NRRC Technical Regulations

Management of Radioactive Waste

NRRC-R-16

2022

هيئة الرقابة النووية والإشعاعية
Nuclear and Radiological Regulatory Commission

Regulation

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Preamble

In accordance with the provisions of the Law of Nuclear and Radiological Control issued by Royal Decree No. (M/82) dated 25/7/1439 AH, and NRRC's Statue issued by the Minsters' Cabinet Resolution No. (334) dated 25 /6/1439 AH, the NRRC prepared regulations that ensure control over radiological activities and practices as well as nuclear and radiological facilities.

This regulation has been prepared on the basis of International Atomic Energy Agency (IAEA) standards, international best practices and the experiences of similar international regulatory bodies, and in accordance with the Kingdom's international commitments. This Regulation has been presented in "the Public Consultation Platform" for the public review, comments, feedback.

This regulation has been approved by the NRRC's Board of Directors in resolution No. (R/1/1/2022), dated 20/04/2022.

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Chapter 1: Objective, Scope, and Definitions

Section 1: Objective

1. This regulation sets out the safety objectives, criteria and requirements for the protection of human health and the environment that shall be applied to the activities and to the facilities for the predisposal management of radioactive waste, and the requirements that shall be met to ensure the safety of such activities and facilities.

Section 2: Scope

2. This regulation applies to the predisposal management of radioactive materials which are defined as radioactive waste as well as to those disused sealed radioactive sources declared as radioactive waste.

3. This regulation applies to the predisposal management of radioactive waste of all types and covers all the steps in its management from its generation up to its disposal, including its processing (pretreatment, treatment and conditioning), storage and transport.

4. This regulation establishes the safety requirements that apply to all facilities and activities that are involved in the management of radioactive waste before disposal.

5. This regulation dose not establish requirements for radioactive waste disposal management facilities and activities.

6. This regulation does not set requirements for non-radiological hazards or conventional industrial health and safety issues that are associated with predisposal management of radioactive waste.

Section 3: Definitions

Activity Concentration

The activity per unit mass or volume of the material in which the radionuclides are essentially uniformly distributed.

Categorization (radioactive wastes)

System of categorization of the radioactive waste developed by the facility which is designed to take into account operational needs in the management. It shall consider the acceptance criteria established for the subsequent handling, processing, transport, storage and disposal steps, within the overall waste management process.

Characterization of waste

Determination of the physical, mechanical, chemical, radiological and biological properties of radioactive waste to establish the need for further adjustment, treatment or conditioning, or its suitability for further handling, processing, storage or disposal.

Classification (radioactive waste)

System of classification of radioactive waste aligned with the National Policy and strategy which is organized to take into account matters considered of prime importance for the safety of disposal of radioactive waste.

Clearance

Removal of regulatory control by the Nuclear and Radiological Regulatory Commission (NRRC) from radioactive material or radioactive objects within notified or authorized facilities and activities.

Conditioning

Those operations that produce a waste package suitable for handling, transport, storage and/or disposal. Conditioning may include the conversion of the waste to a solid waste form, enclosure of the waste in containers and, if necessary, provision of an overpack.

Disposal facility

A nuclear facility where waste is emplaced for disposal.

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.

National Policy on Radioactive Waste Management (National Policy)

Is a set of established goals or requirements at the national level for the safe management of radioactive waste that defines national roles and responsibilities in the Kingdom, approved pursuant to Council of Ministers' Resolution no. 371, dated 4/7/1442H.

Naturally Occurring Radioactive Material (NORM)

Radioactive material with amounts of radionuclides other than naturally occurring radionuclides that dose not exceed values stablished by the NRRC.

Overpack

A secondary (or additional) outer container for one or more waste packages, used for handling, transport, storage and/or disposal.

Packaging

Preparation of radioactive waste for safe handling, transport, storage and/or disposal by means of enclosing it in a suitable container.

Predisposal management activities

Any waste management steps carried out prior to disposal, such as pre-treatment, treatment, conditioning, storage and transport activities.

Predisposal management facilities

Facility for predisposal management of radioactive waste that may take place at the facility where the waste originated, or at a separate facility dedicated for waste management that are authorized by the NRRC for such purpose.

Predisposal management of radioactive waste

Any waste management steps carried out prior to disposal, such as pre-treatment (collection, characterization, segregation), treatment, conditioning, storage and transport activities.

Pretreatment

Any or all the operations prior to waste treatment, such as collection, segregation, chemical adjustment and decontamination.

Processing

Any operation that changes the characteristics of radioactive waste, including pretreatment, treatment and conditioning.

Radioactive waste

For legal and regulatory purposes, material for which no further use is foreseen that contains, or is contaminated with, radionuclides at activity concentrations greater than clearance levels prescribed by the NRRC.

Radioactive Waste Acceptance Criteria

Quantitative or qualitative criteria specified by the NRRC, or specified by an applicant in the authorization process and approved by the NRRC, for the waste form and waste package to be accepted in any step of a radioactive waste management process.

Radioactive Waste Management

All administrative and operational activities involved in the handling, pretreatment, treatment, conditioning, transport, storage and disposal of radioactive waste.

Radioactive Waste Management Program

Is a program to assist the authorized person to ensure the safe management of radioactive waste through the adoption of management structures, facilities, activities, processes, technical options for the management of radioactives wastes, procedures, and organizational arrangements that are commensurate with the nature and extent of the risks.

Safety assessment

Is the assessment of all aspects of predisposal radioactive waste management facilities and activities that are relevant to protection and safety. For an authorized facility, this includes siting, design and operation of the facility. It includes analysis to predict the performance of an overall system

and its impact, where the performance measure is the radiological impact or some other global measure of the impact on safety.

Safety case

A collection of arguments and evidence in support of the safety of a radioactive waste predisposal management facility or activity , including the findings of a safety assessment and a statement of confidence in these findings and how they should be implemented.

Secondary waste

A form and quality of waste that results as a byproduct of the processing of waste.

Segregation

An activity where types of waste or material (radioactive or exempt) are separated or are kept separate based on radiological, chemical and/or physical properties to facilitate waste handling and/or processing.

Storage

The holding of radioactive sources, radioactive material, or radioactive waste in a facility that provides for their/its containment, with the intention of retrieval.

Storage facility

A facility where waste is temporary safely emplaced for storage.

Treatment

Operations intended to benefit safety and/or economy by changing the characteristics of the radioactive waste.

Volume reduction

A treatment method that decreases the physical volume of a waste. Typical volume reduction methods are mechanical compaction, incineration and evaporation.

Waste form

Waste in its physical and chemical form after treatment and/or conditioning (resulting in a solid product) prior to packaging.

Waste package

The product of conditioning that includes the waste form and any container(s) and internal barriers (e.g. absorbing materials and liners), prepared in accordance with the requirements for handling, transport, storage and/or disposal.

Chapter 2: Responsibilities Associated with the Predisposal Management of Radioactive Waste

Section 4: General Authorized Person Responsibilities

7. No person or organization shall generate and/or manage radioactive waste except in accordance with a license issued by the NRRC under the terms of this regulation and any other relevant regulation.

8. The prime responsibility for the safe and secure predisposal radioactive waste management rest on the authorized person. The authorized person may delegate any work or activity associated with his responsibilities related to the predisposal management of radioactive waste to other authorized person by the NRRC and shall retain overall responsibility and control.

9. The authorized person 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 of the facilities are carried out in compliance with the legal and regulatory framework in force as well as with the requirements made under this regulation.

10. The authorized person shall in performing predisposal management of radioactive waste to adequately protect the people and the environment against the hazards of radioactive waste from generation to disposal.

11. The authorized person shall ensure that the provisions to control the occupational and public exposure and the protection of the environment are in compliance with the Regulation on Radiation Safety (NRRC-R-01).

12. The authorized person shall ensure that the predisposal management of radioactive waste is part of the entire facility or activity giving rise to the waste and the concerned safety justification and assessment is included in the application for an authorization of the practice that generates radioactive waste.

13. In the case of emergency exposure situation or existing exposure situations, radioactive waste generated as result of the remediation activities shall be managed by an authorized person to preform these activities.

14. The authorized person shall use requirements established in the National Policy for radioactive waste management, proven technologies, cost-benefit arguments and safety justification to justify its proposed radioactive waste management program.

15. The authorized person shall ensure an adequate level of protection and safety of the predisposal management of radioactive waste by various means, including:

    a. Generation of radioactive waste in terms of its activity and volume is kept to the minimum practicable by suitable design, operation and decommissioning of its facilities;

    b. Radioactive waste is managed by appropriate classification, categorization, segregation, treatment, conditioning, storage and disposal, and maintaining records of such activities;

    c. Radioactive waste is managed in such a way as to avoid imposing an undue burden on future generations, with the aim that predictable impacts on future generations do not exceed the level of protection of the current generation;

    d. Appoint Radiation Safety Officer to be responsible for overseeing radioactive waste management activities at the facilitie;

    e. Prepare and implement the appropriate operating procedures, including monitoring;

    f. Applies a good already proven engineering practice;

g. Establish and implement of a management system;

h. Ensures that staff are trained, qualified and competent in predisposal radioactive waste mangement activities;

i. Establish and implement a radioactive waste management program for the radioactive waste that is generated, including waste that has arisen from practices operating before the regulatory oversight of the NRRC entered in force;

j. Establish and maintain a mechanism to provide and ensure adequate financial resources to discharge its responsibilities with the predisposal management of radioactive waste and disused sealed radioactive sources, with due consideration given to the protection of future generations;

k. Implement operational limits, conditions and controls, including waste acceptance criteria derived from the safety assessment, to ensure that the predisposal radioactive waste management facility and activities are operated in accordance with the safety case;

l. Ensures that there are no unavoidable delays in processing waste and transferring to the next step as soon as practicable; and

m. Disposal of radioactive waste is not unnecessarily delayed.

16. The authorized persons shall ensure that all employees be informed annually of the importance of effective measures for protection and

safety of the safe predisposal radioactive waste management and be trained in their implementation as appropriate.

17. The authorized persons shall ensure that training programmes are routinely evaluated, updated and recorded as necessary.

Section 5: Radiation Safety Officer

18. In discharging his duties, the appointed Radiation Safety Officer, in relation to the radioactive waste management, among others, shall:

    a. Make and maintain contact with all relevant persons (inside or outside the facility) involved in the safe predisposal radioactive waste management to provide a qualified advice and guidance as well as monitoring of compliance;

    b. Liaise as needed with other radioactive waste management organizations;

    c. Establish and maintain a detailed record-keeping system for all stages of predisposal radioactive waste management, including the inventory of radioactive waste;

    d. Ensure and/or control the proper radioactive waste conditioning for storage and future disposal;

    e. Ensure and/or control that on-site transfer of radioactive waste is carried out in accordance with written safety procedures;

f. Ensure and/or control that waste packages for off-site transportation are prepared to be in compliance with transport regulations;

g. Ensure and/or control that any transportation of radioactive waste has been approved by the NRRC;

h. Ensure and/or control the appropriate shielding, labelling, physical security and integrity of waste packages;

i. Ensure and/or control that any discharge of effluents is made below the limits authorized by the NRRC, and recorded;

j. Ensure and/or control that solid released waste disposed of at a municipal landfill is in accordance with clearance levels established or approved in the licence´s conditions by the NRRC;

k. Report on accidents and inappropriate predisposal radioactive waste management practices to the authorized persons' management; and

l. Maintain an up-to-date knowledge of the characteristics of discharge and potential disposal options.

Section 6: Requirements for Reporting to the NRRC

19. The authorized person shall report to the NRRC of required information at intervals specified by the NRRC.

20. The authorized persons shall:

a. Notify the NRRC 60 days or as specified by the NRRC in advance of any intention to transfer the management of the radioactive waste to another authorized person;

b. Notify the NRRC immediately of any event during the predisposal radioactive waste management in which a dose limit or any other limits, conditions or controls exceeded the authorized values;

c. Notify the NRRC as soon as practicable, but not later than 24 hours after discovery, of any significant unintended accidental event during the predisposal radioactive waste management;

d. Submit to the NRRC, within 30 days or as specified by the NRRC after discovery of any significant accident, a written report which states the cause of the accident and includes information on the doses, corrective measures and any other relevant information;

e. When required in the licence conditions, report a summary of the public exposure monitoring results to the NRRC at approved intervals and promptly inform the NRRC of any abnormal results which lead or could lead to an increase of public exposure;

f. Report discharges of radioactive materials to the environment to the NRRC at intervals as may be specified in the licence and promptly report any discharges exceeding the authorized limits;

g. Report promptly and within the period specified by the NRRC submit a written report to the NRRC any releases of radioactive material to the environment above the clearance criteria established by NRRC;

h. Inform on material which has been removed from regulatory control to the NRRC as required in the licence conditions.

21. In addition to the radiation safety related reports in Article 20, the authorized persons shall submit the following reports to the NRRC:

a. Radioactive source inventory data and subsequent changes to those data, except for routine movements of the source allowed in the authorization;

b. Unusual events or incidents, such as:

i. Loss of control over any radioactive waste or disused sealed source.

ii. Unauthorized access to, or unauthorized use of radioactive waste.

iii. Discovery of any orphan sources.

c. Any intentions to introduce modifications to any predisposal management practice with radioactive waste whenever the modifications could have significant implications for safety;

d. A copy of relevant parts of any contract or acceptance document relating to the transfer of any radioactive waste to another authorized person; and

e. Reports on its radioactive waste management activities as specified by the NRRC.

22. The authorized person shall communicate any breaches of this regulation as specified by the NRRC.

Section 7: Investigations and Feedback of Operating Experience

23. The authorized persons shall ensure that information on normal operation performance, good practices and experiences as well as abnormal conditions and events significant to safety of the predisposal radioactive waste management is disseminated or made available to the NRRC and other person, as specified by the NRRC.

24. The authorized persons shall conduct an investigation as specified by the NRRC in case that:

    a. A quantity or operating parameter relating to protection and safety exceeds an investigation level or is outside the stipulated range of operating conditions for predisposal radioactive waste management activities; or

    b. Any equipment failure, accident, error, mishap or other unusual event or condition occurs that has the potential for causing a quantity to exceed any relevant limit or operating restriction authorized by the NRRC.

25. The authorized person shall conduct an investigation immediately after the occurrence of an event that differs from established procedures, limits, conditions and controls established in the authorization for any activity or facility of predisposal radioactive waste management.

26. The authorized person shall prepare a report of the causes of any occurred event, or suspected causes, including a verification or determination of any doses received or committed and recommendations for preventing the recurrence of the event and the occurrence of similar events.

Chapter 3: Integrated Approach to Safety

Section 8: Management system

27. The authorized person shall establish and implement a management system in accordance with relevant NRRC regulations.

28. The management system shall be commensurate with the hazard of the predisposal radioactive waste management activities and shall be approved by the NRRC.

29. To ensure the safety of predisposal radioactive waste management facilities, activities and the fulfilment of waste acceptance criteria, the management systems shall be applied to all stages of facility life cycle and to all activities of the management of radioactive waste as well as to the corresponding safety assessment and safety case.

30. The authorized person shall establish and maintain a strong safety culture by means of an effective management system that demonstrate commitment to safety of senior management.

31. The authorized person shall take into account human factors and shall support good performance and good practices to prevent human and organizational failures in the predisposal radioactive waste management.

Section 9: Application for an Authorization

32. Facilities and activities for predisposal management of radioactive waste require an authorization. The information presented in application for an authorization shall demonstrate the compliance with the requirements established in this regulation applying the graded approach for safety.

33. The applicant for an authorization shall submitt the safety case and a supporting safety assessment as prescribed in Section 10.

34. As part of the authorization application, the applicant for a facility or activity which generates radioactive waste or disuses sealed radioactive sources or manages radioactive waste and disused sealed radioactive sources shall submit for review and approval the radioactive waste management program.

35. The radioactive waste management program proposed by the applicant or authorized person shall be in accordance with the National Policy, taking into account interdependences among all steps in waste management and the available options.

36. An application for an authorization shall address all typical elements of predisposal management of radioactive waste, as applicable to the facility or activity for which an authorization is being sought. as follows:

    a. Waste generation;

    b. Characterization and categorization;

c. Segregation;

d. Pretreatment;

e. Treatment;

f. Conditioning;

g. Storage;

h. Control of discharges;

i. Clearance and its control;

j. Packaging strategies;

k. Transport;

l. Design and manufacture of containers;

m. Handling of waste packages;

n. Site evaluation, design, construction, operation, closure and the post-closure stage of a waste management facility;

o. Any additional safety elements prescribed by NRRC.

37. In applying for an authorization which involves the predisposal management of radioactive waste the applicant shall ensure that the adequate financial mechanism is in place to cover the full costs of the safe management of the radioactive waste according to the National Policy.

Section 10: Safety Case and Supporting Safety Assessment for Predisposal Radioactive Waste Management Facilities and Activities

38. The safety case and its supporting safety assessment developed by the authorized person shall demonstrate the level of protection provided and shall provide assurance to the NRRC that safety requirements will be met.

39. The authorized person shall ensure that the safety case addresses operational safety and all safety aspects of the facility and activities for the predisposal management of radioactive waste.

40. The safety case and safety assessment shall include the following:

    a. Description of how all the safety aspects of the site, the siting, design, construction, commissioning, operation, shutdown and decommissioning of the facility and/or activity and the managerial controls satisfy the regulatory requirements;

    b. Demonstration of the radiological and non-radiological safety under normal operation and an assessment of potential effects of incidents and accidents, according to national regulations;

    c. Considerations for reducing hazards posed to workers, members of the public and the environment during normal operation and in possible accident conditions;

    d. The selection of operational occurrences and accidents to be analyzed that shall take account of their estimated probabilities and impacts;

e. Definition of the radioactive waste acceptance criteria

f. When appropriate and needed, such assessments shall make use of appropriate modeling methods and data from available experience;

g. Where necessary, the assessments shall demonstrate long term safety;

h. Demonstration that the appropriated interdependencies among all steps in the predisposal management are ensured;

i. Description of the methods for determining the activity content and other safety-related parameters of the radioactive waste;

j. Cover all stages and safety aspects of the radioactive waste management process, in relation to the workers, the public and the environment; and

k. Prepared based on the design of the facility and the process description.

41. The safety case and supporting safety assessment for a predisposal management facility or activity shall be prepared by the applicant early in the development of a facility as a basis for the process of regulatory decision making and approval, and shall be progressively developed and refined as the project proceeds.

42. The safety assessment shall be periodically reviewed at predefined intervals in accordance with regulatory requirements established by the

NRRC for the renewal of the issued authorization. The results of the periodic safety review shall be reflected in the updated version of the safety case for the facility.

43. The authorized person shall implement any safety upgrades required by the NRRC following the review of the safety assessment.

44. In addition to the established frequency in the authorization for periodic reviews of the safety assessment, it shall be reviewed and updated when:

    a. There is any significant change that may affect the safety of the predisposal radioactive waste management facility or activity;

    b. There are significant developments in knowledge and understanding (such as developments arising from research or operational experience feedback);

    c. There is an emerging safety issue owing to a regulatory concern or an incident;

    d. There have been significant improvements in assessment techniques such as computer codes or input data used in the safety analysis; and

    e. There are related regulatory requirements had been reviewed and updated.

Section 11: Monitoring, Testing and Verification of Compliance

45. The authorized person shall conduct monitoring and testing to verify compliance with the limits, conditions and controls of the license and with the requirements for the safe management of radioactive waste.

Section 12: Radioactive Waste Records

46. The authorized person shall develop a comprehensive recording system for predisposal radioactive waste management activities.

47. The recording system as set forth in Article 46 shall include radioactive discharges and clearance of radioactive materials and shall allow for traceability of radioactive waste from the point of its collection through to its long-term storage and its clearance or disposal.

48. All records related to radioactive waste inventory (including radioactive disused sealed sources) and radioactive waste management activities shall be:

    a. Maintained up to date;

    b. Retained in such a way as to ensure that relevant information is maintained for the entire lifecycle of the facility in which the radioactive waste generated and managed; and

    c. Accessible in the future, as necessary and considering the radionuclides half-live present in the radioactive waste or radioactive disused sealed source.

49. A waste characterization record shall contain the following information pertaining to the waste:

a. The source or origin;

b. The physical and chemical form;

c. The amount in term of (volume and/or mass);

d. The radiological characteristics related to (the activity concentration, the total activity, the radionuclides present and their relative proportions, the date at which measurement were performed);

e. The classification in accordance with the waste classification system established in this regulation;

f. Any chemical, pathogenic or other hazards associated with the waste and the concentrations of hazardous material;

g. Any special handling necessary owing to criticality concerns, the need for the removal of decay heat or significantly elevated radiation fields; and

h. Any other information required by the NRRC.

50. To ensure proper control over waste management activities, the authorized person of a facility that generates radioactive waste shall maintain the following records:

a. Generated radioactive waste;

b. Stored radioactive waste including spent and/or disused radioactive sealed sources (including identification, origin, location, physical and chemical characteristics);

c. Material from which regulatory control has been removed or that has been discharged to the environment (including data related to the process);

d. Spent and/or disused sealed radioactive sources returned to suppliers;

e. Radioactive waste and disused sealed radioactive sources transferred to management waste facility or another user;

f. Non compliance to the limits, conditions and controls established for the radioactive waste and the corrective actions taken in response; and

g. Any other records required by the NRRC.

51. In case of centralized processing and storage facilities for radioactive waste the records concerning radioactive waste management activities shall, in addition, include the following:

a. The data of waste and disused sealed radioactive sources collected or received from generating facilities;

b. The data of the secondary radioactive waste produced in the predisposal management process;

c. The data needed for a national inventory of radioactive waste;

d. The data needed for waste characterization;

e. The records from the control processes for treatment, packaging and conditioning;

f. The documents on the procurement of containers required to provide confinement for a certain period;

g. The specifications for waste packages and audit records for individual containers and packages;

h. Trends in operating performance;

i. The non-compliance to the specifications for waste packages and the actions taken to rectify them;

j. The performed radioactive discharges and clearance of radioactive materials; and

k. Any other records required by the NRRC.

52. The radioactive waste records shall be provided to the authorized person responsible for the transferred waste.

Section 13: Interdependences

53. Interdependencies shall be considered among all steps in the predisposal management of radioactive waste, including the impact of the anticipated disposal option established in the National Policy.

54. In considering possible options for the management of radioactive waste, care shall be taken to avoid conflicting demands that might compromise safety. Optimization of one step in the predisposal management of radioactive waste shall not impose significant constraints on the subsequent steps or forecloses viable options.

Section 14: Emergency Preparedness

55. Authorized persons shall ensure that their emergency plans include arrangements for the generated radioactive waste during normal operation as well as for the radioactive waste potentially generated in an emergency situation. This situation shall be evaluated in the safety assessment and safety case.

Section 15: Physical Protection and Security

56. The authorized person, subject to decision by the NRRC, shall submit a security plan that described the measures in compliance with the established regulation to ensure the physical protection and security that prevent the unauthorized access of individuals and the unauthorized removal of radioactive materials. These measures shall be implemented in an integrated manner and not to compromise the safety of the radioactive waste predisposal management facility or activity.

Section 16: Nuclear Safeguards

57. When nuclear materials are present in the radioactive waste predisposal management facility or activity, the authorized person shall ensure the compliance with nuclear safeguards requirements established by the NRRC in the design and the operation of these facilities and activities to which nuclear safeguards apply. These requirements shall be imple-mented in such a way as not to compromise the safety of the radioactive waste predisposal man-agement facility or activity.

Chapter 4: Steps in the Predisposal Management of Radioactive Waste

Section 17: Control of Radioactive Waste Generation

58. Authorized persons generating radioactive waste shall ensure that appropriate measures are taken to keep generation of radioactive waste to the minimum practicable 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. Applying authorized discharge of effluent and clearance of materials from regulatory control, after appropriate processing and/or a sufficiently long period of storage, to reduce the amount of radioactive waste that needs further processing or storage;

    d. Using the minimum quantity of radioactive material;

    e. Establishing contractual arrangements for the return of disused sealed radioactive sources to the manufacturer when purchasing sealed radioactive sources;

    f. Implementing a comprehensive management system for all activities potentially generating radioactive waste;

g. Maintaining consistency with the National Policy.

59. In order to keep the generation of radioactive waste to the minimum and in addition to the above-mentioned requirements, the authorized person, shall adopt provisions such as:

a. Careful identification and control of the collecting, segregating, packaging and handling of produced radioactive materials;

b. Adopting good segregation practices, including authorized clearance of materials, at point of waste generation;

c. Efficient operation of collecting and processing systems for gaseous and liquid radioactive waste;

d. Taking precautions to avoid the contamination of materials, equipment and building surfaces in order to reduce the need of decontamination;

e. Restrictions on taking packaging and other unnecessary material into the controlled area;

f. Planning and performing periodical surface monitoring and maintenance work with due care and with particular emphasis on precautions to avoid the spread of contamination; and

g. Creating and maintaining proper record system that would allow the periodical assessment of the effectiveness of measures adopted to minimize radioactive wastes generation.

Section 18: Radioactive Waste Characterization

60. The authorized person shall characterize radioactive waste at various steps in the predisposal management of radioactive waste, in terms of its physical, mechanical, chemical, radiological and biological properties.

61. The authorized person shall ensure that the characterization provides all information relevant to process control and assurance that the waste or waste package will meet the acceptance criteria for processing, storage, transport and disposal of the waste.

62. The relevant characteristics of the waste shall be recorded to facilitate its further management.

Section 19: Radioactive Waste Classification

63. The authorized person shall classify radioactive waste under its responsibility in accordance with the radioactive waste classification scheme established in Article 64 of this regulation for the purpose of the final disposal of radioactive waste.

64. Radioactive waste shall be classified in the following classes:

    a. **Exempt waste (EW):** Waste that meets the clearance criteria specified in the relevant regulation and can be dispose of as common waste.

    b. **Very short-lived waste (VSLW):** Waste that can be stored for decay over a limited period of up to a few years and sub-

sequently cleared from regulatory control according to arrangements approved by the NRRC, for uncontrolled, use or discharge. This class includes waste containing primarily radionuclides with very short half-lives often used for research and medical purposes.

c. **Very low-level waste (VLLW):** Waste that does not necessarily meet the criteria of EW, but that does not need a high level of containment and isolation. Typical waste in this class includes soil and rubble with low levels of activity concentration. Concentrations of longer-lived radionuclides in VLLW are generally very limited.

d. **Low-level waste (LLW):** Waste that is above clearance levels, but with limited amounts of long lived radionuclides. Such waste requires robust isolation and containment for periods of up to a few hundred years. This class covers a very broad range of waste. LLW may include short lived radionuclides at higher levels of activity concentration, and long-lived radionuclides, but only at relatively low levels of activity concentration.

e. **Intermediate-level waste (ILW):** Waste that, because of its content, particularly of long lived radionuclides, requires a greater degree of containment and isolation. However, ILW needs no provision, or only limited provision, for heat dissipation during its storage and disposal. ILW may contain long lived radionuclides, in particular, alpha emitting radionuclides.

f. **High-level waste (HLW):** Waste with levels of activity concentration high enough to generate significant quantities of heat by the radioactive decay process or waste with large amounts of long lived radionuclides.

Section 20: Radioactive Waste Categorization

65. Operational categorization systems for radioactive waste shall be proposed by the authorized person for approval by the NRRC during the authorization process considering different points of view, such as safety related aspects, process engineering demand or regulatory issues.

66. In developing the categorization system to be applied in the facility or activity the authorized person shall meet a number of objectives, including the following that cover the full range of types of radioactive waste:

    a. To address all stages of predisposal radioactive waste management (segregation, processing/conditioning or packaging and storage);

    b. To relate categories of radioactive waste to the associated potential hazard;

    c. To be flexible to serve specific needs;

    d. To modify as little as possible already accepted terminology for the categorization of radioactive waste;

    e. To be simple and easy to understand;

f. To be as universally applicable as possible.

67. The authorized person, in developing the categorization system to be applied in the facility or activity, shall consider the following characteristics of radioactive waste:

a. Non-radioactive and radioactive materials;

b. Half-life of radionuclides present: short lived radionuclides suitable for decay storage or long-lived radionuclides;

c. Activity and radionuclide content;

d. Physical and chemical form:

i. Liquid: aqueous or organic;

ii. Non-homogeneous (e.g., Containing sludge or suspended solids);

iii. Solid: combustible/non-combustible, compactable/ non-compactable, metallic or non-metallic.

e. Fixed or non-fixed surface contamination;

f. Disused sealed sources; and

g. Non-radiological hazards characteristics (e.g., Chemical and biological toxicity).

Section 21: Radioactive Waste Acceptance Criteria

68. The authorized person shall develop and submit to the approval by NRRC the waste acceptance criteria. The acceptance criteria shall specify the radiological, mechanical, physical, chemical and biological characteristics of waste packages and unpackaged waste that are to be processed, conditioned, stored or disposed of.

69. The waste acceptance criteria shall be defined for each step of the radioactive waste predisposal management process.

70. In developing the waste acceptance criteria, the authorized person shall consider at least the following elements:

    a. The stability of the waste form with respect to mechanical, chemical, structural, radiological and biological characteristics;

    b. The maximum content of liquids;

    c. Limitations on activity (for example, activity per package);

    d. Potential for criticality;

    e. The extent to which the waste should be non-pyrophoric, non-explosive or non-reactive; and

    f. Possibility of generation of toxic gases.

71. The authorized person in developing the waste acceptance criteria for the facility or activity under its authorization, shall ensure that the radioactive waste to be transferred to other installations or to other waste management steps in the same facility meets the waste acceptance criteria established by the other installation or for the subse-

quent step in the facility generating the radioactive waste.

72. The authorized person shall ensure that an appropriate control system is established to provide confidence that the waste under its responsibility meets the applicable waste acceptance criteria.

73. For any step in the radioactive waste predisposal management, the authorized persons' procedures for the reception of waste at the following step shall contain provisions for safely managing waste that fails to meet the acceptance criteria; for example, by taking remedial actions or by returning the waste.

Section 22: Processing of Radioactive Waste from Collection up to Treatment

74. Radioactive material for which no further use is foreseen, and with characteristics that make it unsuitable for authorized discharge, authorized use or clearance from regulatory control shall be processed as radioactive waste.

75. The authorized person shall ensure that radioactive waste is collected, characterized, and segregated, at the point of origin in accordance with:

    a. The established criteria;

    b. A defined and approved radioactive waste predisposal management categorization and program; and

    c. The waste acceptance criteria defined for the next step in the waste management process.

76. During the radioactive waste collection phase, the authorized person shall ensure that:

    a. Containers for solid wastes shall be lined with a durable plastic bag that can be sealed (e.g., Tied with plastic adhesive tape, heat-sealed with a radio-frequency welder);

    b. Sharps shall be collected separately and stored in rigid; puncture-resistant containers (preferably metal) that have been clearly labelled 'sharps';

    c. Damp solid waste and liquid waste shall be collected in suitable containers according to the chemical and radiological characteristics, volume of the waste, handling and storage requirements. Normally double packaging is used;

    d. Disused sealed sources shall be kept in their shielding; and

    e. Containers shall be checked for radioactive contamination and loose contamination should be removed before reuse.

77. Where necessary to adjust the characteristics of the collected radioactive waste, it shall be done based upon appropriate consideration of the characteristics of the waste, of the requirements imposed by subsequent steps and through formally approved operating procedures.

78. Segregation of radioactive waste shall be performed according to a categorization scheme approved in the authorization to allow for safe and adequate accomplishment of further predisposal steps.

79. The authorized person shall ensure that radioactive waste is rendered into a safe and passive form for storage or disposal as soon as possible.

80. The effluent and radioactive materials produced during predisposal management of radioactive waste that are suitable for discharge or clearance from regulatory control shall be authorized by the NRRC.

81. The authorized person shall ensure that waste is processed in such a way that the safety of the operations is appropriately ensured during normal operations, that measures are taken to prevent the occurrence of incidents or accidents, and that provisions are made to mitigate the consequences if accidents occur.

82. The authorized person shall ensure that the processing of radioactive waste is consistent with the type and characteristic of waste, and the demands imposed by the different steps in its management including the possible need for its storage, the anticipated disposal option, and the limits, conditions and controls established in the safety case and in the assessment of environmental impacts.

83. The authorized person shall ensure that radioactive waste is processed in such a way that the resulting waste form can be safely stored and retrieved from the storage facility until its ultimate disposal.

84. The pretreatment processes of radioactive waste shall include, when necessary and applicable, physical or chemical adjustment to make the waste less hazardous or more amenable to further processing.

85. The treatment of waste shall be justified for safety, technical or finan-

cial reasons. Whenever necessary to carry out any waste treatment process, the authorized person shall ensure that:

a. The waste is processed only after its precise characterization; and

b. The methods used for waste treatment are based on:

i. Compatible with the waste characteristics;

ii. Capable of minimizing the generation of secondary radioactive waste; and

iii. Based on the use of proven good technology and practices.

86. The authorized person shall establish provisions for identifying, assessing, and dealing with waste and/or waste packages that do not meet process specifications and requirements for its and/or their safe handling, transport, storage and/or disposal.

87. The production of secondary radioactive waste should be limited to the extent practicable during the pretreatment, treatment, and conditioning of the radioactive waste. Consideration shall be given to the consequences of dealing with any secondary waste (both radioactive and non-radioactive) that is created during predisposal management of the radioactive waste.

88. The authorized person shall ensure the compatibility of waste packag-

es with the properties of the waste form, and with the subsequent steps of radioactive waste predisposal management.

89. Radioactive waste containers shall be properly identified and labelled so that the required information will be available at all stages of the predisposal radioactive waste management. The information shall be sufficient to ensure the effectiveness and safety of the next step in the management process. It should include:

    a. Identification number;

    b. Radionuclides;

    c. Activity (if measured or estimated)/date of measurement;

    d. Origin (room, laboratory, individual, etc. If applicable);

    e. A radiation trefoil;

    f. Other potential/actual hazards (chemical, infectious, etc.);

    g. Surface dose rate/date of measurement; and

    h. Quantity (weight or volume).

Section 23: Conditioning

90. In selecting a conditioning process, the authorized person 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; and

c. The minimization of the generation of secondary radioactive waste.

91. The authorized person shall ensure that the produced waste packages at the stage of conditioning are designed and produced so that radionuclides are confined under both normal conditions and accident conditions that may occur during handling, storage, and disposal.

92. The authorized person shall ensure that each package of conditioned waste is provided with a durable label bearing the identification number and relevant information.

93. The conditioning processes shall include provision to ensure the max-imum homogeneity and stability of the waste form; minimum free space in the container; low leachability, and max-imum container durability.

94. Since the waste packages may be used for a long time, quality control of the conditioning process and produced wastes packages shall be considered by the authorized person as a key aspect for safety. The quality control shall include, but is not limited to:

a. The definition of quality standards applying to waste packages;

b. An unambiguous definition of quality indicators for the conditioning processes as well as for the final packages;

c. The quality indicators shall demonstrate that the packages meet specified requirements and acceptance criteria;

d. The development of a testing program to verify the performance of the packages;

e. Appropriate record keeping; and

f. Making available technical support for radiological and non-radiological measurements and procedures.

95. The authorized person shall ensure that the information associated with each conditioned waste package is recorded and adequately managed under the record-keeping system.

96. All records on waste packages shall be securely stored, easily accessible and retrievable over an extended period, at least utill the radioactive waste will be conditioned for final disposal where the records will be updated and maintained. Information shall include as a minimum for each individual package the following:

a. Origin of the waste;

b. Identification number of the package;

c. Type and design details of the package and unloading documentation;

d. Weight of the package;

e. External size and/or volume of the package;

f. Maximum dose rate at contact and 1 m (transport index) and

date of measurement;

g. Results of surface contamination measurement;

h. Radionuclide content and activity content;

i. Content of fissile material (such as 239 Pu–Be sources);

j. Physical nature; and

k. Presence of potential biological, chemical and other hazards.

Section 24: Management of Disused Sealed Radioactive Sources

97. Authorized persons shall review their sealed radioactive source inventory at least annually to identify any sources that have become disused. Disused sealed radioactive sources shall be included on the inventory of radioactive material. The authorized person has the responsibility to meet any regulatory requirements for reporting these sources.

98. Before declaring disused sealed radioactive source as a radioactive waste, the authorized person shall first attempt to return the source to its supplier in accordance with the signed and presented contract as part of the documentation presented in the application for an authorization.

99. Once the radioactive sources have become disused, the authorized person shall ensure the maintenance of continuity of control. Authorized persons shall periodically review the status of control of such sources.

100. Besides ensuring compliance with Article 99, when a source has become disused, the authorized person shall as soon as possible explore

the possibility of ensuring its further management by:

a. Return to the manufacturer or supplier;

b. Recycle and reuse by some other authorized person, when the source complies with the requirements for its safe use;

c. Transfer to a licensed, interim or long-term storage facility; and

d. Safe disposal in accordance with the national regulation and National Policy.

101. The following aspects shall be considered in respect of the management of disused sealed radioactive sources:

a. Disused sealed radioactive sources with high potential hazard shall be segregated and stored separately. For sources with a potential for leaking, particular radiological precautions shall also be taken during the handling and storage;

b. Special attention shall be paid to monitoring the surface and the air for contamination. These sources shall be stored in a dedicated area with appropriate ventilation and equipment;

c. Disused radioactive sealed sources shall be conditioned if that will improve safety unless the half-life of the radionuclides they contain is short enough to permit their removal from regulatory control. Conditioning methods of disused sealed radioactive sources shall be approved by the NRRC;

d. Procedures shall be established to ensure that disused sealed

radioactive sources are not subjected to compaction, shredding or incineration; and

e. Special attention shall be given to measures aimed to ensure that control of disused sealed radioactive sources is maintained to prevent that the sources get lost.

Section 25: Management of Orphan Sources

102. Once an orphan source is identified and secured, the organization designated by the NRRC shall organize the safe management of this orphan source.

103. If the organization responsible (owner) of this orphan source is identified, this organization shall cover all the costs derived from the management options defined for the safe management of this source.

104. If solutions to the identified orphan source are not found, such as: repatriation to the supplier, or reuse in any other field after the verification that the source comply with the features established by the producer or supplier, the orphan source will be managed as any other disused sealed radioactive source considered already as radioactive waste.

Section 26: Recycle and Reuse

105. The applicant for a radioactive waste predisposal management license shall demonstrate that the option of reuse and recycling of radioactive material has been considered and relevant provisions adopted where appropriate.

106. Whenever the option of recycle and reuse of radioactive material or radioactive sources requires the transfer of ownership of the equipment, radioactive material or radioactive source to another organization, the authorized person shall ensure compliance with relevant regulatory requirements and shall apply for an authorization from the NRRC. In this case the authorized person shall ensure that all information, radiological and non-radiological, concerning the transferred materials is available to the receiving organization.

Section 27: Management of NORM Residues and Waste

107. Any person responsible for an industry generating NORM residues shall justify the generation of waste and prove that it is appropriately optimized.

108. Notwithstanding to Article 107, NORM waste with activity concentrations greater than those specified by the NRRC shall be subject to the requirements of this regulation.

109. At any situation, the management of NORM waste shall be designed to prevent radioactive contamination of natural resources.

110. The provisions in the NORM waste management program shall be evaluated and approved by the NRRC.

Section 28: Discharge or Release of Radioactive Materials to the Environment

111. When the applicant anticipates that some radioactive materials will be discharged into the environment as part of the planning activity, the applicant must consider the safety requirements established by the

NRRC in the applicable regulation when preparing the application documentation.

112. The authorized person shall ensure that radioactive materials from authorized practices including the predisposal management of the radioactive waste are not discharged to the environment unless such discharges are within the limits and conditions on their implementation specified by the NRRC in the authorization.

113. The authorized person shall review operating experience of discharges and, in agreement with the NRRC, adjust their discharge control measures to ensure optimization of protection and safety.

114. As part of the discharge control, the authorized person shall establish and document technical procedures to carry out discharge operations, monitoring and record as well as define the involvement of individual responsibility.

Section 29: Clearance and its Control

115. Radioactive waste of low activity concentration may be released from regulatory control and treated as ordinary waste if it can be shown that the potential doses for the public from this activity are lower or equal to the clearance criteria and values specified by the NRRC.

116. Radioactive waste determined as being below the activity concentration values specified in the relevant regulation is considered to fulfill the condition set forth in Article 115 and may be released from regulatory control without further assessment (clearance).

117. In an application for authorization, the applicant shall declare its intention to clear materials from regulatory framework during the operational phase as part of the radioactive waste predisposal management. The applicant shall propose methods and procedures to be used for general clearance its control and record. The plan shall be approved by the NRRC. Upon approval, radioactive material may be cleared as it accumulates.

118. In regard to clearance and its control, the authorized person shall adopt provisions to ensure that deliberate dilution of material, other than the dilution that takes place in normal operations shall not be carried out.

119. Information on material which has been removed from regulatory control and its measurement results and controls shall be recorded, retained and reported to the NRRC as established in the authorization.

120. Control measures for release of radioactive materials shall include:

a. Determination of the activity concentration of the waste;

b. Segregation of such waste designated for decay;

c. Sampling of each batch of waste prior to removal from control; and

d. Record the volume, activity concentration and radionuclides in the materials to be cleared.

121. Whenever the activity concentrations exceed the approved clearance levels and the removal from regulatory control appears to be the op-

timum option for the predisposal management of radioactive waste, the authorized person shall consider seeking regulatory approval for conditional clearance once the condition in Article 115 is fulfilled.

122. The authorized person for clearance of radiopharmaceutical generators or contaminated items with radionuclides of a very short physical half-life prior to removal from regulatory control as a common waste, the authorized person shall comply to the following conditions:

    a. The radionuclide is held for decay below the clearance level;

    b. Monitoring of activity that proof the concerned values are below the clearance levels;

    c. Record of monitoring and data that conform to Article 122 (a) and (b) on the material including the personnel involved;

    d. Radiation labels are removed or obliterated.

123. For transfer of radioactive waste above the clearance level, the authorized person shall ensure the transfer is conducted only to another authorized person by the NRRC.

Section 30: Common Safety Considerations for Radioactive Waste Storage

124. Prior to generating radioactive waste that may require subsequent management, the authorized person shall ensure the availability of an adequate storage facilities, equipment, and other arrangements available for the safe handling and storage of radioactive waste generated during operation.

125. The authorized person shall follow the National Policy and the safety requirements established in this regulation for predisposal management of radioactive waste when they define the arrangements for the storage of radioactive waste.

126. For monitoring of compliance with the waste acceptance criteria for storage the authorized person shall follow up the requirements established in the Section 21 of this regulation.

127. The authorized person shall adopt provisions to ensure that radioactive waste and radioactive disused sealed sources will be stored in such containers, packages and facilities that meet the acceptance criteria and requirements approved by the NRRC in the safety case and issued authorization for the storage of such radioactive sources and packages.

128. Full traceability of the waste packages by means of record keeping and adequate labelling that ensure, when needed, the preservation of the information in the potential long term storage period, shall be maintained during the different stages of storage.

129. The authorized person shall ensure that the waste package container provides integrity throughout the storage period and authorizations:

a. Systematic monitoring of all the packages;

b. Retrieval at the end of the storage period;

c. Enclosure in an overpack, if necessary;

d. Transport to and handling at a disposal facility; and

e. Compliance with relevant waste acceptance criteria.

130. If according to the radioactive waste management National Policy, the radioactive waste is to be stored in a centralized storage facility, the authorized person shall adopt provisions to ensure the prompt transfer of radioactive waste and radioactive disused sealed radioactive sources to that facility.

131. The applicant for a license to operate large and/or centralized storage facility shall design and construct a facility which:

a. Has sufficient storage capacity to account for uncertainties in the availability of facilities for treatment, conditioning, and disposal;

b. Maintains that the safety is ensured by means of successive levels of protection independent of each other (defense in depth safety principle);

c. Ensures that the design of a facility takes into account the possible need to process waste arising from incidents or accidents;

d. Is suitable for the expected period of storage, preferably using passive safety features, considering the potential degradation and with due consideration of natural site characteristics that could impact performance as geology, hydrology and climate;

e. Allows that waste can be inspected, monitored and preserved in a condition suitable for release, retrieval or transport, as appropriate;

f. Ensures appropriate containment of the waste; for example, on the integrity of the facility's structures and equipment, as well as the integrity of the waste forms and containers over the expected duration of storage.

g. For long term storage in particular, measures shall be taken to prevent degradation of the waste containment. Consideration shall be given to interactions between the waste, the containers and their environment (e.g., Corrosion processes due to chemical or galvanic reactions); and

h. Makes provision for retrieval of the waste whenever required.

132. The authorized person shall also consider, in addition to the above requirements that the waste shall be stored in a way that ensures:

a. Separation of treated and conditioned radioactive waste from unconditioned waste, non-radioactive materials and maintenance equipment; and

b. That consideration is given to the assignment of a separate storage area, when biomedical radioactive waste is produced in large volumes.

133. The authorized person of the storage facility 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.

Chapter 5: Development of Predisposal Radioactive Waste Management Facilities

Section 31: Location and Design

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

135. The effect of local conditions on operational safety and the feasibility of implementing the arrangements for security and emergency preparedness during the operational period shall be considered when selecting the site of predisposal management radioactive waste facilities. The site shall be such that the possible threats and detriments posed by the facility to its vicinity remain low.

136. In designing predisposal radioactive waste management facilities, including storage facilities, the authorized person shall take in to account the following factors:

    a. Expected inventory of radiative waste and its potential hazard;

    b. The need for operational maintenance, testing, examination and inspection;

    c. Providing sufficient capacity to process and store all such radioactive waste demanded by technological requirements of the installation or by the National Policy;

d. Minimization of waste generation;

e. In case of a small waste storage facility within a large installation the area outside should have a low public occupancy factor and should be a low traffic area;

f. Separation of the radioactive waste processing systems from other systems, as well as from the premises and facilities, where other potentially hazardous materials are stored (e.g., radioactive materials should not be store with explosive materials);

g. Providing auxiliary systems (e.g., For air sampling, radiation alarms or decontamination);

h. Compartments, to separate different kinds of waste that may be stored (e.g., To facilitate the safe storage of especially hazardous materials, such as volatile, pathogenic and putrescible materials, chemically reactive materials);

i. Providing radiological control at all stages including control over the receipt of radioactive waste and elements affecting personnel protection and protection of the working environment;

j. Providing adequate containment (e.g., Fume cupboards, drip trays, sealed and dipped work benches) and shielding (e.g., Lead or concrete blocks);

k. Establishing appropriate demarcation of the working premises according to their classification (e.g., Labels, rope or other

barriers) for area and personnel, as appropriate;

l. Maintaining radiation control (measurement of dose rates and surface contamination);

m. Arranging the location and layout of the equipment and systems in a way that provides ease of access for normal operation, reduction and control of potential contamination, maintenance and control;

n. Maintainning safe handling of radioactive waste by having appropriate handling equipment and selecting short and uncomplicated routes;

o. Providing adequate drainage and ventilation systems (e.g., By means of air filtration, air pressure differentials and flow considerations);

p. Providing normal and emergency electrical supplies when needed;

q. Establishing premises for emergency equipment;

r. Providing fire detection and protection systems; and

s. Providing physical protection and security of radioactive waste and radioactive waste management facilities.

Section 32: Construction and Commissioning

137. Predisposal radioactive waste management facilities shall be constructed in accordance with the design as described in the safety case and supporting safety assessment approved by the NRRC.

138. Commissioning of the facility shall be carried out to verify that the equipment, structures, systems and components, and the facility as a whole, performed as planned.

139. When commissioning is carried out in stages, each stage shall be reviewed and approved by the NRRC.

140. Upon the completion of commissioning, a final commissioning report shall be produced by the authorized person. The safety case shall be updated, as necessary, to reflect the as-built status of the facility and the conclusions of the commissioning report.

141. A modification of a facility with significant safety implications that requires a revision of the safety case shall be subject to the same regulatory controls and approvals as are applicable for the new facility.

Section 33: Facility Operation

142. Predisposal radioactive waste management facilities shall be operated in accordance with national regulations and with the limits, conditions and controls established by the NRRC in the authorization.

143. Operations shall be based on documented procedures. All facility-specific safety provisions and documented operating procedures that the NRRC requires must be submitted for approval. Such proce-

dures may include a programme of periodic maintenance, testing and inspection of systems that are essential to safe operation to ensure its safe performance.

144. The applicant for a license to operate a facility for predisposal management of radioactive waste shall demonstrate to the NRRC that the operation of the facility is consistent with the agreed National Policy and the legal and regulatory framework on radiation safety and safe radioactive waste management.

145. All operations and activities important to safety shall be subject to documented limits, conditions and controls, and shall be carried out by trained, qualified and competent personnel. Due consideration shall be given to the maintenance of the facility to ensure its safe performance.

Section 34: Shutdown and Decommissioning

146. At the design stage, the authorized person shall develop an initial plan for the shutdown and decommissioning of the predisposal radioactive waste management facility and shall periodically update it throughout the operational period at intervals established by the NRRC.

147. Prior to the conduct of decommissioning phase, the authorized person shall prepare and submit a final decommissioning plan to the NRRC for review and approval.

148. The final decommissioning plan shall comply with requirements specified by the NRRC. A graded approach shall be applied to the planning, conduct and completion of decommissioning.

149. The authorized person shall ensure that the release of the buildings and the site of a nuclear facility from regulatory control comply with the requirements specified by the NRRC.

Section 35: Facilities and Activities at the Time of Approval of this Regulation

150. The safety at the authorized or unauthorized facilities and activities generating or managing radioactive waste and/or disused sealed radioactive sources shall be reviewed to verify compliance to this regulation upon issuance of this regulation.

151. The authorized person shall upgrade the facilities and activities in line with the national policies for those facilities and activities that are not in compliance with all, or part, of the requirements made under this Regulation, as per agreement by the NRRC.

152. The authorized person shall develop a plan of measures to ensure the compliance with this Regulation for facilities and activities in Article 150, that shall:

a. Ensure that a detailed inventory of radioactive material, including radioactive waste and disused sealed radioactive sources is established;

b. Determine the potential risk posed by the radioactive waste or facility to individuals, society, or the environment;

c. Review the safety level to determine compliance with the requirements of this Regulation;

d. Determine measures, needed to be taken to upgrade the existing level of safety in accordance with this regulation;

e. Determine if any facilities need to be shutdown; and

f. Establish a reasonable time frame for these facilities and activities to implement the needed measures to comply with the this regulation.

Superseded by NRRC-R-16 Rev. 0.1 2024

King Fahd National Library Cataloging-in-Publication Data

L.D. no. 1443/12901
ISBN: 978-603-04-1957-9

Superseded by NRRC-R-16 Rev. 0.1 2024

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هيئة الرقابة النووية والإشعاعية
Nuclear and Radiological Regulatory Commission