans to carry out;
4. Has paid all applicable fees as provided for in ANNEX III.

**Article 63: Authorization for Site Assessment**

The authorization holder has the following obligations:

1. Meet obligations related to site assessment,
2. Notify the Regulatory Authority any modification in the Facility land title, layout and plan;
3. Provide to the Regulatory Authority a detailed report of the site assessment;
4. Comply with any other obligation as requested by the Regulatory Authority

**Article 64: Authorization for design and construction of waste management facility**

The authorization holder has the following obligations:

1. Meet obligations related to design and construction;
2. Notify to the Regulatory Authority any modification in the Facility land title, layout and plan;
3. Comply with any other obligation as requested by the Regulatory Authority.

**Article 65: Authorization to import a waste management equipment**

The applicant has the following obligations:

1. Meet obligations related to export waste;
2. Notify to the Regulatory Authority the export schedule
3. Provide to the regulatory authority a detailed report of the test performed on the waste package;
4. Comply with any other obligation as requested by the Regulatory Authority.

**Article 66: License to operate a Waste management facility**

The person licensed to operate a Waste management facility have the following obligations:



1. Ensure that all technical Obligations with regard to safety and protection are met as provided in this regulation;
2. Ensure that all obligations related to commissioning;
3. Submit a decommissioning plan to the Regulatory Authority;
4. Ensure continuous training of personnel;
5. Reports all incidents and accidents as provided in this regulation.

#### **Article 67: Authorization for modification and/or Decommissioning**

The licensee shall fulfil all obligations related to modification and decommissioning as provided in this regulation and provides to the Regulatory Authority a detailed plan for approval.

#### **Article 68: Validity of licenses/authorizations**

The validity of Authorizations/licenses issued in Waste management field are given in the Annex III.

#### **Article 69: License renewal**

Application for renewal of license is submitted three (3) months before expiration of the current license and is granted subject to documented evidence of due compliance with laws, regulations and license obligations after payment of required fees.

#### **Article 70: License/Authorization modification**

A license modification proceeding may be initiated by the Regulatory Authority or by the request of the licensee. The Regulatory Authority may modify a license before its expiration term when it determines that a modification of the license is needed in order to:

- 1° respond to significant changes in a new law or Regulation or Court decision that directly affect the license terms and conditions;
- 2° the request of the licensee due to relevant reasons;
- 3° adjust to the changes necessitated by existing market conditions;
- 4° respond to the requirements of any technological developments or changes;

5° if it is for the purpose of correction of errors indicated during licensing review for radiation safety in waste management.

**Article 71: Transfer of the license**

The transfer of license or other transfer of assets or activities subject to a license to a different individual or institution is subject to a prior written approval of the Regulatory Authority.

Such approval is granted after consideration of the matter and if the proposed transferee meets all the conditions to be granted the relevant license.

During the license transfer, the duration of the license and the license terms and conditions remain the same.

**Article 72: License/Authorization suspension**

The Regulatory Authority may suspend the license to operate a waste management facility upon determination of the following:

- 1° failure to comply with license terms and conditions;
- 2° failure to cooperate with the Regulatory Authority's inspection and audits;
- 3° failure to provide the Regulatory Authority with monitoring and reporting data required;
- 4° failure to pay the regulatory fee and such fee remains unpaid six (6) months after it has become due and the Regulatory Authority has given to the Licensee a notice in writing that such payment is overdue and the Licensee has not paid;

**Article 73: License/Authorization Revocation**

The Regulatory Authority may revoke the license/Authorization before its expiration when it determines that the revocation is needed to respond to:

- a. Abandonment of licensed activities,
- b. Liquidation of the licensee/authorization holder;
- c. Submittal of deliberately misleading data or information to the Regulatory Authority in response to its request or in response to its inspection;

- d. Repetitive failure by the licensee/authorization holder to comply with any of the terms and conditions of the license.
- e. Any other severe mistake as judged by the Regulator Authority as a reason of revocation.

## **CHAPTER IX: FAULTS AND AMINISTRATIVE SANCTIONS**

### **Article 74: Failure to notify the Regulatory Authority**

Any licensee/authorization holder who fails to notify the Regulatory Authority on any matters needed to be notified as provided in this regulation commits a fault, and is liable to an administrative fine equivalent between two hundred thousand (200,000) Rwandan francs to five hundred thousand (500.000) Rwandan francs.

### **Article 75: Unauthorized modification radioactive waste management facility design**

A licensee/authorization holder who modifies a radioactive waste management facility design without an authorization from the Regulatory Authority commits a fault and is liable to an administrative fine of fifty million (50.000.000) Rwandan francs.

### **Article 76: failure to conduct occupational and area exposure monitoring**

A licensee who fails to conduct a regular individual and area exposure monitoring as specified under this regulation commits a fault and is liable upon conviction to an administrative fine as follows:

1. Five million Rwandan francs (5,000,000Frw) in the event they are no occupational or area exposure monitoring tools in place;
2. Two million Rwandan francs (2,000,000Frw) in case they are no regular monitoring reports.

### **Article 77: Failure to perform calibration of detection equipment**

Any licensee operating with a non-calibrated equipment commits a fault and is sanctioned by a suspension of a license until the calibration is made and related certificate issued.

## **ANNEX I: IMPORTANT CHARACTERISTICS AND CLASSIFICATION OF RADIOACTIVE WASTE**

### **I.1. Waste characteristics**

Minimum requirements for all classes of waste and are intended to facilitate handling at the disposal site and provide protection of health and safety of personnel at the disposal site.

- a) Waste must not be packaged for disposal in cardboard or fibreboard boxes.
- b) Liquid waste must be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid.
- c) Solid waste containing liquid shall contain as little free standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume.
- d) Waste must not be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.
- e) Waste must not contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste.
- f) Waste must not be pyrophoric. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be non-flammable.
- g) Waste in a gaseous form must be packaged at a pressure that does not exceed 1.5 atmospheres at 20 °C. Total activity must not exceed 100 curies per container.
- h) Waste containing hazardous, biological, pathogenic, or infectious material must be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological materials.

The requirements in this section are intended to provide stability of the waste in order to ensure that the waste does not structurally degrade and affect overall stability of the site through slumping, collapse, or other failure of the disposal unit and thereby lead to water infiltration. Stability is also a factor in limiting exposure to an inadvertent intruder, since it provides a recognizable and no dispersible waste.

- a) Waste must have structural stability. A structurally stable waste form will generally maintain its physical dimensions and its form, under the expected disposal conditions such as weight of overburden and compaction equipment, the presence of moisture, and microbial activity, and internal factors such as radiation effects and chemical changes.
- b) Liquid wastes, or wastes containing liquid, must be converted into a form that contains as little free standing and noncorrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1% of the volume of the waste when the waste is in a disposal container designed to ensure stability, or 0.5% of the volume of the waste for waste processed to a stable form

- c) Void spaces within the waste and between the waste and its package must be reduced to the extent practicable.

## **I.2. Waste classification**

- (a) Classification of waste for near surface disposal.

(1) *Considerations.* Determination of the classification of radioactive waste involves two considerations. First, consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.

- (2) *Classes of waste.*

- i. Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth section I.1. of this Annex.
- ii. Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability after disposal.
- iii. Class C waste is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion.

(3) Classification determined by long-lived radionuclides. If radioactive waste contains only radionuclides listed in Table 1, classification shall be determined as follows:

- i. If the concentration does not exceed 0.1 times the value in Table 1, the waste is Class A.
- ii. If the concentration exceeds 0.1 times the value in Table 1 but does not exceed the value in Table 1, the waste is Class C.
- iii. If the concentration exceeds the value in Table 1, the waste is not generally acceptable for near-surface disposal.
- iv. For wastes containing mixtures of radionuclides listed in Table 1, the total concentration shall be determined by the sum of fractions rule described in paragraph I.2 (7) of this section.

**Table 1:**

<b>Radionuclide</b>	<b>Concentration curies per cubic meter</b>
C-14	8
C-14 in activated metal	80
Ni-59 in activated metal	220
Nb-94 in activated metal	0.2
Tc-99	3
I-129	0.08
Alpha emitting transuranic nuclides with half-life greater than 5 years	1100
Pu-241	13,500

<sup>1</sup>Units are nanocuries per gram.

(4) Classification determined by short-lived radionuclides. If radioactive waste does not contain any of the radionuclides listed in Table 1, classification shall be determined based on the concentrations shown in Table 2. If radioactive waste does not contain any nuclides listed in either Table 1 or 2, it is Class A.

- a) If the concentration does not exceed the value in Column 1, the waste is Class A.
- b) If the concentration exceeds the value in Column 1, but does not exceed the value in Column 2, the waste is Class B.
- c) If the concentration exceeds the value in Column 2, but does not exceed the value in Column 3, the waste is Class C.
- d) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.
- e) For wastes containing mixtures of the nuclides listed in Table 2, the total concentration shall be determined by the sum of fractions rule.

**Table 2:**

Radionuclide	Concentration-curies per cubic meter		
	Col. 1	Col. 2	Col. 3
Total of all nuclides with less than 5-year half-life	700	( <sup>1</sup> )	( <sup>1</sup> )
H-3	40	( <sup>1</sup> )	( <sup>1</sup> )
Co-60	700	( <sup>1</sup> )	( <sup>1</sup> )
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

<sup>1</sup>There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other nuclides in Table 2 determine the waste to the Class C independent of these nuclides.

(5) Classification determined by both long- and short-lived radionuclides. If radioactive waste contains a mixture of radionuclides, some of which are listed in Table 1, and some of which are listed in Table 2, classification shall be determined as follows:

- I. If the concentration of a nuclide listed in Table 1 does not exceed 0.1 times the value listed in Table 1, the class shall be that determined by the concentration of nuclides listed in Table 2.
- II. If the concentration of a nuclide listed in Table 1 exceeds 0.1 times the value listed in Table 1 but does not exceed the value in Table 1, the waste shall be Class C, provided the concentration of nuclides listed in Table 2 does not exceed the value shown in Column 3 of Table 2.

(6) Classification of wastes with radionuclides other than those listed in Tables 1 and 2. If radioactive waste does not contain any nuclides listed in either Table 1 or 2, it is Class A.

(7) The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each nuclide's concentration by the appropriate limit and adding the resulting values. The appropriate

limits must all be taken from the same column of the same table. The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column.

DRAFT



## ANNEX II: Clearance Level for Radioactive Waste

Table II.a. Single-radionuclide

Clearance level Nuclide	Annual release activity (Bq)	Specific activity (annual release waste amount $\geq 1t$ ) (Bq/g)	Specific activity (annual release waste amount $< 1t$ ) (Bq/g)
H-3	1.E+9	1.E+2	1.E+6
Be-7	1.E+7	1.E+1	1.E+3
C-14	1.E+7	1.E+0	1.E+4
F-18	1.E+6	1.E+1	1.E+1
Na-22	1.E+6	1.E-1	1.E+1
Na-24	1.E+5	1.E+0	1.E+1
Si-31	1.E+6	1.E+3	1.E+3
P-32	1.E+5	1.E+3	1.E+3
P-33	1.E+8	1.E+3	1.E+5
S-35	1.E+8	1.E+2	1.E+5
Cl-36	1.E+6	1.E+0	1.E+4
Cl-38	1.E+5	1.E+1	1.E+1
K-40	1.E+6	1.E+1	1.E+2
K-42	1.E+6	1.E+2	1.E+2
K-43	1.E+6	1.E+1	1.E+1
Ca-45	1.E+7	1.E+2	1.E+4
Ca-47	1.E+6	1.E+1	1.E+1
Sc-46	1.E+6	1.E-1	1.E+1
Sc-47	1.E+6	1.E+2	1.E+2
Sc-48	1.E+5	1.E+0	1.E+1
V-48	1.E+5	1.E+0	1.E+1
Cr-51	1.E+7	1.E+2	1.E+3
Mn-51	1.E+5	1.E+1	1.E+1
Mn-52	1.E+5	1.E+0	1.E+1
Mn-52m	1.E+5	1.E+1	1.E+1

Clearance level Nuclide	Annual release activity (Bq)	Specific activity (annual release waste amount $\geq 1t$ ) (Bq/g)	Specific activity (annual release waste amount $< 1t$ ) (Bq/g)
Mn-53	1.E+9	1.E+2	1.E+4
Mn-54	1.E+6	1.E-1	1.E+1
Mn-56	1.E+5	1.E+1	1.E+1
Fe-52	1.E+6	1.E+1	1.E+1
Fe-55	1.E+6	1.E+3	1.E+4
Fe-59	1.E+6	1.E+0	1.E+1
Co-55	1.E+6	1.E+1	1.E+1
Co-56	1.E+5	1.E-1	1.E+1
Co-57	1.E+6	1.E+0	1.E+2
Co-58	1.E+6	1.E+0	1.E+1
Co-58m	1.E+7	1.E+4	1.E+4
Co-60	1.E+5	1.E-1	1.E+1
Co-60m	1.E+6	1.E+3	1.E+3
Co-61	1.E+6	1.E+2	1.E+2
Co-62m	1.E+5	1.E+1	1.E+1
Ni-59	1.E+8	1.E+2	1.E+4
Ni-63	1.E+8	1.E+2	1.E+5
Ni-65	1.E+6	1.E+1	1.E+1
Cu-64	1.E+6	1.E+2	1.E+2
Zn-65	1.E+6	1.E-1	1.E+1
Zn-69	1.E+6	1.E+3	1.E+4
Zn-69m	1.E+6	1.E+1	1.E+2
Ga-72	1.E+5	1.E+1	1.E+1
Ge-71	1.E+8	1.E+4	1.E+4
As-73	1.E+7	1.E+3	1.E+3

Clearance level Nuclide	Annual release activity (Bq)	Specific activity (annual release waste amount $\geq 1t$ ) (Bq/g)	Specific activity (annual release waste amount $< 1t$ ) (Bq/g)
As-74	1.E+6	1.E+1	1.E+1
As-76	1.E+5	1.E+1	1.E+2
As-77	1.E+6	1.E+3	1.E+3
Se-75	1.E+6	1.E+0	1.E+2
Br-82	1.E+6	1.E+0	1.E+1
Rb-86	1.E+5	1.E+2	1.E+2
Sr-85	1.E+6	1.E+0	1.E+2
Sr-85m	1.E+7	1.E+2	1.E+2
Sr-87m	1.E+6	1.E+2	1.E+2
Sr-89	1.E+6	1.E+3	1.E+3
Sr-90	1.E+4	1.E+0	1.E+2
Sr-91	1.E+5	1.E+1	1.E+1
Sr-92	1.E+6	1.E+1	1.E+1
Y-90	1.E+5	1.E+3	1.E+3
Y-91	1.E+6	1.E+2	1.E+3
Y-91m	1.E+6	1.E+2	1.E+2
Y-92	1.E+5	1.E+2	1.E+2
Y-93	1.E+5	1.E+2	1.E+2
Zr-93	1.E+7	1.E+1	1.E+3
Zr-95	1.E+6	1.E+0	1.E+1
Zr-97	1.E+5	1.E+1	1.E+1
Nb-93m	1.E+7	1.E+1	1.E+4
Nb-94	1.E+6	1.E-1	1.E+1
Nb-95	1.E+6	1.E+0	1.E+1
Nb-97	1.E+6	1.E+1	1.E+1
Nb-98	1.E+5	1.E+1	1.E+1
Mo-90	1.E+6	1.E+1	1.E+1

Clearance level Nuclide	Annual release activity (Bq)	Specific activity (annual release waste amount $\geq 1t$ ) (Bq/g)	Specific activity (annual release waste amount $< 1t$ ) (Bq/g)
Mo-93	1.E+8	1.E+1	1.E+3
Mo-99	1.E+6	1.E+1	1.E+2
Mo-101	1.E+6	1.E+1	1.E+1
Tc-96	1.E+6	1.E+0	1.E+1
Tc-96m	1.E+7	1.E+3	1.E+3
Tc-97	1.E+8	1.E+1	1.E+3
Tc-97m	1.E+7	1.E+2	1.E+3
Tc-99	1.E+7	1.E+0	1.E+4
Tc-99m	1.E+7	1.E+2	1.E+2
Ru-97	1.E+7	1.E+1	1.E+2
Ru-103	1.E+6	1.E+0	1.E+2
Ru-105	1.E+6	1.E+1	1.E+1
Ru-106	1.E+5	1.E-1	1.E+2
Rh-103m	1.E+8	1.E+4	1.E+4
Rh-105	1.E+7	1.E+2	1.E+2
Pd-103	1.E+8	1.E+3	1.E+3
Pd-109	1.E+6	1.E+2	1.E+3
Ag-105	1.E+6	1.E+0	1.E+2
Ag-110m	1.E+6	1.E-1	1.E+1
Ag-111	1.E+6	1.E+2	1.E+3
Cd-109	1.E+6	1.E+0	1.E+4
Cd-115	1.E+6	1.E+1	1.E+2
Cd-115m	1.E+6	1.E+2	1.E+3
In-111	1.E+6	1.E+1	1.E+2
In-113m	1.E+6	1.E+2	1.E+2
In-114m	1.E+6	1.E+1	1.E+2
In-115m	1.E+6	1.E+2	1.E+2

Clearance level Nuclide	Annual release activity (Bq)	Specific activity (annual release waste amount $\geq 1t$ ) (Bq/g)	Specific activity (annual release waste amount $< 1t$ ) (Bq/g)
Sn-113	1.E+7	1.E+0	1.E+3
Sn-125	1.E+5	1.E+1	1.E+2
Sb-122	1.E+4	1.E+1	1.E+2
Sb-124	1.E+6	1.E+0	1.E+1
Sb-125	1.E+6	1.E-1	1.E+2
Te-123m	1.E+7	1.E+0	1.E+2
Te-125m	1.E+7	1.E+3	1.E+3
Te-127	1.E+6	1.E+3	1.E+3
Te-127m	1.E+7	1.E+1	1.E+3
Te-129	1.E+6	1.E+2	1.E+2
Te-129m	1.E+6	1.E+1	1.E+3
Te-131	1.E+5	1.E+2	1.E+2
Te-131m	1.E+6	1.E+1	1.E+1
Te-132	1.E+7	1.E+0	1.E+2
Te-133	1.E+5	1.E+1	1.E+1
Te-133m	1.E+5	1.E+1	1.E+1
Te-134	1.E+6	1.E+1	1.E+1
I-123	1.E+7	1.E+2	1.E+2
I-125	1.E+6	1.E+2	1.E+3
I-126	1.E+6	1.E+1	1.E+2
I-129	1.E+5	1.E-1	1.E+2
I-130	1.E+6	1.E+1	1.E+1
I-131	1.E+6	1.E+1	1.E+2
I-132	1.E+5	1.E+1	1.E+1
I-133	1.E+6	1.E+1	1.E+1
I-134	1.E+5	1.E+1	1.E+1
I-135	1.E+6	1.E+1	1.E+1

Clearance level Nuclide	Annual release activity (Bq)	Specific activity (annual release waste amount $\geq 1t$ ) (Bq/g)	Specific activity (annual release waste amount $< 1t$ ) (Bq/g)
Cs-129	1.E+5	1.E+1	1.E+2
Cs-131	1.E+6	1.E+3	1.E+3
Cs-132	1.E+5	1.E+1	1.E+1
Cs-134	1.E+4	1.E-1	1.E+1
Cs-134m	1.E+5	1.E+3	1.E+3
Cs-135	1.E+7	1.E+2	1.E+4
Cs-136	1.E+5	1.E+0	1.E+1
Cs-137	1.E+4	1.E-1	1.E+1
Cs-138	1.E+4	1.E+1	1.E+1
Ba-131	1.E+6	1.E+1	1.E+2
Ba-140	1.E+5	1.E+0	1.E+1
La-140	1.E+5	1.E+0	1.E+1
Ce-139	1.E+6	1.E+0	1.E+2
Ce-141	1.E+7	1.E+2	1.E+2
Ce-143	1.E+6	1.E+1	1.E+2
Ce-144	1.E+5	1.E+1	1.E+2
Pr-142	1.E+5	1.E+2	1.E+2
Pr-143	1.E+6	1.E+3	1.E+4
Nd-147	1.E+6	1.E+2	1.E+2
Nd-149	1.E+6	1.E+2	1.E+2
Pm-147	1.E+7	1.E+3	1.E+4
Pm-149	1.E+6	1.E+3	1.E+3
Sm-151	1.E+8	1.E+3	1.E+4
Sm-153	1.E+6	1.E+2	1.E+2
Eu-152	1.E+6	1.E-1	1.E+1
Eu-152m	1.E+6	1.E+2	1.E+2
Eu-154	1.E+6	1.E-1	1.E+1

Nuclide	Clearance level	Annual release activity (Bq)	Specific activity (annual release waste amount $\geq 1t$ ) (Bq/g)	Specific activity (annual release waste amount $< 1t$ ) (Bq/g)
Eu-155		1.E+7	1.E+0	1.E+2
Gd-153		1.E+7	1.E+1	1.E+2
Gd-159		1.E+6	1.E+2	1.E+3
Tb-160		1.E+6	1.E+0	1.E+1
Dy-165		1.E+6	1.E+3	1.E+3
Dy-166		1.E+6	1.E+2	1.E+3
Ho-166		1.E+5	1.E+2	1.E+3
Er-169		1.E+7	1.E+3	1.E+4
Er-171		1.E+6	1.E+2	1.E+2
Tm-170		1.E+6	1.E+2	1.E+3
Tm-171		1.E+8	1.E+3	1.E+4
Yb-175		1.E+7	1.E+2	1.E+3
Lu-177		1.E+7	1.E+2	1.E+3
Hf-181		1.E+6	1.E+0	1.E+1
Ta-182		1.E+4	1.E-1	1.E+1
W-181		1.E+7	1.E+1	1.E+3
W-185		1.E+7	1.E+3	1.E+4
W-187		1.E+6	1.E+1	1.E+2
Re-186		1.E+6	1.E+3	1.E+3
Re-188		1.E+5	1.E+2	1.E+2
Os-185		1.E+6	1.E+0	1.E+1
Os-191		1.E+7	1.E+2	1.E+2
Os-191m		1.E+7	1.E+3	1.E+3
Os-193		1.E+6	1.E+2	1.E+2
Ir-190		1.E+6	1.E+0	1.E+1
Ir-192		1.E+4	1.E+0	1.E+1
Ir-194		1.E+5	1.E+2	1.E+2

Nuclide	Clearance level	Annual release activity (Bq)	Specific activity (annual release waste amount $\geq 1t$ ) (Bq/g)	Specific activity (annual release waste amount $< 1t$ ) (Bq/g)
Pt-191		1.E+6	1.E+1	1.E+2
Pt-193m		1.E+7	1.E+3	1.E+3
Pt-197		1.E+6	1.E+3	1.E+3
Pt-197m		1.E+6	1.E+2	1.E+2
Au-198		1.E+6	1.E+1	1.E+2
Au-199		1.E+6	1.E+2	1.E+2
Hg-197		1.E+7	1.E+2	1.E+2
Hg-197m		1.E+6	1.E+2	1.E+2
Hg-203		1.E+5	1.E+1	1.E+2
Tl-200		1.E+6	1.E+1	1.E+1
Tl-201		1.E+6	1.E+2	1.E+2
T-202		1.E+6	1.E+1	1.E+2
Tl-204		1.E+4	1.E+0	1.E+4
Pb-203		1.E+6	1.E+1	1.E+2
Bi-206		1.E+5	1.E+0	1.E+1
Bi-207		1.E+6	1.E-1	1.E+1
Po-203		1.E+6	1.E+1	1.E+1
Po-205		1.E+6	1.E+1	1.E+1
Po-207		1.E+6	1.E+1	1.E+1
At-211		1.E+7	1.E+3	1.E+3
Ra-225		1.E+5	1.E+1	1.E+2
Ra-227		1.E+6	1.E+2	1.E+2
Th-226		1.E+7	1.E+3	1.E+3
Th-229		1.E+3	1.E-1	1.E+0
Th-232		1.E+4	1.E+0	1.E+1
Pa-230		1.E+6	1.E+1	1.E+1
Pa-233		1.E+7	1.E+1	1.E+2

Clearance level Nuclide	Annual release activity (Bq)	Specific activity (annual release waste amount $\geq 1t$ ) (Bq/g)	Specific activity (annual release waste amount $< 1t$ ) (Bq/g)
U-230	1.E+5	1.E+1	1.E+1
U-231	1.E+7	1.E+2	1.E+2
U-232	1.E+3	1.E-1	1.E+0
U-233	1.E+4	1.E+0	1.E+1
U-235	1.E+4	1.E+0	1.E+1
U-236	1.E+4	1.E+1	1.E+1
U-237	1.E+6	1.E+2	1.E+2
U-238	1.E+4	1.E+0	1.E+1
U-239	1.E+6	1.E+2	1.E+2
U-240	1.E+7	1.E+2	1.E+3
Np-237	1.E+3	1.E+0	1.E+0
Np-239	1.E+7	1.E+2	1.E+2
Np-240	1.E+6	1.E+1	1.E+1
Pu-234	1.E+7	1.E+2	1.E+2
Pu-235	1.E+7	1.E+2	1.E+2
Pu-236	1.E+4	1.E+0	1.E+1
Pu-237	1.E+7	1.E+2	1.E+3
Pu-238	1.E+4	1.E-1	1.E+0
Pu-239	1.E+4	1.E-1	1.E+0
Pu-240	1.E+3	1.E-1	1.E+0
Pu-241	1.E+5	1.E+1	1.E+2
Pu-242	1.E+4	1.E-1	1.E+0
Pu-243	1.E+7	1.E+3	1.E+3
Pu-244	1.E+4	1.E-1	1.E+0
Am-241	1.E+4	1.E-1	1.E+0
Am-242	1.E+6	1.E+3	1.E+3
Am-242m	1.E+4	1.E-1	1.E+0

Clearance level Nuclide	Annual release activity (Bq)	Specific activity (annual release waste amount $\geq 1t$ ) (Bq/g)	Specific activity (annual release waste amount $< 1t$ ) (Bq/g)
Am-243	1.E+3	1.E-1	1.E+0
Cm-242	1.E+5	1.E+1	1.E+2
Cm-243	1.E+4	1.E+0	1.E+0
Cm-244	1.E+4	1.E+0	1.E+1
Cm-245	1.E+3	1.E-1	1.E+0
Cm-246	1.E+3	1.E-1	1.E+0
Cm-247	1.E+4	1.E-1	1.E+0
Cm-248	1.E+3	1.E-1	1.E+0
Bk-249	1.E+6	1.E+2	1.E+3
Cf-246	1.E+6	1.E+3	1.E+3
Cf-248	1.E+4	1.E+0	1.E+1
Cf-249	1.E+3	1.E-1	1.E+0
Cf-250	1.E+4	1.E+0	1.E+1
Cf-251	1.E+3	1.E-1	1.E+0
Cf-252	1.E+4	1.E+0	1.E+1
Cf-253	1.E+5	1.E+2	1.E+2
Cf-254	1.E+3	1.E+0	1.E+0
Es-253	1.E+5	1.E+2	1.E+2
Es-254	1.E+4	1.E-1	1.E+1
Es-254m	1.E+6	1.E+1	1.E+2
Fm-254	1.E+7	1.E+4	1.E+4
Fm-255	1.E+6	1.E+2	1.E+3
All Others	1.E+3	1.E-1	1.E-1

**II.b. Multi-radionuclides:** To determine if a mixture of radionuclides is below the limit a simple summation formula can be used.

$$\sum_{i=1}^n \frac{C_i}{C_{i,0}} \leq 1$$

where

$C_i$ : is the activity or specific activity of radionuclide  $i$ ,

$C_{i,0}$ : is the activity or specific activity limit of radionuclide  $i$  in Table II.a,

$n$ : is the number of radionuclides in the mixture

DRAFT

**ANNEX III: TYPES OF LICENSES AND AUTHORIZATION ISSUED FOR SAFE WASTE  
MANAGEMENT FIELD AND RELATED FEES**

<b>TYPE OF PERMISSION</b>	<b>APPLICATION FEES/FRW</b>	<b>LICENSE/AUTHORIZATION FEES/FRW</b>	<b>VALIDITY</b>
Authorization for site evaluation	100,000	1,000,000	6 Months
Authorization for Design and construction	100,000	500,000	1 year
Authorization for export radioactive waste	100,000	500,000	3years
License for Operation	500,000	50,000,000	10years
License to import radioactive waste	200,000	10,000,000	3 Months
Authorization for modification and Decommissioning	NA	5,000,000	1year