Extraordinary

Federal Republic of Nigeria Official Gazette

No. 69 **Lagos—13th April, 2026** **Vol. 113**

Government Notice No. 10

The following is published as supplement to this *Gazette* :

Printed and Published by The Federal Government Press, Lagos, Nigeria
FGP 16/42026/500

Annual Subscription from 1st January, 2026 is Local : ₦85,000.00 Overseas : ₦110,500 [Surface Mail] ₦135,500.00 [Second Class Air Mail]. Present issue ₦8,500 per copy. Subscribers who wish to obtain *Gazette* after 1st January should apply to the Federal Government Printer, Lagos, for amended Subscriptions.

NUCLEAR SAFETY AND RADIATION PROTECTION ACT (CAP N142 LAWS OF THE FEDERATION OF NIGERIA)

NIGERIAN RADIOACTIVE WASTE AND SPENT NUCLEAR FUEL MANAGEMENT REGULATIONS, 2023

ARRANGEMENT OF REGULATIONS

Regulation:

S. I. No. 4 of 2026

NUCLEAR SAFETY AND RADIATION PROTECTION ACT (CAP N142 LAWS OF THE FEDERATION OF NIGERIA)

NIGERIAN RADIOACTIVE WASTE AND SPENT NUCLEAR FUEL MANAGEMENT REGULATIONS, 2023

[23*rd Day of November,* 2023] Commencement

In exercise of the powers conferred on it by section 47 of the Nuclear Safety and Radiation Protection Act, CAP N142 Laws of the Federation of Nigeria, 2004 and all other powers enabling it in that behalf, the Nigerian Nuclear Regulatory Authority, with the approval of the President, makes the following Regulations —

PART I — GENERAL

Objective

1. These Regulations sets up the basic technical and organisational requirement to be complied with by any legal person who generates or manages radioactive waste and spent nuclear fuel including disposal, in order to ensure protection of human health and environment from the hazardous effects of ionizing radiation, resulting from radioactive waste generated within Nigeria.

Scope

2.—(1) These Regulations covers the —

(*a*) requirement associated with management of any radioactive waste, including waste containing elevated levels of naturally occurring radionuclides, disused sealed radioactive sources and spent nuclear fuel; and

(*b*) management steps from generation up to and including disposal, discharge of effluent and clearance of radioactive materials.

(2) The requirement shall apply to the siting, design, construction, commissioning, operation and decommissioning of any facility for the predisposal management of radioactive waste and disposal of radioactive waste.

(3) The managements includes processing, pretreatment, treatment, conditioning, storage, transport of radioactive waste and remediation of contaminated sites.

Application

3.—(1) These Regulations shall apply in addition to the regulation on Nigeria basic ionizing radiation, the regulations on naturally occurring radioactive materials, the regulations on transportation of radioactive sources, national policy and strategy on radioactive waste and spent nuclear fuel management and any other existing regulations on ionization, radiation and nuclear.

(2) These Regulations shall apply to any—

(*a*) solid, liquid and gaseous waste with activity level above the clearance level specified in the Schedules to these Regulations; and

(*b*) facility and activity subject to registration or licensing under the Act.

Part II — Responsibilities and Administrative Measures Associated with Management of Radioactive Waste and Spent Nuclear Fuel

Responsibilities of the generator and operating organisation

4.—(1) The generator of radioactive waste, including waste from the mining and processing of radioactive ores, or operator of radioactive waste management and spent nuclear fuel management and disposal facility as the case may be, shall—

(*a*) be responsible for safety of radioactive waste or spent nuclear fuel management facility or activity;

(*b*) provide for the technical, financial and administrative management of such waste;

(*c*) carry out safety assessment and develop safety case;

(*d*) establish limits, controls, conditions and operating procedures based on the safety case, including waste acceptance criteria;

(*e*) ensure that the necessary activity for siting, design, construction, commissioning, operation, shutdown and decommissioning are carried out in compliance with the legal and regulatory requirement;

(*f*) develop, maintain and implement specific waste management plan;

(*g*) establish and implement the management system;

(*h*) maintain, track and control records for any activity in the waste management system, including an inventory of radioactive waste generated, treated, stored and disposed;

(*i*) establish and maintain a reporting system to the NNRA;

(*j*) provide adequate financial resources to safely manage and dispose the radioactive waste; and

(*k*) establish and implement a stakeholder communication programme.

(2) The generator of radioactive waste that may not decay to clearance level within one year from the time of its generation shall transfer the waste to a designated radioactive waste management facility, unless, specifically authorised by the NNRA to manage the radioactive waste on its premises.

(3) The generator of radioactive waste shall give consideration to the protection of present and future generations in accordance with the fundamental safety principles.

Integrated approach to safety and security

5.—(1) The operating organisation shall put in place security measures approved by the NNRA, including development of a safety and security culture within the staff, to prevent the unauthorised access of any individual and the unauthorised removal of radioactive material.

(2) The operating organisation shall approach safety and security in an integrated manner in the management of radioactive waste.

(3) The operating organisation shall manage radioactive waste in isolation from people and the environment to prevent hazard potential of the waste.

(4) Where there is a safety lapse and security breach that may include theft, loss, unauthorised damage, unauthorised access, or transfer of radioactive material or any malicious intent, the operating organisation shall notify—

(*a*) the relevant security services; and

(*b*) the NNRA.

(5) Notwithstanding the provisions of sub-regulation (4) of this regulation, the operating organisation shall provide the following minimum information to the NNRA within 7 days of the incident—

(*a*) circumstances of the security breach;

(*b*) steps taken or proposed to be taken to rectify the breach;

(*c*) where a radioactive source is lost or stolen, any information that may assist in the recovery of the source; and

(*d*) a written report of the incident containing the information enumerated in sub-regulation (4) of this regulation.

Inter-dependence management of radioactive waste

6.—(1) The operating organisation shall take into account the interdependence among various steps in the management of radioactive waste including any activity from the generation of radioactive waste up to disposal, to enable the safety and the effectiveness of the management of radioactive waste to be considered in an integrated manner.

(2) The operating organisation shall select the radioactive waste management elements of each step to be compatible with the other steps involved.

Management System

7.—(1) The operating organisation shall develop and implement the management system approved by the NNRA.

(2) The operating organisation shall—

(*a*) develop and maintain an accurate documentation system to cover the stages of radioactive waste management from its generation to disposal, and quality assurance programme; and

(*b*) provide for controlled approval, receipts, retention, distribution and disposition of the records important for safety in accordance with the NNRA requirements.

(3) The management system shall address the maintenance of records as required by this regulation.

(4) The operating organisation shall maintain adequate safeguard against tampering, and loss of records.

(5) An external independent audit to the operating organisation shall verify the effectiveness of the management system at a frequency approved by the NNRA to ensure that the radioactive waste management system meets specific NNRA requirements and that the implementation is adequate.

Part III — Steps in the Radioactive Waste Management Operations and Control

Radioactive waste generation and control

8. The operating organisation shall have —

(*a*) arrangement in place to identify the waste generated; and

(*b*) controls in place, to ensure that the radioactive waste generated are identified, controlled and kept to the minimum practicable.

Radioactive waste characterisation

9.—(1) The operating organisation shall characterise radioactive waste to ensure it meets the acceptance criteria for management and disposal.

(2) The characterisation process provided in sub regulation (1) of this regulation shall include—

(*a*) physical form;

(*b*) mechanical properties;

(*c*) chemical composition;

(*d*) radiological properties; and

(*e*) biological properties.

Radioactive waste classification

10.—(1) The operating organisation shall classify the final waste produced from a processing activity in accordance with the classification scheme provided in the Fifth Schedule to these Regulations.

(2) Nothwithstanding the provision of sub-regulation (1) of this regulation, premises not licensed under the Act are permitted for accumulation of radioactive waste described in the Tenth Schedule to these Regulations.

Control of radioactive discharge

11.—(1) An operating organisation shall not discharge radioactive effluents into the environment unless—

(*a*) it is in accordance with the condition given by the NNRA in the

licence and based on the dose constraints provided in the Seventh Schedule to these Regulations; and

(*b*) the resulting doses are kept as low as reasonably achievable.

(2) Prior to initiating the discharge of any radioactive effluent into the environment, the operating organisation shall—

(*a*) determine the characteristics and activity of the material to be discharged and the potential point and method of discharge;

(*b*) determine by a pre-operational study, any significant exposure pathway by which discharged radionuclides may deliver exposure;

(*c*) assess the dose likely to be incurred by the environment and public due to planned discharge; and

(*d*) submit the requisite report as contained in paragaphs (a) to (c) of this sub-regulation to the NNRA to indicate compliance with authorised established discharge limit and condition.

(3) Subject to sub-regulation (4) of this regulation, an operating organisation is exempt from the regulatory control provided in sub-regulations (1) and (2) of this regulation in respect of aqueous radioactive waste described in column 1 of Table 5 of the Sixth Schedule to these Regulations, where the operating organisation complies with the conditions in sub-regulation (5) of this regulation.

(4) An operating organisation is not exempt under sub-regulation (3) of this regulation where a generator of radioactive waste fails to minimise the quantity of radionuclides generated as waste to the extent reasonably practicable.

(5) The operating organisation, in respect to waste conditions referred to in sub-regulation (3) of this regulation, shall—

(*a*) ensure that the total amount of waste disposed off on or from the premises in a year and the quantity of radioactivity in the waste does not exceed the value specified in column 3 of Table 5 of the Sixth Schedule to these Regulations;

(*b*) dispose of the waste to a relevant sewer or waste permitted person;

(*c*) keep an adequate record of waste disposed of on or from the premises; and

(*d*) allow the NNRA access to such records or premises as the NNRA may request in order to ensure that the preceding conditions in paragraphs (a) to (c) of this sub-regulation are complied with.

(6) An operating organisation is—

(*a*) not exempt in respect of premises, where it holds authorisation for disposal of aqueous radioactive waste on or from the premises; and

(*b*) exempt from the requirements of the regulatory control in respect of aqueous radioactive waste provided in sub-regulation (7) of this regulation, where it disposes of waste in accordance with the conditions in sub-regulation (9) of this regulation.

(7) Subject to sub-regulation (8) of this regulation, the waste referred to in sub-regulation (6) of this regulation, is aqueous radioactive waste—

(*a*) which is not described in an entry in column 1 of Table 5; and

(*b*) with a total concentration of radioactivity which does not exceed 100Bq/ml.

(8) Sub-regulation (7) of this regulation shall not apply to aqueous radioactive waste—

(*a*) which a person has diluted with the intention that—

(*i*) the waste has a concentration of radioactivity which is below the value in sub-regulation (7) (b) of this regulation, or

(*ii*) the condition in sub-regulation (11)(a) or (8)(b) of this regulation is complied with in respect of the waste; and

(*b*) where the generator of the waste did not minimise the quantity of radionuclides generated as waste to the extent reasonably practicable.

(9) An operating organisation, subject to the condition referred to in sub-regulation (6) of this regulation, in respect of any other aqueous radioactive waste not provided in column 1 of Table 5 of Sixth Schedule to these Regulations, with total concentration of radioactivity which does not exceed 100 Bq/ml, shall—

(*a*) dispose the waste, subject to sub-regulation (10) of this regulation—

(*i*) directly into a relevant river or the sea,

(*ii*) to a relevant sewer, or

(*iii*) to a waste permitted person;

(*b*) keep an adequate record of the waste disposed under sub-regulation (10) of this regulation;

(*c*) in respect of the disposal of aqueous non-Table 3 waste, comply with sub-regulations (11) or (12) of this regulation as appropriate; and

(*d*) allow the NNRA access to such records or premises as the NNRA may request in order to ensure that the preceding conditions in this sub-regulation are complied with.

(10) An operating organisation shall not use the disposal routes prescribed in sub-regulation (9)(a)(i) and (ii) of this regulation in a year to dispose off aqueous non-Table 5 waste from premises, and where it uses the route in sub-regulation (9) (a)—

(*a*) (i) of this regulation, the conditions in sub-regulation (11) of this regulation shall apply; or

(*b*) (ii) of this regulation or it does not use the route in sub-regulation (9)(a)(i) or (ii) of this regulation, the conditions in sub-regulation (12) of this regulation shall apply.

(11) Where sub-regulation (10) of this regulation applies and aqueous non-table 5 waste is disposed directly into a relevant river or the sea, the operating organisation shall—

(*a*) in respect of an aqueous non-Table 5 waste which it disposes off, ensure that the concentration of radioactivity does not exceed the value specified in column 2 of Table 6 of the Eighth Schedule to these Regulations; and

(*b*) in respect of the total amount of aqueous non-Table 5 waste which it disposes off from the premises in a year, ensure that the quantity of radioactivity does not exceed the value specified in column 4 of Table 6 of the Eighth Schedule to these Regulations.

(12) Where sub-regulation (10) of this regulation applies, and the operating organisation disposes off the aqueous non-Table 5 waste to a relevant sewer or to a waste permitted person, it shall ensure that, the total quantity of radioactivity in respect of the total amount of aqueous non-Table 5 waste which is disposed off from the premises in a year, does not exceed—

(*a*) the values specified in column 2 of Table 6 of the Eighth Schedule to these Regulations, and sub-regulation (13) of this regulation ; or

(*b*) the value specified in column 2 of Table 6 of the Eighth Schedule to these Regulations, and sub-regulation (13) or (14) of this regulation.

(13) The value referred to in sub-regulation (12) (a) and (b) of this regulation is—

(*a*) 1×10^8 Bq for the sum of the following radionuclides- H-3, C-11, C-14, F-18, P-32, P-33, S-35, Ca-45, Cr-51, Fe-55, Ga-67, Sr-89, Y-90, Tc-99m, In-111, I-123, I-125, I-131, Sm-153, TI-201; and

(*b*) 1×10^6 Bq for the sum of any other radionuclides.

(14) The value referred to in sub-regulation (12)(b) of this regulation is the value specified in column 3 of Table 6 of the Eighth Schedule to these Regulations.

(15) The operating organisation is exempted from this regulation subject to sub-regulation (16) of this regulation in respect of gaseous radioactive waste where—

(*a*) the radionuclide contained in the waste is Kr-85 and the operating organisation shall—

(*i*) ensure that in respect of the total amount of such waste which is disposed off from the premises in a year, the total quantity of radioactivity shall not exceed 10^{11}Bq, and

(*ii*) comply with the conditions in sub-regulation (17) of this regulation; or

(*b*) it falls under the requirement contained in sub-regulation (16) of this regulation and the waste shall be—

(*i*) released from within a container at the time that the container is opened, and

(*ii*) emitted by solid radioactive material within the container, and the operating organisation shall comply with the condition provided in sub-regulation (17) of this regulation.

(16) Sub-regulation (15) of this regulation shall not apply to waste where the generator did not minimise the quantity of radionuclides generated as waste to the extent reasonably practicable.

(17) Sub-regulation (15) (b) of this regulation shall not apply to a gas arising from a process carried out on a contained radioactive material.

(18) The conditions referred to in sub-regulation (15) of this regulation are that the operating organisation shall—

(*a*) to the extent reasonably practicable,—

(*i*) in respect of relevant gaseous waste which arises in a building, cause the waste to be disposed by an extraction system which removes the waste from the area where it arose and which vents the waste into the atmosphere, and

(*ii*) prevent the entry or, where sub-paragraph (i) of this sub-regulation applies, the re-entry, of relevant gaseous waste into a building; and

(*b*) allow the NNRA access to such record or premises as the NNRA may request in order to determine compliance.

Clearance of materials

12.—(1) An operating organisation shall not clear any material from an authorised or unauthorised facility, activity or contaminated land unless, it is in accordance with conditions given by the NNRA in the certificate of registration or licence, or any other authorisation based on the levels prescribed in the First, Second and Third Schedules to these Regulations.

(2) The process of clearance shall be undertaken in accordance with the procedure approved by the NNRA as prescribed in the Fourth Schedule to these Regulations.

Processing of radioactive waste

13.—(1) An operating organisation shall process radioactive waste as soon as possible in order to enhance safety and produce a waste form, that fulfils the waste acceptance criteria for safe management and disposal.

(2) An operating organisation shall ensure safety during normal operation, take appropriate measures to prevent any incident or accident and make provisions to mitigate the consequences if any accident occurs in the management of radioactive waste.

(3) The waste management process shall be consistent with the type of waste, the possible need for its storage, the anticipated disposal option and limit, conditions and controls established in the safety case and in the assessment of environmental impact.

Storage of radioactive waste and spent nuclear fuel

14.—(1) An operating organisation shall provide an interim storage facility for radioactive waste and spent nuclear fuel prior to its processing, clearance, discharge or disposal.

(2) The interim storage facility shall be designed and constructed—

(*a*) on the basis of the assumed conditions for its normal operation and any assumed incident or accident; and

(*b*) for the likely period of storage to the extent practicable, with passive safety features, and the potential for degradation taken into account.

(3) Radioactive waste and spent nuclear fuel shall be stored in a manner that allows inspection, monitoring, retrieval and preservation in a condition suitable for its subsequent management, and measures shall be taken to prevent degradation of its containment.

(4) The design of the storage facility shall depend on the type of radioactive waste and spent nuclear fuel, its characteristics and radioactive inventory, which are anticipated in the period of storage.

(5) Provisions shall be made for regular monitoring, inspection and maintenance of the radioactive waste, spent nuclear fuel and storage facility to ensure the continued integrity and the storage capacity shall be reviewed periodically taking into account predicted waste and spent nuclear fuel, from normal operation to any possible incident of the expected lifetime of the storage facility.

(6) The store shall be large enough to hold the generated and anticipated radioactive waste and spent nuclear fuel in an orderly manner and keep

different categories separated, and the store design shall provide for—

(*a*) defense in depth by the provision of multiple safety function, and adequate safety margin;

(*b*) optimization of safety design;

(*c*) adequate shielding of the radioactive waste or spent nuclear fuel;

(*d*) prevention of deterioration of any waste package;

(*e*) handling and ability to retrieve any waste package;

(*f*) adequate cooling and ventilation of any waste package;

(*g*) conventional safety; and

(*h*) physical protection.

(7) The provision of the measures listed in sub-regulation (6) of this regulation shall be demonstrated in the safety case.

(8) The radioactive waste and spent nuclear fuel store shall not be located close to any corrosive, explosive or flammable material.

(9) Spent nuclear fuel and radioactive waste storage facility shall be clearly and legibly marked with the radiation warning signs and symbols.

(10) The operating organisation shall review the adequacy of the storage facility periodically to ensure the radioactive storage area is clearly demarcated and have controlled access.

(11) The radioactive waste or spent nuclear fuel storage facility shall be designed in a way that the waste or spent nuclear fuel is retrievable where necessary.

Part IV — Transfer and Transportation of Radioactive Waste and Spent Nuclear Fuel

Transfer of ownership of radioactive waste and spent nuclear fuel

15.—(1) The radioactive waste and spent nuclear fuel to be transferred to a designated radioactive waste management facility shall be prepared by the waste generator in accordance with the requirement developed by the designated radioactive waste management facility and approved by the NNRA.

(2) The operating organisation and waste generator shall provide the required information on the radioactive waste and spent nuclear fuel to the designated radioactive waste management facility prior to transfer.

(3) Where incomplete or incorrect information is given, the designated radioactive waste and spent nuclear fuel management facility shall, make the necessary investigation and report to the NNRA for instructions regarding receiving such waste and its further management.

(4) The operating organisation and waste generator shall supervise the

preparation of the radioactive waste for transportation and ensure that adequate shielding, labeling and documentation is provided.

On-site and off-site transportation

16.—(1) The operating organisation shall carry out the transportation of radioactive waste and spent nuclear fuel within an installation under the operating instruction issued by the management of the facility approved by the NNRA.

(2) The off-site transportation of radioactive waste and spent nuclear fuel shall be in accordance with the regulations on transportation of radioactive sources and any other relevant regulation.

(3) The designated radioactive waste management facility and any other consignor shall secure the necessary approval as required by the regulations on the transport of radioactive sources prior to shipment.

(4) The NNRA shall be notified at least 14 days in advance of any off-site transfer of radioactive waste, and the waste generator shall receive an acknowledgement receipt of the dispatched radioactive waste within 14 days from the designated radioactive waste management facility.

(5) Consignment of radioactive waste or spent nuclear fuel, of which acknowledgement of receipt is not received within the specified time shall be investigated by the consignor and a report prepared and submitted to the NNRA within one week after completion of the investigation but not later than 28 days after the date of shipment.

(6) Transportation of radioactive waste may be required in between the various management steps and may include on and off-site transportation, and the shipment route shall be the most direct one from the point of consignment to the central storage facility designated in the waste management plan.

(7) The consignment shall not be temporarily left anywhere other than at the designated central storage facility.

Part V — Management of Radioactive Waste and Spent Nuclear Fuel

Treatment

17.—(1) The treatment process shall be directed towards volume reduction and producing a stable waste form.

(2) The designated radioactive waste management facility and any other operator of waste management facility shall treat the radioactive waste in order to reduce its volume and facilitate further conditioning.

(3) The treatment method shall be suitably selected for the radioactive waste received depending on factors such as volume and type of the waste, the discharge requirement for liquid effluent and any additional requirement.

(4) Radioactive waste shall be treated, where necessary, to ensure that

it meets the waste acceptance criteria for the subsequent stage of waste management.

(5) The operating organisation shall prepare a detailed specification of the proposed treatment for approval by the NNRA.

(6) The operating organisation shall provide for conditioning of waste to ensure conformity to the waste acceptance criteria for the particular category of waste and waste management step.

Conditioning

18.—(1) The radioactive waste and spent nuclear fuel to be accepted for storage, transportation and disposal shall be properly conditioned by the designated radioactive waste management facility or any other authorised waste management operating organisation.

(2) Any waste package produced by a conditioning process shall be fully characterised with regard to important physical, chemical, radiological, mechanical and biological property as required in the safety case.

(3) The operating organisation shall institute arrangement within the management system to verify that the packaging, labeling and accompanying documentation accurately reflects the content of conditioned waste package received for predisposal.

Radioactive waste acceptance criteria

19.—(1) The operating organisation shall provide the waste acceptance criteria for waste package and unpacked waste accepted for processing, storage or disposal, taking into account the relevant operational limit consistent with the safety case.

(2) Any associated non-radioactive waste and potential contaminant shall be considered, taking into account that contaminant may have the potential to affect the fate and transport of radionuclides.

(3) The waste shall be in a packaged form retrievable during and at the end of the storage period.

(4) The operating organisation shall ensure that the design life of the package exceeds the design life of the radioactive waste and spent nuclear fuel stored, and describe the broad arrangement envisaged for re-packaging or re-certification of the waste package prior to the end of their design life.

(5) The operating organisation shall ensure that any special property of the package that may affect the radioactive waste are taken into account in the design of a container.

(6) The operating organisation shall prescribe how a waste package is to be checked for container breach and surface contamination, and to ensure it is consistent with the waste acceptance criteria.

(7) The operating organisation shall prescribe in detail the characteristics of any non-radiological contaminant in the waste that shall be accepted for storage and how such contaminant shall be managed to ensure safety and integrity of the waste form.

(8) The operating organisation shall take into account —

(*a*) the requirement that the container, in the event of any incident or accident, is in compliance with waste acceptance criteria;

(*b*) the storage environment such as ambient temperature and humidity, in the design of storage containers as appropriate;

(*c*) and ensure that the container is sufficiently resistant to corrosion over the duration of storage;

(*d*) and ensure that the storage container is not placed on a surface where condensation cycle may develop;

(*e*) that special precaution may be necessary for certain types of waste particularly corrosive liquid waste, such as the use of double walled container or the lining of storage room with stainless steel or other corrosion resistance;

(*f*) and ensure that liquid waste containment system is provided with collection and recovery system below the container such as secondary containment, with provision for monitoring for any leakage and in adherence with the principles of passive safety, liquid waste shall be converted to solid as early as practicable;

(*g*) and ensure that consideration is given to the dynamic and static loads resulting from handling and stacking of waste package;

(*h*) the wall thickness of the container and the filled weight of the stacking orientation at the design stage;

(*i*) and ensure that package venting is considered as part of the safety case;

(*j*) and ensure that the design of waste storage container shall facilitate monitoring to allow early detection of any failure of the containment, as appropriate such as for gas and liquid;

(*k*) and ensure that arrangements is put in place for liquid waste that may contain suspended solids or substances that may precipitate out of solution to prevent settling on the bottom of a container such as tank waste; and

(*l*) and ensure that the procedure for the reception of waste shall contain provision for safely managing the waste that fails to meet the acceptance criteria, such as taking remedial actions or returning the waste.

Part VI — Management of Sealed Sources

Return of disused sealed radiation source

20.—(1) A contract for the purchase of a radioactive source that contains radioactive material shall include a clause which permits the return of the source to the supplier and a copy of the contract shall be submitted to the NNRA before the radioactive source is imported or otherwise acquired.

(2) A licensee shall—

(*a*) inform the NNRA at least one month prior to a source being permanently taken out of use;

(*b*) where a source is unusable and is to be taken out of use, inform the NNRA within one working day; and

(*c*) make an application to the NNRA to amend the licence to continue possessing the source until it is returned to the supplier or transfered to another licensed facility.

(3) Where a sealed source is permanently taken out of use, a declaration shall be made by the licensee that the source is disused and the NNRA shall be informed of the declaration.

(4) Any sealed source that is disused and cannot be cleared in terms of these Regulations within a period of one year shall be returned to the supplier or transferred to the Waste Management Organization (WMO) or any other facility licensed to receive such sources as soon as practicable, but not later than one year from being declared to be disused.

(5) Where it is not possible to return disused sealed radiation sources to the supplier, for reasons agreed by the NNRA to be reasonable, the disused sealed source shall at the cost of the licensee be sent to the WMO or any other facility licensed to receive such sources within one year of being declared to be disused.

(6) Where a radiation source or a radioactive material, above the levels specified in the regulation on Nigeria Basic Ionizing Radiation, is identified to have no owner, the NNRA shall be notified immediately and upon being notified, the NNRA shall make arrangements for the source or material to be safely managed, recovered and transferred to the WMO.

Part VII — Disposal of Radioactive Waste

Disposal of radioactive waste

21.—(1) The operating organisation that manages radioactive waste which does not qualify for discharge into the environment, or clearance within a reasonable time shall dispose it off in an authorised disposal facility, as the case may be for aqueous specific disposal to air, provided in the Nineth Schedule to these Regulations.

(2) Radioactive waste shall be disposed off in a disposal facility licensed by the NNRA as suitable for the disposal of the type of waste.

(3) A radioactive waste disposal facility shall be developed, operated and closed in a series of steps, each supported, as necessary, by iterative evaluation of the site, option for design, construction, operation and management, performance and safety of the disposal system and each step shall be approved by the NNRA.

(4) A radioactive waste disposal facility shall be located away from significant known underground mineral, geothermal water and any other valuable resources to reduce the risk of human intrusion into the site and any potential for use of the surrounding area to be in conflict with the facility.

(5) Where it is not possible to provide sufficient assurance of separation from the accessible biosphere, owing to phenomena such as uplift, erosion and glaciations, and if the remaining activity in the waste is significant at the time, the possibility of human intrusion shall be evaluated in determining the degree of isolation provided.

(6) The operating organisation shall site, design, construct, operate and close the disposal facility in a way that safety is ensured by passive means to the extent possible and that the need for any action to be taken after the closure of the facility is minimised.

(7) The operating organisation shall put in place the institutional control approved by the NNRA following closure of the disposal facility.

(8) The host environment shall be selected and the facility designed and operated shall be engineered to ensure that safety is provided by means of multiple safety functions.

(9) Containment and isolation of the waste shall be provided by means of a number of physical barriers of the disposal system and the performance of the physical barriers shall be achieved by means of diverse physical and chemical processes with various operational controls.

(10) The capability of the individual barriers and controls with that of the overall disposal system to perform in the safety case shall be demonstrated, and the overall performance of the disposal system shall not be unduly dependent on a single safety function.

(11) The safety case shall explain and justify the function performed by each physical element and any other feature, identify the period of time over which any physical component and other features are expected to perform their various safety functions, and the alternative or additional safety functions that are available if a physical element does not fully perform or another safety function is not fulfilled.

(12) The engineered barriers, including the waste form and packaging, shall be designed, and the host environment selected, to provide containment of the waste during the period when radioactive decay has not significantly reduced the hazard posed by the waste, and in the case of heat generating waste, when the waste produces heat energy in any amount that may adversely affect the performance of the disposal system.

(13) The containment of radioactive waste implies designing the disposal facility to avoid or minimise the release of radionuclides.

(14) The release of small amount of gaseous radionuclides and small fractions of any other highly mobile specie from some types of radioactive waste may be inevitable and such release shall be demonstrated to be acceptable by means of safety assessment.

(15) The containment of radioactive waste may be provided by the characteristics of the waste form, packaging and characteristics of any other engineered component of the disposal system, host environment and geological formation.

(16) The containment capability of the waste package shall be demonstrated by means of safety assessment to be appropriate for the waste type and the overall disposal system.

(17) The disposal facility shall be sited, designed and operated to provide features that are aimed at isolation of the radioactive waste from the biosphere and humans.

(18) The features of the disposal facility shall aim to provide isolation for several hundreds of years for low level waste and at least several thousand years for intermediate and high level waste, and consideration shall be given to both the natural evolution of the disposal system and any disturbing event.

(19) The dose limit for any member of the public from dose from any planned exposure situation shall comply with the provisions in the Seventh Schedule to these Regulations, and its risk equivalent shall be considered as criteria that shall not be exceeded in the future.

(20) Where the radioactive waste contains activity levels for which the dose or risk criteria for human intrusion into such facility referred to in the Seventh Schedule to these Regulations may be exceeded, alternative disposal options shall be considered.

(21) Surveillance and control measures shall be applied in order to protect and preserve the passive safety barriers to the extent needed to fulfill the function assigned in the post closure safety case.

(22) The safety case for a disposal facility shall address both operational safety and post-closure safety.

(23) Any aspect of operation relevant to radiation safety shall be considered, including underground development work, waste emplacement, backfilling, sealing and closing operations.

(24) Consideration shall be given to both occupational exposure and public exposure resulting from normal operations, which includes operational occurrences anticipated to occur over the operating lifetime of the disposal facility and the adequacy of the design and operational features shall be evaluated.

(25) Any accident of a lesser frequency but with significant radiological consequence shall be considered with regard to both the likelihood of occurrence and the magnitude of possible radiation dose.

(26) The site for a disposal facility shall be characterised at a level of detail sufficient to support both a general understanding of the characteristics of the site, including its present condition, it's probable natural evolution, possible natural event, human plans and action that may affect the facility or its vicinity over the period of interest with regard to safety, and a specific understanding of the impact on safety of any feature, event and process associated with the site and facility.

(27) The disposal facility and its engineered barriers shall be designed to contain the waste with its associated hazard, to be physically and chemically compatible with the host geological or surface environment, and to provide post-closure safety features that complement those afforded by the host environment.

(28) The facility and its engineered components shall be designed to provide for safety during the operational period.

(29) A disposal facility shall be constructed in accordance with the design provided in the approved safety case and supporting safety assessment.

(30) A disposal facility shall be constructed to preserve the post-closure safety function of the host environment that is shown to be important by the safety case and the construction activity shall be carried out to ensure safety during the operational period.

(31) A disposal facility shall be operated in accordance with the conditions of the licence and the relevant regulatory requirements to maintain safety during the operational period, and in a manner to preserve the post-closure safety functions assumed in the safety case.

(32) Any operation and activity important to the safety of a disposal facility shall be subjected to limitations and controls and emergency plans shall be put in place, the various procedures and plans shall be documented and the documentation shall be subject to appropriate control procedures.

(33) The safety case shall address and justify both the design and the operational management arrangements that are used to ensure that the safety objective and criteria set are met.

(34) Active control of safety shall be maintained where the disposal facility is unsealed, and this may include an extended period after the emplacement of waste and before the final closure of the facility.

(35) Radioactive waste package and unpackaged waste accepted for emplacement in a disposal facility shall conform to criteria fully consistent with and derived from the safety case for the operational and post-closure safety of the disposal facility.

(36) A disposal facility shall be closed in a way that provides for the safety functions shown by the safety case to be important for the post-closure period, and plans for closure, and the transition from active management of the facility shall be well defined and practicable so that closure is carried out safely at an appropriate time.

(37) Waste intended for disposal shall be characterised to provide sufficient information to ensure compliance with waste acceptance requirements and criteria.

(38) Monitoring programme shall be carried out prior to and during the construction and operation, and after the closure of a disposal facility.

(39) The monitoring programme shall be designed to collect and update the information needed to confirm the conditions necessary for the safety of any worker, any member of the public and the protection of the environment during the operation of the facility and to confirm the absence of any condition that may reduce the post-closure safety of the facility.

(40) An appropriate level of surveillance and control shall be applied in order to protect and preserve the passive safety barriers to the extent that this is needed in order to fulfill the functions that they are assigned in the post closure safety case.

(41) The operating organisation shall prepare plans in consultation with the NNRA to address surveillance, control and the arrangement to maintain the availability of information on the disposal facility and these plans shall form part of the safety case on which the licence to close the facility is granted.

(42) The operating organisation shall conduct or commission the research and development work necessary to ensure the planned technical operations for the disposal facility is practically and safely accomplished.

(43) The operating organisation shall conduct or commission the research work necessary to investigate, understand and support the understanding of the processes on which the safety of the disposal facility depends.

(44) The operating organisation shall carry out the necessary investigation of sites and materials and assess their suitability and obtain the data necessary for the purpose of safety assessment.

(45) The operating organisation shall establish technical specifications justified by safety assessment, to ensure that the disposal facility is developed in accordance with the safety case, which includes waste acceptance criteria and any other control and limit to be applied during construction, operation and closure.

(46) The safety case shall, identify and acknowledge the unresolved uncertainties that exist at any step in the development of a disposal facility and the safety significance and approaches for their management.

Part VIII — Safety Approach to Radioactive Waste and Spent Nuclear Fuel Management

Preparation and assessment of safety measures

22. The operating organisation shall develop a safety case to justify safety during the entire life time of any facility's activity and the step-by-step approach shall provide for the collection, analysis and interpretation of the relevant technical data.

Supporting safety case assessment and documentation

23.—(1) The safety case shall include a description of how the safety aspects of the site, design, operation, shut-down, decommissioning of the facility and managerial control satisfy the regulatory requirements.

(2) The safety case and its supporting safety assessment shall demonstrate the level of protection provided and provide assurance of safety to the NNRA and any other interested party that safety requirements shall be met.

(3) The safety case and its supporting safety assessment shall be documented at a level of detail, to a quality sufficient to demonstrate safety, support the decision at each stage and allow for the independent review and approval by the NNRA.

(4) The documentation shall be clearly written and shall include argument which justifies the approach taken in the safety case on the basis of information that is traceable.

(5) The consequence of any unexpected event and process may be

explored to test the robustness of the disposal system and the resilience of the disposal system shall be assessed.

(6) Quantitative analyses shall be undertaken, at least over the period for which regulatory requirements applies.

Periodic safety review

24.—(1) The operating organisation shall carry out periodic safety review and shall implement any safety upgrade required by the NNRA following the review.

(2) The result of the periodic safety review shall be reflected in the up dated version of the safety case for the facility.

(3) The safety assessment shall be reviewed periodically to confirm that any input assumption required is adequately controlled within the overall safety management controls.

(4) The safety assessment and the management systems within which it is conducted shall be periodically reviewed at predefined intervals in accordance with NNRA regulatory requirements and in addition to such predefined periodic reviews, the safety assessment shall be reviewed and updated where there is any—

(*a*) significant change that may affect the safety of the facility or activity;

(*b*) significant development in knowledge and understanding such as development arising from research or operational experience feedback;

(*c*) emerging safety issue owing to a regulatory concern or an incident; and

(*d*) significant improvement in assessment techniques such as computer codes or input data used in the safety analysis.

Part IX — Development, Design and Operation of Radioactive Waste Management and Spent Nuclear Fuel Facility

Location and design of a facility

25.—(1) A radioactive waste management and spent nuclear fuel facility shall be designed and located to ensure safety for the expected operating lifetime under normal and possible accident condition.

(2) Suitable engineered barriers of natural or manufactured material for radioactive waste and spent nuclear fuel shall be incorporated in the design of the facility.

(3) The features to be incorporated in the design shall depend largely on the property, total inventory and any potential radiological and non-radiological hazard associated with the radioactive waste and spent nuclear fuel to be managed.

(4) A radioactive waste management facility shall be located and designed to ensure safety, operational maintenance, testing, examination and inspection for the expected operating lifetime under normal and possible accident conditions, and for the decommissioning.

Construction of radioactive waste management facility

26.—(1) Radioactive waste management and spent nuclear fuel facility shall be constructed in accordance with the design described in the safety case and approved by the NNRA.

(2) The operating organisation shall construct a facility in accordance with the approved design, including conducting any verification or test required.

Commissioning of radioactive waste management facility

27.—(1) Commissioning shall be carried out in several stages to verify that the equipment, structure, system, component, and facility, performs at optimal capacity.

(2) The commissioning of radioactive waste management facility may be carried out in the following stages and shall be subject to review and approval by the NNRA—

(*a*) completion of construction and inspection;

(*b*) installation and testing of equipment; and

(*c*) demonstration of performance during non-active and active commissioning.

(3) The operating organisation shall upon completion of commissioning—

(*a*) produce a report assessed and approved by the NNRA; and

(*b*) document the as-built status of the facility and provide information of the facility for possible future modification, shutdown and decommissioning.

(4) The operating organisation shall update the safety case, where necessary, to reflect the as-built status of the facility and the conclusions of the commissioning report.

Facility operation and closure

28.—(1) A predisposal radioactive facility shall be operated in accordance with NNRA regulations and the conditions of authorisation, operation based on approved documented procedures by the NNRA, and due consideration shall be given to the maintenance of the facility to ensure its safe performance.

(2) Emergency and response plans shall be developed by the operating organisation and subject to the approval of the NNRA.

(3) Any operation and activity important to safety shall be subject to documented limit, condition and control, and carried out by trained, qualified and competent personnel.

(4) Any facility specific safety related criteria and documented operating procedure shall be submitted to the NNRA for approval, and such procedures

may include a programme of periodic maintenance, testing and inspection of any system that is essential to safe operation.

(5) Closure and stabilisation measures provided in the safety case shall be carried out.

Shutdown and decommissioning of radioactive waste management facility

29.—(1) The operating organisation shall develop, in the design stage, an initial plan for the shut-down and decommissioning of the radioactive waste and spent nuclear fuel management facility and shall periodically update it throughout the operational period.

(2) The decommissioning of the facility shall be carried out on the basis of the final decommissioning plan as approved by the NNRA.

(3) A radioactive waste management facility shall be shut down and decommissioned in accordance with the conditions provided by the NNRA and the period between updates of the decommissioning plan shall depend on the type of facility, operational history and as defined and specified in the authorisation.

Facility accounting and control system of radioactive waste and nuclear material

30. The system of accounting for and control of nuclear material for any facility subject to any international agreement on nuclear material accounting, shall be implemented in a way that the safety of the facility is not compromised.

Existing facility

31.—(1) The operating organisation shall carry out safety upgrade of any existing facility of predisposal radioactive waste reviewed in compliance with the relevant regulations.

(2) The NNRA shall initiate where necessary any additional modification, operational restriction or shutdown if the operation is not in compliance with the relevant regulations.

(3) The safety of any existing facility shall be assessed periodically until termination of authorisation, when a significant safety modification is planned or when changes with respect to the authorised conditions happen.

(4) Where a safety requirement provided in these Regulations is not met, measures shall be put in place to upgrade the safety of the facility, economic and social factors being taken into consideration.

PART X — EMERGENCY PREPAREDNESS

Emergency preparedness

32.—(1) An operating organisation shall establish written procedure and have equipment to—

(*a*) deal with any emergency which involves radioactive waste in a facility; and

(*b*) inform the Authority without delay of any emergency in relation to radioactive waste and spent nuclear fuel.

(2) The designated radioactive waste management and spent nuclear fuel facility shall establish written procedures and have equipment available to deal with any emergency, and the NNRA may advice and assist on any emergency at a waste generator's facility whether on request or not.

PART XI — FINANCIAL ARRANGEMENTS

Funding for management of radioactive waste and spent nuclear fuel

33.—(1) The generator of radioactive waste and spent nuclear fuel, shall pay into the Radioactive Waste Management Fund (RWMF) the fees approved by the NNRA.

(2) The fees include fees for management, storage, decommissioning and disposal activities.

(3) The fund generator shall enter into an agreement with the RWMF to manage long term provisions for institutional control measures.

(4) The Fund shall be to ensure that there are sufficient provisions for the long-term management options of the various waste forms.

PART XII — MISCELLANEOUS

Right of entry and inspection

34.—(1) The NNRA shall appoint inspectors to inspect any radioactive waste and spent nuclear fuel management facility proposed to be licensed or licensed by the NNRA.

(2) An inspector shall for the purpose of the execution of this regulation,—

(*a*) enter, without hindrance at anytime, the premises of any licensee, or any other premises where he has reason to suspect that radioactive waste or spent nuclear fuel is present during the normal working hours of the facility concerned or as may be determined by the NNRA; and

(*b*) inspect, carry out tests, take samples and photographs, bring in equipment or other experts if there is reason to believe that the waste or spent nuclear fuel may endanger human health or environment.

(3) The inspector may recommend to the NNRA or management of the facility that generates or processes radioactive waste or spent nuclear fuel to shut down if the inspector believes that the safety is jeopardised.

(4) A licensee shall assist the inspector in his duties by granting him access to the facility and record.

Offences and penalties

35.—(1) A person who contravenes any of the provisions of these Regulations commits an offence and is liable on conviction to the penalties

stipulated under the Act and any other extant law or guideline made pursuant to the Act.

(2) Notwithstanding the provisions of sub-regulation (1) of this regulation, the Authority may impose any other penalty such as administrative fine, suspension, revocation of authorisation or sealing of facility or any combination of these.

Appeal

36. A person or organisation may appeal to the Governing Board of the NNRA against any decision made by the NNRA pursuant to these Regulations.

Interpretation

37. In these Regulations, —

"*the Act*" means the Nuclear Safety and Radiation Protection Act, Cap N142 Laws of the Federation of Nigeria;

"*the NNRA*" means the Nigerian Nuclear Regulatory Authority established under section 1 of the Act;

"*ALARA*" means As Low As Reasonably Achievable;

"*Annual Limit on Intake*" (ALI) means the intake of a given radionuclide in a year by reference which may result in a committed dose equal to the relevant dose limit, it is expressed in units of activity and an effective dose of 20 mSv average over five years shall not be exceeded for occupationally exposed workers and of 1mSv for members of the public;

"*authorisation*" means permission granted in a document by the NNRA to a legal person who has submitted an application to possess, produce, process, manufacture, purchase, sell, import, export, handle, use, transform, transfer, trade, assign, transport, store or dispose of radioactive material, nuclear material, radioactive waste, nuclear installation and radiation installations, prescribed substances or any apparatus emitting ionizing radiation and the authorisation may take the form of a registration or licence;

"*aqueous non-Table 5 waste*" means radioactive waste which is not described in an entry in column 1 of Table 5 in the Sixth Schedule to these Regulations;

"*clearance levels*" means a set of values, established by the NNRA and expressed in terms of activity concentration and total activity, at or below which any source of radiation may be released from regulatory control;

"*clearance*" means the removal of radioactive materials within an authorised practice from any further regulatory control by the NNRA;

"*commissioning*" means the process during which the system and component of any facility and activity, which is constructed, is made operational

and verified to be in accordance with designed specifications and meets the required performance criteria;

"*conditioning*" means the operation that produces a waste package suitable for handling, transportation, storage or disposal and shall include the conversion of waste to a solid waste form, enclosure of the waste in containers and if necessary, providing an overpack;

"*consumer product*" means an appliance or device produced, made, manufactured, refined or improved in which a small amount of radioactive substance is deliberately incorporated or induced, and which may be supplied to members of the public;

"*decommissioning*" means an administrative and technical action taken to allow the removal of the regulatory controls from a facility;

"*discharge*" means a planned and controlled release of radioactive material to the environment, usually gaseous or liquid;

"*disposal*" means the placement of waste in an approved, specified disposal facility without the intention of retrieval;

"*dose*" means the quantity of ionizing radiation in Joules absorbed, per unit mass, by any body tissue;

"*dose rate*" means, in relation to a place, the rate at which a person or part of a person shall receive a dose of ionizing radiation from external radiation if he were at that place being a dose rate at that place averaged over a period;

"*effective dose*" means the quantity E, defined as a summation of the tissue equivalent doses, each multiplied by the appropriate tissue weighting factor—

$$E = \sum_{T} W_T H_T$$

where H_T is the equivalent dose in tissue T and W_T is the tissue weighting factor for tissue T. from the definition of equivalent dose, it follows that—

$$E = \sum_{T} W_T \,.\, \sum_{R} W_R \,.\, D_{T,R}$$

where W_R is the radiation weighting factor for radiation R and D_{TR} the average absorbed dose in the organ or tissue T, the unit of effective dose is J. kg^{-1}, termed the Sievert (Sv);

"*effluent*" means gaseous or liquid radioactive materials which are discharged to the environment;

"*nuclear fuel*" means fissionable and fertile material used in a nuclear reactor to generate energy;

"*spent fuel*" means nuclear fuel removed from a reactor following irradiation, which is no longer usable in its present form due to depletion of fissile material, buildup of poison or radiation damage;

"*inspection*" means an activity carried out in a facility such as, examination, verification, observation, surveillance, measurement or test undertaken by the NNRA to assess any structure, system, component, materials, operational activity, technical process, organisational process, procedure and personnel competence;

"*inspector*" means a staff of NNRA or any other person or group of persons assigned by the NNRA to carry out inspection;

"*legal person*" means an individual, public, private, or government corporation, joint stock company, industry, partnership, co-partnership, firm, association, trust, estate, public or private institution, group, government agency, department or bureau of the state, or political subdivision, and any legal subsidiary, successor, representative, agent, or agency of the foregoing, or any other legal entity;

"*licence*" means an authorisation granted by the NNRA on the basis of a safety assessment and accompanied by specific requirement and condition to be complied with by the licensee;

"*luminised article*" means an article which is made wholly or partly from a luminescent substance in the form of a film or a paint which is radioactive material or radioactive waste solely because it contains Pm-147 or H-3, and is not a sealed source;

"*operating organisation*" means the organisation or its contractors which undertakes any activity and facility subject to authorisation;

"*operator*" means a natural person who operates the controls of a nuclear or radiation installation or facility;

"*practice*" means work which involves —

(*i*) the production, processing, handling, use, holding, storage, transport or disposal of radioactive materials, or

(*ii*) the operation of any electrical equipment which emits ionizing radiation and contains components that operates at a potential difference of more than 5 kilovolts, that shall increase the exposure of any individual and any other specie in the environment to radiation;

"*pretreatment*" means any of the operation prior to waste treatment, such as collection, segregation, chemical adjustment and decontamination;

"*radioactive discharge*" means any radioactive material discharged as gas, aerosol, liquid or solid to the environment from a source within any activity generally with the purpose of dilution and dispersion;

"*radioactive material*" means any material containing radionuclides which above certain concentration is subject to provisions of the regulations on basic ionizing radiation;

"*radioactive waste*" means material, of any physical form, remaining from a practice or intervention and for which no further use is foreseen that—

(*i*) contains or is contaminated with radioactive materials and has an activity or activity concentration higher than the level for exemption or clearance from regulatory requirements, and

(*ii*) may give rise to exposure which is not excluded from these Regulations;

"*Radioactive Waste Management Fund*" means the fund established by government with contributions from waste generators to make provisions for long-term management options of the various waste forms;

"*radioactive waste management*" means any activity, administrative and operational, that is involved in the handling, pretreatment, treatment, conditioning, transport, storage and disposal of radioactive waste;

"*relevant gaseous waste*" means waste which is described in regulation 11(15) of these Regulations and disposed under the exemption in the regulation;

"*relevant sewer*" means a public sewer or a disposal main which leads to a sewage disposal works that—

(*i*) has the capacity to handle a minimum of 100m^3 of effluent per day, and

(*ii*) discharges treated effluent to the sea or to a relevant river, public sewer, disposal main, sewage disposal works and effluent;

"*safety case*" means a collection of argument and evidence in support of the safety of a facility or activity, this may include the findings of a safety assessment, and information, including supporting evidence and reasoning, on the robustness and reliability of the safety assessment and the assumptions made;

"*safety assessment*" means a review of the aspects of design and operation of a radiation or nuclear installation which is relevant to the protection of a person and an environment from ionizing radiation or the safety of the installation, including the analysis of the provisions for safety and protection established in the design, operation of the installations, the analysis of risks associated with normal conditions and any accident situation;

"*sealed source*" means a radiation source containing any radioactive material whose structure is such as to prevent, under normal conditions of use, any dispersion of radioactive material;

"*segregation*" means an activity where waste, radioactive material and exempt waste are sorted or kept separate according to radiological, chemical or physical properties which shall facilitate waste handling or processing;

"*treatment*" means the operation intended to benefit safety and economy by changing the characteristics of radioactive waste;

"*waste management*" means any activity, administrative and operational, that is involved in the handling, pretreatment, treatment, conditioning, transport, storage and disposal of radioactive waste;

"*waste acceptance criteria*" means quantitative or qualitative criterion specified by the NNRA, or an operator and approved by the NNRA for radioactive waste to be accepted by the operator of a waste management facility, storage facility and repository for disposal; and

"*waste management organisation*" means an independent body established by the government responsible for the management of radioactive waste in Nigeria.

Citation

38. These Regulations may be cited as the Nigerian Radioactive Waste Management and Spent Nuclear Fuel Regulations, 2023.

SCHEDULES

First Schedule

[*Regulation* 12(1)]

Waste Clearance

1. Waste may be released into the atmosphere, discharged into public sewer system, incinerated in a municipal incinerator or sent for municipal landfill where the conditions provided in this Schedule are satisfied.

2. Conditions of gaseous waste

(1) A waste generator or the designated radioactive waste management facility may discharge gaseous waste in quantities not exceeding 10 ALImin per year directly into the atmosphere.

(2) Table 1 of the Second Schedule to these Regulations gives the numerical values of ALImin for the most frequently used radionuclides.

(3) If the waste contains more than one radionuclide, the highest permitted activity shall be calculated in accordance with the equation (1) of this Schedule—

$$\sum \frac{A_k}{ALI_{mink}} < 10 \quad \ldots\ldots (1)$$

where A_k is the activity of radionuclide. $ALI_{min.}$ values are in Table 1 for radionuclide k.

3. Conditions of liquid waste

(1) A waste generator or the designated radioactive waste management facility may discharge liquid waste into a local sewer if the total activity does not exceed 1 ALImin per month and 0.1 ALImin or 5 MBq, whichever is less, per individual discharge.

(2) If the waste contains more than one radionuclide the highest permitted activity shall be calculated in accordance with equation (2) of this Schedule—

$$\sum \frac{Ak}{ALI\ mink} < 1 \quad \ldots\ldots (2)$$

the total activity, shall not exceed 100 MBq per month.

4. Condition of solid waste

(1) A waste generator or the designated radioactive waste management facility may dispose in a local landfill the waste containing a total activity not greater than 1 ALImin per month and the maximum activity in waste package shall not exceed 0.1 ALImin or 5MBq.

(2) If the waste contains more than one radionuclide the highest activity shall be calculated in accordance with equation (3) and for the activity in one individual package, equation (3) of this Schedule shall apply—

$$\sum \frac{Ak}{ALI\ m} < 0,1 \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

(4) For unconditional clearance of solid materials containing the relevant radionuclides from licensed facility, derived values in Table 2 of the Third Schedule to these Regulations shall be complied with.

(5) Where a single value of the clearance level is required by the NNRA, the log-mean values for each category shall be used as representative clearance level values as indicated in column 3 of Table 2 of the Third Schedule to these Regulations.

(6) The dose rate at the surface of the package to be sent to a municipal incinerator or landfill shall not exceed 5 µGy/h.

(7) Where a waste package is sent to a municipal incinerator or landfill, it shall carry the following marking—

(*a*) "this waste package is exempted from nuclear control according to the Radiation Waste management Regulations";

(*b*) name and address of sender; and

(*c*) signature of sender.

(8) The record of discharged exempt waste shall be established by the waste generator and kept for at least 3 years and the record shall be available for inspection by the Authority.

5. MATERIALS FROM NUCLEAR FUEL CYCLE INSTALLATIONS

For unconditional clearance of any material containing radionuclides from nuclear fuel cycle installations, the activity concentration and surface contamination levels in Table 3 of the Fourth Schedule to these Regulations or lower shall be complied with.

[*Regulation* 12(1)]

VALUES OF ALImin FOR CERTAIN COMMON RADIONUCLIDES

Table 1

Nuclides	**ALImin(Bq)**	**Nuclides**	**ALImin(Bq)**
^{3}H eau	3×10^{9}	^{85m}Sr	8×10^{9}
^{14}C	3×10^{8}	^{85m}Sr	6×10^{7}
^{18}F	2×10^{9}	^{87m}Sr	1×10^{9}
^{22}Na	2×10^{7}	^{89}Sr	5×10^{6}
^{24}Na	1×10^{8}	^{90}Sr	1×10^{5}
^{32}P	1×10^{7}	^{90}Y	2×10^{7}
^{36}CI	9×10^{6}	^{99m}Tc	3×10^{9}
^{38}CI	6×10^{8}	^{99}Mo	2×10^{8}
^{42}K	2×10^{8}	^{113}In	2×10^{9}
^{43}K	2×10^{8}	^{124}Sb	1×10^{8}
^{45}Ca	3×10^{7}	^{123}I	1×10^{8}
^{47}Ca	7×10^{8}	^{125}I	1×10^{6}
^{51}Cr	3×10^{7}	^{129}I	2×10^{5}
^{52}Mn	1×10^{9}	^{130}I	1×10^{7}
^{52m}Mn	3×10^{7}	^{131}I	1×10^{6}
^{54}Mn	2×10^{8}	^{132}I	1×10^{8}
^{56}Mn	3×10	^{109}Cd	1×10^{6}
^{52}Fe	7×10^{7}	^{115}Cd	3×10^{7}
^{55}Fe	1×10^{7}	^{111}In	2×10^{8}
^{59}Fe	7×10^{6}	^{129}Cs	9×10^{7}
^{56}Co	2×10^{7}	^{130}Cs	2×10^{9}
^{57}Co	3×10^{7}	^{131}Cs	8×10^{8}
^{58}Co	1×10^{6}	^{134}Cs	3×10^{6}
^{60}Co	1×10^{8}	^{134m}Cs	4×10^{9}
^{63}Ni	4×10^{8}	^{137}Cs	4×10^{6}
^{64}Cu	2×10^{8}	^{131}Ba	1×10^{8}
^{67}Cu	5×10^{7}	^{133m}Ba	9×10^{7}
^{62}Zn	1×10^{7}	^{135m}Ba	1×10^{8}
^{65}Zn	2×10^{8}	^{140}La	2×10^{7}
^{69m}Zn	3×10^{7}	^{169}Yb	2×10^{7}
^{67}Ga	6×10^{8}	^{192}Ir	8×10^{6}
^{68}Ga	8×10^{8}	^{198}Au	4×10^{7}
^{73}As	8×10^{7}	^{197}Hg	2×10^{8}
^{74}As	6×10^{7}	^{203}Hg	2×10^{7}
^{75}Se	1×10^{8}	^{201}TI	2×10^{8}
^{76}Br	6×10^{8}	^{204}TI	7×10^{7}
^{77}Br	1×10^{8}	^{210}Pb	9×10^{3}
^{82}Br	9×10^{9}	^{212}Pb	1×10^{6}
^{81m}Rb	1×10^{9}	^{210}Po	2×10^{4}
^{81}Rb	2×10^{7}	^{226}Ra	2×10^{4}
^{86}Rb	7×10^{8}	^{232}Th	4×10^{1}

Nuclides	ALImin(Bq)	Nuclides	ALImin(Bq)
^{88}Rb	1×10^{9}	^{238}U	2×10^{3}
^{89}Rb	4×10^{2}	^{241}Am	2×10^{2}
^{244}Cm		^{252}Cf	1×10^{3}

THIRD SCHEDULE

[*Regulation* 12(1)]

DERIVED UNCONDITIONAL CLEARANCE LEVELS

Table 2

Ranges of activity concentration (Bq/g)	**Radionuclides**			**Representative single values of activity concentration (Bq/g)**
0.1	Na-22	Cs-134	U-234	
	Na-24	Cs-137	U-235	
	Mn-54	Eu-152	U-238	
	Co-60	Pb-210	Np-237	
	Zn-65	Ra-226	Pu-239	
	Nb-94	Ra-228	Pu-240	0.3
	Ag-110m	Th-228	Am-241	
	Sb-124	Th-230	Cm-244	
		Th-232		
< 1.0				
≥ 1.0				
	Co-58	In-111		
	Fe-59	I-131		
	Sr-90	Ir-192		3
	Ru-106	Au-198		
		Po-210		
< 10				
≥ 10				
	Cr-51			
	Co-57	I-129		
	Tc-99m	Ce-144		30
	I-123	T1-201		
	I-125	Pu-241		
< 100				
≥ 100				
	C-14	Sr-89		
	P-32	Y-90		300
	C1-36	Tc-99		
	Fe-55	Cd-109		
< 1000				
≥ 1000				
	H-3	Ni-63		
	S-35	Pm-147		3000
	Ca-45			
< 10,000				

FOURTH SCHEDULE

[*Regulation* 12(2)]

CLEARANCE LEVELS FOR RADIONUCLIDES ACTIVITY CONCENTRATION AND SURFACE CONTAMINATION

Table 3

Radionuclide	**(Bq/g)**	**(Bq/cm²)**
H-3	1×10^4	1×10^4
C-14	1×10^3	1×10^3
Na-22	3×10^0	1×10^1
Na-24	2×10^0	1×10^1
P-32	1×10^4	3×10^2
S-35	2×10^5	1×10^3
Cl-36	2×10^4	4×10^2
Ca-45	7×10^4	6×10^2
Cr-51	2×10^2	1×10^3
Mn-54	7×10^0	4×10^1
Fe-55	2×10^5	1×10^4
Fe-59	5×10^0	4×10^1
Co-57	5×10^1	3×10^2
Co-58	6×10^0	5×10^1
Co-60	2×10^0	1×10^1
Ni-63	1×10^5	2×10^4
Zn-65	1×10^1	7×10^1
Sr-89	1×10^4	4×10^2
Sr-90	2×10^3	1×10^2
Y-90	7×10^3	4×10^2
Nb-94	4×10^0	2×10^1
Tc-99m	8 x 10'	5×10^2
Tc-99	6×10^4	6×10^2
Ru-106	3×10^1	1×10^2
Ag-110m	2 x 10°	1×10^1
Cd-109	9×10^2	4×10^2
In-111	2×10^1	1×10^2
1-123	5×10^1	3×10^2
1-125	5×10^1	5×10^2
1-129	8×10^2	7×10^1
1-131	2×10^1	1×10^2
Sb-124	3 x 10°	2×10^1
Cs-134	4 x 10°	2×10^1
Cs-137	1×10^1	4×10^1
Ce- 144	1×10^2	2×10^2
Pm-147	1×10^4	7×10^2

FIFTH SCHEDULE

[*Regulation* 10]

RADIOACTIVE WASTE CLASSIFICATION SCHEME

TABLE 4

S/N	CLASSIFICATION	DESCRIPTION	LIMITS	DISPOSAL TECHNIC
1.	Exempt Radioactive Waste (ERW)	(1) Waste that contains such small concentrations of radionuclides that do not require provisions for radiation protection, irrespective of whether the waste is disposed of in conventional landfills or recycled. (2) The exemption activity concentrations and exempt activities of radionuclides are specified. (3) Such material is exempt from regulatory control and does not require any further consideration from a regulatory control perspective. (4) Liquid or gaseous effluents discharged to the environment under appropriate regulatory control is exempt waste, where discharged material requires no further consideration from the perspective of radiation protection and safety.	0.4 Bq/g	Discharge to the environment
2.	Very short lived Radioactive waste (VSLRW)	(1) Waste that may be stored for decay over a few years and subsequently exempted from regulatory control according to arrangements approved by the relevant regulatory authority, for uncontrolled disposal, use or discharge. (2) This class includes waste containing primarily short lived radionuclides such as waste from industrial, medical and research.	(1) Radio-nuclides with $t_{1/2} < 50$ days. (2) Clearance level < 1yr. (3) Activity < 10 MBq.	
3.	Very low level radioactive waste (VLLRW)	(1) Waste that is low in activity concentration and contains some long lived radionuclides. (2) It does not require a high level of containment and radiation protection provisions is required while the waste is being processed.	(1) 400 KBq/ 0.1m^3 With $t_{1/2} < 30$. (2) 40 KBq single/4 MBq bulk waste form. (3) Fourth Schedule to these Regulat-ions is applicable.	Ordinary Re-fuse dump (near-surface, industrial or commercial landfill-type facility

S/N	CLASSIFICATION	DESCRIPTION	LIMITS	DISPOSAL TECHNIC
		(3)Its activity concentration does not exceed one hundred times clearance levels for each of the radionuclides concerned. (4)For convenience, waste with activity concentrations in the region of, or below, clearance levels is sometimes processed with VLLRW. (5)VLLRW often exists in large volumes, is mainly generated during the operational, decommissioning and dismantling stages of a nuclear facility and includes concrete, soil rubble and ^{14}C, ^{3}H.		
4.	Low level radioactive waste (LLRW)	(1)Waste which contains higher activity concentrations than VLLRW with a limit on the concentration of long lived radionuclides. (2)It requires robust isolation and containment from the biosphere for a few hundred years and is suitable for disposal in engineered near surface disposal facilities. (3) This class covers a very broad range of materials that may include short-lived radionuclides at higher activity levels and long lived radionuclides at relatively low activity concentration. (4) LLRW may be stored initially (interim storage) in steel drums.	(1) Radionuclides with $t_{1/2} > 30$ years. (2) 4 GBq/te of α. (3) 12 GBq/te of β and γ (4) Fourth Schedule to these Regulations is applicable.	(1)Controlled land fills. (2) Surface trenches above local water level. (3)disposal in engineered near-surface disposal facilities
5.	Intermediate level radioactive waste (ILRW)	(1)Waste which contains long lived radionuclides, and requires a greater degree of containment and isolation. (2) ILRW needs little or no provision for heat dissipation during its storage and disposal. (3)ILRW may contain long lived radionuclides that may not decay to an activity concentration that is acceptable for near surface disposal during the time for which control of disposal site may	Limits > LLW	(1) Encase in cement inside steel drum. (2) Deep geological repository.

S/N	CLASSIFICATION	DESCRIPTION	LIMITS	DISPOSAL TECHNIC
		be relied upon such as resins, claddings, leaches chemicals, sludge, activated reactor component or as may be applicable.		
6.	High level radioactive waste (HLRW)	(1)High level radioactive waste, with thermal power above 2 kW/m^3. (2)Waste with activity concentration levels high enough to generate significant quantities of heat by the radioactive decay process or waste with large amounts of long lived radionuclides that needs to be considered in the design of a disposal facility for waste such as spent-fuel. (3) HLRW may be stored under water near reactor. (4) Liquid HLRW may also be stored in tanks to solidified or vitrified as borosilicate.	Limits > LLW	Deep stable geological repository

SIXTH SCHEDULE

[*Regulations* 11(3),(5)(a),(9) *and* 37.]

RADIOACTIVE WASTE : VALUES OF QUANTITIES AND CONCENTRATION

Table 5

Radioactive waste	**Maximum concentration of radionuclides**	**Maximum quantity of radioactivity to be disposed of in the period stated**
Solid waste with no single item > $4x10^4$ Bq	$4x10^5$ Bq for the sum of all radionuclides per $0.1m^3$	$2x10^8$ Bq/year
Solid waste containing tritium (^3H) and carbon – 14 (^{14}C) with no single item >$4x10^5$ Bq	$4x10^6$ Bq for the sum of ^{14}C and ^3H per $0.1m^3$	$2x10^9$ Bq/year
Individual seal sources	$2x10^5$ Bq for the sum of all radionuclides per $0.1m^3$	$1x10^7$ Bq/year
Individual seal sources which are solely radioactive waste because they contain ^3H	$2x10^{10}$ Bq of ^3H per $0.1m^3$	$1x10^{13}$ Bq/year
Luminised articles with no single item containing > $8x10^7$ Bq of ^{147}Pm or $4x10^9$ Bq of ^3H	$8x10^7$ Bq of ^{147}Pm per $0.1m^3$ or $4x10^9$ Bq per $0.1m^3$ for ^3H	$2x10^9$ Bq/year of ^{147}Pm or $1x10^{11}$ Bq/year of ^3H
Solid radioactive waste which consist of magnesium alloy, thoriated tungsten or dross from harder alloy in which the thorium concentration does not exceed 4% by mass	No limit	0.5Kg of uranium or thorium per week
Aqueous liquid uranium or thorium compound	No limit	0.5Kg of uranium or thorium per week
Aqueous liquid human excreta	No limit	$1x10^{10}$ Bq/year of ^{99m}Tc and $5x10^9$ Bq/year for the sum of all other radionuclides

SEVENTH SCHEDULE

[*Regulations* 11(1)(a),21(19) *and* (20).]

RADIATION DOSE LIMITATION

1. The dose—

(*a*) limit for any member of the public for a dose from any planned exposure situation is an effective dose of 1 mSv in a year;

(*b*) and its risk equivalent are criteria that shall not be exceeded; and

(*c*) constraint for an individual facility is 0.3 mSv in a year.

2. A disposal facility, considered as a single source, shall in compliance with the dose limit, be designed in a way that the calculated dose or risk to the representative person who may be exposed in the future as a result of possible natural processes affecting the disposal facility shall not exceed a dose constraint of 0.3 mSv in a year or a risk constraint of the order of 1 in 10,000 per year.

3. Natural processes include the range of conditions anticipated over the lifetime of the facility and events that may occur with a lesser likelihood, but extremely low probability event is outside the scope of consideration.

4. Risk due to the disposal facility in the context of paragraph 3 of this Schedule shall be understood as the probability of fatal cancer or serious hereditary effects.

5. In relation to the effects of inadvertent human intrusion after closure, if such intrusion is expected to lead to an annual dose of less than 1 mSv to those living around the site, the efforts to reduce the probability of intrusion or to limit its consequences are not warranted.

6. If human intrusions are expected to lead to a possible annual dose of more than 20 mSv to those living around the site, the alternative options for waste disposal shall be considered, such as, disposal of the waste below the surface, or separation of the radionuclide content giving rise to the higher dose.

7. If annual doses in the range 1-20 mSv are indicated, the reasonable efforts are warranted at the stage of development of the facility to reduce the probability of intrusion or to limit its consequences by means of optimization of the facility's design.

8. Similar considerations to those provided in this Schedule shall apply where, the relevant thresholds for deterministic effects in organs may be exceeded.

EIGHTH SCHEDULE

[*Regulation* 11(11)(a),(12)(a),(b) *and* (14).]

AQUEOUS RADIOACTIVE WASTE VALUES

Table 6

Radionuclide	Concentration in Bq/litre	Maximum annual quantity of radionuclides to a relevant sewer (Bq/year)	Maximum annual quantity of radionuclides directly into a relevant river or the sea (Bq/year)
H-3	10^3	10^{10}	10^{10}
Be-7	1	10^7	10^7
C-14	0.1	10^6	10^6
F-18	0.1	10^6	10^6
Na-24	1	10^7	10^7
Si-31	10	10^8	10^8
P-32	0.001	10^4	10^4
P-33	0.001	10^4	10^4
S-35	10	3×10^7	10^8
Cl-36	10	10^7	10^8
Cl-38	0.1	10^6	10^6
K-42	0.01	10^5	10^5
K-43	0.01	10^5	10^5
Ca-45	1	10^7	10^7
Ca-47	0.1	10^6	10^6
Sc-46	0.001	10^4	10^4
Sc-47	0.01	10^5	10^5
Sc-48	0.001	10^4	10^4
V-48	1	10^7	10^7
Cr-51	10	10^8	10^8
Mn-51	0.001	10^4	10^8
Mn-52	0.001	10^4	10^4
Mn-52m	0.001	10^4	10^4
Mn-53	1	10^7	10^7
Mn-54	0.01	10^5	10^5
Mn-56	0.001	10^4	10^4
Fe-52	0.01	10^5	10^5
Fe-55	1	10^7	10^7
Fe-59	0.01	10^5	10^5
Co-55	0.001	10^4	10^4
Co-56	0.001	10^4	10^4
Co-57	0.1	10^6	10^6
Co-58	0.1	10^6	10^6
Co-58m	1	10^7	10^7
Co-60	0.01	10^5	10^5
Co-60m	1	10^7	10^7

Radionuclide	Concentration in Bq/litre	Maximum annual quantity of radionuclides to a relevant sewer (Bq/year)	Maximum annual quantity of radionuclides directly into a relevant river or the sea (Bq/year)
Co-61	0.1	10^6	10^6
Co-62m	0.001	10^4	10^4
Ni-59	1	10^7	10^7
Ni-63	10^2	10^9	10^9
Ni-65	0.01	10^5	10^5
Cu-64	0.1	10^6	10^6
Zn-65	0.1	3×10^5	10^6
Zn-69	10	10^8	10^8
Zn-69m	0.1	10^6	10^6
Ga-67	0.1	10^6	10^6
Ga-72	0.001	10^4	10^4
Ge-71	1	10^7	10^7
As-73	10	10^8	10^8
As-74	1	10^7	10^7
As-76	1	10^7	10^7
As-77	1	10^7	10^7
Se-75	0.1	3×10^5	10^6
Br-82	0.1	10^6	10^6
Rb-86	0.1	10^6	10^6
Sr-85	0.1	10^6	10^6
Sr-85m	0.1	10^6	10^6
Sr-87m	0.1	10^6	10^6
Sr-89	1	10^7	10^7
Sr-90+	0.1	3×10^5	10^6
Sr-91	0.01	10^5	10^5
Sr-92	0.01	10^5	10^5
Y-90	1	10^7	10^7
Y-91	1	10^7	10^7
Y-91m	0.01	10^5	10^5
Y-92	0.1	10^6	10^6
Y-93	0.1	10^6	10^6
Zr-93	10	10^8	10^8
Zr-95+	0.001	10^4	10^4
Zr-97	0.01	10^5	10^5
Nb-93m	10	10^8	10^8

Radionuclide	Concentration in Bq/litre	Maximum annual quantity of radionuclides to a relevant sewer (Bq/year)	Maximum annual quantity of radionuclides directly into a relevant river or the sea (Bq/year)
Nb-94	0.1	10^6	10^6
Nb-95	1	10^7	10^7
Nb-97	1	10^7	10^7
Nb-98	0.1	10^6	10^6
Mo-90	0.1	10^6	10^6
Mo-93	1	10^7	10^7
Mo-99	0.1	10^6	10^6
Mo-101	0.01	10^5	10^5
Tc-96	1	10^7	10^7
Tc-96m	10^2	10^9	10^9
Tc-97	10^2	10^9	10^9
Tc-97m	10	10^8	10^8
Tc-99	10	10^7	10^8
Tc-99m	10	3×10^7	10^8
Ru-97	0.01	10^5	10^5
Ru-103	0.01	10^5	10^5
Ru-105	0.01	10^5	10^5
Ru-106+	0.1	10^6	10^6
Rh-103m	10	10^8	10^8
Rh-105	1	10^7	10^7
Pd-103	0.1	10^6	10^6
Pd-109	0.1	10^6	10^6
Ag-105	1	10^7	10^7
Ag-108m	0.1	10^6	10^6
Ag-110m	0.1	10^6	10^6
Ag-111	10	10^8	10^8
Cd-109	1	10^7	10^7
Cd-115	0.1	10^6	10^6
Cd-115m	1	10^7	10^7
In-111	0.01	10^5	10^5
In-113m	0.01	10^5	10^5
In-114m	0.01	10^5	10^5
In-115m	0.01	10^5	10^5
Sn-113	0.1	10^6	10^6
Sn-125	0.01	10^5	10^5

Radionuclide	Concentration in Bq/litre	Maximum annual quantity of radionuclides to a relevant sewer (Bq/year)	Maximum annual quantity of radionuclides directly into a relevant river or the sea (Bq/year)
Sb-122	0.1	10^6	10^6
Sb-124	0.1	10^6	10^6
Sb-125	1	10^7	10^7
Te-123m	1	10^7	10^7
Te-125m	1	10^7	10^7
Te-127	10	10^8	10^8
Te-127m	1	10^7	10^7
Te-129	10	10^8	10^8
Te-129m	1	10^7	10^7
Te-131	1	10^7	10^7
Te-131m	1	10^7	10^7
Te-132	0.1	10^6	10^6
Te-133	1	10^7	10^7
Te-133m	1	10^7	10^7
Te-134	1	10^7	10^7
I-123	1	10^7	10^7
I-125	1	10^7	10^7
I-126	0.1	10^6	10^6
I-129	0.1	10^6	10^6
I-130	0.1	10^6	10^6
I-131	0.1	10^6	10^6
I-132	0.1	10^6	10^6
I-133	0.1	10^6	10^6
I-134	0.1	10^6	10^6
I-135	0.1	10^6	10^6
Cs-129	0.01	10^5	10^5
Cs-131	0.1	10^6	10^6
Cs-132	0.01	10^5	10^5
Cs-134	0.01	10^5	10^5
Cs-134m	0.1	10^6	10^6
Cs-135	0.1	10^6	10^6
Cs-136	0.001	10^4	10^4
Cs-137+	0.01	10^5	10^5
Cs-138	0.001	10^4	10^4

Radionuclide	Concentration in Bq/litre	Maximum annual quantity of radionuclides to a relevant sewer (Bq/year)	Maximum annual quantity of radionuclides directly into a relevant river or the sea (Bq/year)
Ba-131	0.1	10^6	10^6
Ba-140	0.1	10^6	10^6
La-140	0.001	10^4	10^4
Ce-139	0.1	10^6	10^6
Ce-141	0.1	10^6	10^6
Ce-143	0.01	10^5	10^5
Ce-144	0.1	10^6	10^6
Pr-142	0.1	10^6	10^6
Pr-143	10	10^8	10^8
Nd-147	0.01	10^5	10^5
Nd-149	0.01	10^5	10^5
Pm-147	10	10^8	10^8
Pm-149	1	10^7	10^7
Sm-151	10^2	10^9	10^9
Sm-153	0.1	10^6	10^6
Eu-152	0.01	10^5	10^5
Eu-152m	0.01	10^5	10^5
Eu-154	0.01	10^5	10^5
Eu-155	0.1	10^6	10^6
Gd-153	0.1	10^6	10^6
Gd-159	0.1	10^6	10^6
Tb-160	0.01	10^5	10^5
Dy-165	0.1	10^6	10^6
Dy-166	0.1	10^6	10^6
Ho-166	0.1	10^6	10^6
Er-169	10	10^8	10^8
Er-171	0.01	10^5	10^5
Tm-170	1	10^7	10^7
Tm-171	10	10^8	10^8
Yb-175	0.1	10^6	10^6
Lu-177	0.1	10^6	10^6
Hf-181	0.01	10^5	10^5
Ta-182	0.001	10^4	10^4
W-181	0.1	10^6	10^6

Radionuclide	Concentration in Bq/litre	Maximum annual quantity of radionuclides to a relevant sewer (Bq/year)	Maximum annual quantity of radionuclides directly into a relevant river or the sea (Bq/year)
W-185	1	10^7	10^7
W-187	0.01	10^5	10^5
Re-186	1	10^7	10^7
Re-188	1	10^7	10^7
Os-185	0.01	10^5	10^5
Os-191	0.1	10^6	10^6
Os-191m	1	10^7	10^7
Os-193	0.1	10^6	10^6
Ir-190	0.001	10^4	10^4
Ir-192	0.01	10^5	10^5
Ir-194	0.1	10^6	10^6
Pt-191	0.01	10^5	10^5
Pt-193m	1	10^7	10^7
Pt-197	0.1	10^6	10^6
Pt-197m	0.1	10^6	10^6
Au-198	1	10^7	10^7
Au-199	1	10^7	10^7
Hg-197	1	10^7	10^7
Hg-197m	0.1	10^6	10^6
Hg-203	0.1	10^6	10^6
Tl-200	0.01	10^5	10^5
Tl-201	0.1	10^6	10^6
Tl-202	0.01	10^5	10^5
Tl-204	0.1	10^6	10^6
Pb-203	0.01	10^5	10^5
Pb-210	0.001	10^4	10^4
Pb-212	0.1	10^6	10^6
Bi-206	0.01	10^5	10^5
Bi-207	0.1	10^6	10^6
Bi-210	10	10^8	10^8
Bi-212	1	10^7	10^7
Po-203	0.001	10^4	10^4
Po-205	0.001	10^4	10^4
Po-207	0.001	10^4	10^4

Radionuclide	Concentration in Bq/litre	Maximum annual quantity of radionuclides to a relevant sewer (Bq/year)	Maximum annual quantity of radionuclides directly into a relevant river or the sea (Bq/year)
Po-210	0.001	10^4	10^4
At-211	1	10^7	10^7
Ra-223	0.01	10^5	10^5
Ra-224+	0.01	10^5	10^5
Ra-225	0.01	10^5	10^5
Ra-226+	0.01	10^5	10^5
Ra-227	1	10^7	10^7
Ra-228	0.01	10^5	10^5
Ac-227	0.1	10^6	10^6
Ac-228	0.001	10^4	10^4
Th-226	0.1	10^6	10^6
Th-227	0.01	10^5	10^5
Th-228	1	10^7	10^7
Th-229	0.01	10^5	10^5
Th-230	1	10^7	10^7
Th-231	0.1	10^6	10^6
Th-232	1	10^6	10^6
Th-234	0.1	10^6	10^6
Pa-230	0.01	10^5	10^5
Pa-231	0.01	10^5	10^5
Pa-233	0.1	10^6	10^6
U-230	0.1	10^6	10^6
U-231	10	10^8	10^8
U-232	0.1	10^6	10^6
U-233	0.1	10^6	10^6
U-234	0.1	10^6	10^6
U-235+	0.1	10^6	10^6
U-236	0.1	10^6	10^6
U-237	10	10^8	10^8
U-238+	0.1	10^6	10^6
U-239	10	10^8	10^8
U-240	10	10^8	10^8
Np-237	0.1	10^6	10^6
Np-239	1	10^7	10^7

Radionuclide	Concentration in Bq/litre	Maximum annual quantity of radionuclides to a relevant sewer (Bq/year)	Maximum annual quantity of radionuclides directly into a relevant river or the sea (Bq/year)
Np-240	0.1	10^6	10^6
Pu-234	0.01	10^5	10^5
Pu-235	0.01	10^5	10^5
Pu-236	1	10^7	10^7
Pu-237	0.1	10^6	10^6
Pu-238	0.1	10^6	10^6
Pu-239	0.1	10^6	10^6
Pu-240	0.1	10^6	10^6
Pu-241	10	10^8	10^8
Pu-242	0.1	10^6	10^6
Pu-243	0.1	10^6	10^6
Pu-244	0.1	10^6	10^6
Am-241	0.1	10^6	10^6
Am-242	0.1	10^6	10^6
Am-242m	0.1	10^6	10^6
Am-243	0.1	10^6	10^6
Cm-242	1	10^7	10^7
Cm-243	0.1	10^6	10^6
Cm-244	0.1	10^6	10^6
Cm-245	0.01	10^5	10^5
Cm-246	0.1	10^6	10^6
Cm-247	0.01	10^5	10^5
Cm-248	0.1	10^6	10^6
Bk-249	10^2	10^9	10^9
Cf-246	1	10^7	10^7
Cf-248	1	10^7	10^7
Cf-249	0.01	10^5	10^5
Cf-250	0.1	10^6	10^6
Cf-251	0.01	10^5	10^5
Cf-252	0.1	10^6	10^6
Cf-253	10	10^8	10^8
Cf-254	0.0001	10^3	10^3
Es-253	1	10^7	10^7
Es-254	0.1	10^6	10^6
Es-254m	0.01	10^5	10^5
Fm-254	1	10^7	10^7

Radionuclide	Concentration in Bq/litre	Maximum annual quantity of radionuclides to a relevant sewer (Bq/year)	Maximum annual quantity of radionuclides directly into a relevant river or the sea (Bq/year)
Fm-255	0.1	10^6	10^6
Any other radionuclide that is not of natural terrestrial or cosmic origin	0.0001 or that concentration which gives rise to a dose to a member of the public of 10 microsieverts per year calculated in accordance with the methodology used to calculate other concentrations in this table.	10^3 or that quantity which corresponds to $3000m^3$ of aqueous radioactive waste up to the appropriate concentration as calculated in accordance with column 2 of this table.	10^3 or that quantity which corresponds to $1000m^3$ of aqueous radioactive waste up to the appropriate concentration as calculated in accordance with column 2 of this table.

NINETH SCHEDULE

[*Regulation* 21(1)]

AQUEOUS SPECIFIC DISPOSAL TO AIR

Table 7

Specific waste type	**Disposal outlet reference**	**Source**	**Radionuclides or group of nuclides**	**Annual limits**
Gaseous waste	Group A	Such stacks or outlets as approved by the NNRA and associate with discharge from any minor facility engaged completely or principally in operational work on the part of the premises license under the Act.	α – emitters	5 KBq
			^{3}H	9 GBq
Gaseous waste	Group B	Such stacks or outlets as approved by the NNRA and associate with discharges from any minor facility engaged completely or principally in operational work on the part of the premises not licenced under the Act.	^{3}H	1 GBq

TENTH SCHEDULE

[*Regulation* 10(2)]

ACCUMULATION OF RADIOACTIVE WASTE

Premises not licenced under the Act are permitted for accumulation of radioactive waste.

Table 8

Specific waste type	**Radionuclides or group of nuclides**	**Activity limit**	**Volume limit**	**Period limit**
Liquid waste	α – emitters	1 MBq	$200m^3$	1 year
	β and γ	1 MBq		
	^3H	0.5 GBq		
Solid waste	α – emitters	1 GBq	$200m^3$	2 years
	β and γ	1 GBq		
	^3H	5 GBq		

MADE at Abuja this 23*rd day of November*, 2023

BOLA AHMED TINUBU, GCFR
President, Federal Republic of Nigeria