



RADIATION PROTECTION AUTHORITY OF ZIMBABWE

RADIATION PROTECTION ACT (CHAPTER 15:15)

REQUIREMENTS FOR RADIOACTIVE WASTE MANAGEMENT FACILITIES

1. Site evaluation

- a) The site shall be approved by the local authority and by-laws
- b) The site of the facility must have an approved Environmental Impact Assessment
- c) The site of radioactive waste facilities shall be such that radiation protection of personnel, public and the environment is provided during operating and accident conditions and that the facility is safely decommissioned and closed.

2. Design

- a) The facility shall be designed considering; total radioactive material inventory of wastes to be stored, processed, or disposed of; as well as potential radiological and non-radiological hazards.
- b) 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.
- c) Structures, systems, and components shall be designed to facilitate maintenance, repair, inspection, and tests.
- d) Structures, systems, and components shall be designed in compliance with the related regulations, codes, and standards by classifying them according to their functions and their importance for safety. It shall be ensured in the design phase that, structures, systems, and components important for safety are not harmed during operating conditions. Safety systems are designed to prevent accidents and to mitigate accident consequences.
- e) Design of processing and storage facilities - systems such as ventilation, monitoring and fire protection shall be included. Measures against effects of radiolysis as well as shielding and leak tightness shall be taken into consideration in the design.
- f) Radioactive waste storage facilities shall be designed considering storage period of waste as well as possible increase in storage demand in the future or in emergency situations.
- g) In the design of the facility where high level radioactive wastes shall be stored and/or processed, systems that can monitor radioactive wastes and keep them under control under operating and accident conditions, are included.

- h) The facility shall be designed such that active safety measures, such as control, maintenance, and monitoring activities, are not needed after closure and that passive safety measures including limitations on site use and barriers are sufficient to ensure safety.

3. Construction

- a) It should be demonstrated that main safety requirements are met in the design before the start of construction of the radioactive waste facility.
- b) It should be ensured that the facility is constructed according to its design by a construction organisation whose obligations, authorities and responsibilities are clearly defined.

4. Commissioning

- a) Before commissioning, it must be demonstrated, within the scope of a particular programme, that the facility is constructed in compliance with design objectives by verification with tests showing that systems, structures, and components carry out their intended functions.
- b) Commissioning programme shall include testing of all operation procedures applicability of which can be demonstrated at this stage. Before commissioning, an operating organisation shall be established.
- c) Operating personnel shall be provided with specific trainings for the facility during commissioning. Commissioning tests shall be carried out with the participation of personnel planned to be tasked with operation of the facility.

5. Operation

- a) Authorisation -Activities concerning radioactive waste facilities are subject to authorisation. A radioactive waste facility is subject to authorisation as radiation facility if wastes only come from radiation applications and radiation facilities.
- b) Graded approach -Facilities and activities regarding radioactive waste management shall be treated, inspected, and evaluated in a level commensurate with the extent of potential danger to personnel, public and the environment that the facility or activities may pose.
- c) Radioactive Waste Management – All waste shall be characterised and classified and authorised according to radioactive waste classification:
 - i. Solid waste
 - ii. Liquid aqueous waste
 - iii. Liquid organic waste
 - iv. Gaseous waste
 - v. Sealed radiation sources
 - vi. Medical waste- unsealed sources, linien bed etc
- d) Processing -During pre-treatment, radionuclide content, radioactive decay heat, physical condition, biological properties, chemical reactivity, radioactivity and contamination level of radioactive wastes shall be taken into account.
- e) Radioactive wastes shall be collected in the places where they are produced, by separating them based on the treatment they will be subject to as well as all their properties.
- f) Treatment shall be carried out so that the radioactive waste transferred to the next step in radioactive waste management is as low as possible in volume. During conditioning, radionuclide contents of radioactive wastes, criticality, radioactive decay

heat, contamination level, corrosive material content, gas generation and physical properties shall be considered.

- g) After conditioning, radioactive waste packages' integrity shall be maintained by protection against internal and external factors.
- h) Transport -Except for transportation on facility site where public motorways and railways are not present, the processes regarding transportation of radioactive wastes as well as waste packages used in transportation shall be carried out in accordance with "Regulation on Safe Transportation of Radioactive Materials".
- i) The person authorised with operation of the facility shall develop quality management, radiation protection and on-site emergency procedures for on-site transportation and take all necessary measures by taking into account all possible radiation exposure pathways.
- j) Storage- For safe storage of radioactive wastes, isolation of wastes from the environment shall be ensured with the use of multiple barrier approach. In the storage step, radioisotope content and half-lives, activity concentrations and physical, chemical, and biological properties of radioactive wastes to be stored shall be taken into consideration. Radioactive wastes should be stored by considering the planned storage time.
- k) Radioactive waste packages planned to be stored must be physically and chemically stable. All necessary measures should be taken to prevent lifetime loss and degradation of material of radioactive waste containers.
- l) Storage shall be carried out in a way to allow for testing, inspection, monitoring and examination of radioactive waste packages. Storage can be applied in predisposal radioactive waste management steps and between these steps.
- m) Disposal- Disposal of radioactive wastes should be carried out to ensure that its potential effects to personnel, public and the environment are kept within allowable levels for a particular period determined by the Authority and that to provide passive isolation of the wastes from the environment.
- n) Only conditioned radioactive wastes can be disposed of in near surface, intermediate depth, and deep disposal facilities. Long term safety of disposal facilities should be ensured with a suitable geological structure, engineering design features, adequate content and form of radioactive waste and procedures and controls for operation, closure, and post closure phases of the facility.
- o) Operation- Operating limits and conditions outlining safe operation in all operational conditions of radioactive waste facility and including radioactive waste acceptance criteria shall be defined by the Licensee.

6. Decommissioning

- a) A decommissioning programme shall be developed and put into practice, which ensures to meet safety objectives for decommissioning activities.

7. Closure

- b) A closure programme shall be established and put into practice by the Licensee, ensuring provision of safety objectives for closure activities.