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NUCLEAR SAFETY AND RADIATION PROTECTION ACT
(1995 No. 19)

NIGERIAN URANIUM EXPLORATION, MINING AND PROCESSING REGULATIONS, 2021

ARRANGEMENT OF REGULATIONS

Regulations :

S. I. No. 16 of 2021

NUCLEAR SAFETY AND RADIATION PROTECTION ACT (1995 No. 19)

NIGERIAN URANIUM EXPLORATION, MINING AND PROCESSING REGULATIONS, 2021

[11*th Day of January*, 2021] Commencement.

In exercise of the powers conferred on it by section 47 of the Nuclear Safety and Radiation Protection Act 1995 and of 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

1. The objectives of these Regulations is to set up the basic technical and administrative requirement to be complied with by uranium and thorium mining, milling and processing operators in order to limit, to a reasonable level and in a manner that is consistent with Nigeria's international obligations, the risks to national security, the health and safety of persons and environment that are associated with exploration, mining and processing of uranium and other radioactive minerals.

2.—(1) These Regulations covers the— Scope.

(*a*) requirements for control and monitoring of radiation exposure and the management of radioactive wastes associated with exploring, mining, production, refinement, conversion, processing, reprocessing, management, storage of uranium and other radioactive minerals ; and

(*b*) use and disclosure and restricting the disclosure of prescribed information and safeguard requirements for accounting and auditing of quantities of radioactive minerals processed and handled.

(2) Naturally Occurring Radioactive Materials (NORM) are not covered by these Regulations.

3.—(1) These Regulations shall apply to— Application.

(*a*) all uranium and other radioactive minerals in whatever form with activity levels above the clearance levels as prescribed by the Authority ;

(*b*) all operators in the exploration, mining, milling and processing of uranium and other radioactive ores and whosoever is subject to registration or licensing under these Regulations ;

(*c*) other mining and mineral processing operations that have the potential to produce significant occupational radiation exposures, or to generate waste having the potential to cause a significant increase in the radiological

exposure of members of the public or the environment and which would therefore require specific management ;

(*d*) the control of occupational and public radiation exposures, and the management of radioactive waste generated, at all stages of mining and mineral processing from exploration to final site rehabilitation ; and

(*e*) new operations, those established prior to its implementation, operations which are temporarily suspended, and such others as designated by the Authority.

(2) The other mining and minerals processing operations referred to in sub regulation (1) (*c*) of this regulation may include—

(*a*) the mining and processing of other minerals that adventitiously contain uranium or thorium or their decay products ; and

(*b*) processes which lead to the production of waste not usually regarded as radioactive, but which contains naturally occurring radionuclides.

(3) These Regulations shall not apply to the management of introduced radioactive sources used for process control, analysis or investigative purposes, or x-ray apparatus that might be used in an operation to which these Regulations applies.

(4) The provisions of these Regulations shall apply, in addition to the Nigeria Basic Ionizing Radiation Regulations 2003 (NIBIRR), the Nigerian Radioactive Waste Management Regulations 2006, the Nigerian Naturally Occurring Radioactive Materials (NORM) Regulations 2008 and any other existing ionizing radiation and nuclear regulations and any transport regulations in force at the commencement of these Regulations.

Radiation standards.

4.—(1) A licensee shall not conduct operations, use, or transfer ores in a manner that a member of the public will receive an Annual Effective Dose of 1mSv or Effective Dose 1mSv or from all licensed sources.

(2) Every licensee under these Regulations shall comply with radiation protection standards set out in the Nigeria Basic Ionizing Radiation Regulations, 2003.

(3) Doses from indoor radon and its progeny shall not be included in Effective Dose calculations.

(4) Use, transfer or disposal of waste shall be done in such a way as to prevent accumulation of radon in residential structures, schools and other public buildings in concentrations exceeding 0.15 Bq/l.

(5) A person shall not dispose or release ores for unrestricted use in such a manner that the reasonably maximally exposed individual will receive an

Annual Effective Dose in excess of 0.25mSv/yr or Effective Dose of 0.25mSv excluding natural background.

PART II—RESPONSIBILITIES AND ADMINISTRATIVE MEASURES

Responsibilities of operator or licensee.

5.—(1) An operator or licensee shall—

(*a*) ensure that the workplace and work procedures are designed, constructed, and operated so as to keep exposures to ionizing radiation as low as reasonably achievable, economic and social factors being taken into account, and below the limits set in the First Schedule to these Regulations ;

(*b*) ensure that waste is managed by means of best practicable technology, and that exposures to ionizing radiation resulting from waste are as low as reasonably achievable, economic and social factors being taken into account ;

(*c*) obtain all necessary approvals and authorisations from the Authority prior to commencing the operational aspects to which they apply ;

(*d*) ensure that appropriate expertise in the fields of radiation protection and radioactive waste management is available, and appoint a Radiation Safety Officer (RSO) who has qualifications and experience acceptable to the Authority ;

(*e*) ensure that sufficient resources are available to allow the requirements of the Radiation Management Plan ((RMP) and the Radiation Waste Management Plan (RWMP) to be fully implemented ;

(*f*) notify the Authority promptly of any changes in operation, or operating conditions or other matters which are likely to significantly increase radiation exposures to workers or members of the public, or requirements for the management of radioactive waste, and which are not provided for in approvals or authorisations ;

(*g*) report any unauthorised effluent discharges to the Authority ;

(*h*) investigate promptly any defect, due to design or malfunction discovered in plant equipment or working procedures which is likely to significantly increase radiation exposures to workers or members of the public, or endanger the security of waste management facilities, and record the results of such an investigation ;

(*i*) ensure that any defect referred to in paragraph (*h*) of this regulation is promptly remedied, and the situation resulting from the defect is brought under control ;

(*j*) undertake ongoing reviews of the Radiation Management Plan (RMP) and Radioactive Waste Management Plan (RWMP) as determined by the Authority ;

(*k*) ensure that all employees upon commencing work, are properly instructed in the radiation aspects of their work, and in the precautions necessary to control their exposure to radiation, to avoid radiation accidents, and that reinstruction of employees is undertaken at appropriate intervals ;

(*l*) ensure that employees are properly supervised in the performance of their work to ensure that they act in accordance with approvals and authorisations, and the requirements of these Regulations ;

(*m*) keep records of results of all measurements, monitoring and assessments required by these Regulations or by approvals or authorisations ;

(*n*) provide employees with copies of their dose records on request, and at termination of their employment ;

(*o*) encourage employees to inform the employer when they are pregnant, and when so informed, take steps to limit the exposure of the foetus ;

(*p*) forward to the Authority the following—

(*i*) a general description of and information specifying the location of nuclear fuel cycle-related research and development activities not involving nuclear material,

(*ii*) a general description of each building on each site including a map of the site, its use and, if not apparent from that description, its contents,

(*iii*) information identified by the Authority on the basis of expected gains in effectiveness or efficiency and agreed to by the applicant on operational activities of safeguards relevance at facilities and at locations outside facilities where nuclear material is customarily used,

(*iv*) information specifying the location, operational status and the estimated annual production capacity of uranium mines and concentration plants and thorium concentration plants, and the current annual production of such mines and concentration plants, and

(*v*) information regarding source material which has not reached the composition and purity suitable for fuel fabrication or for being isotopically enriched.

(2) The operator shall provide, upon request by the Authority, current annual production of an individual mine or concentration plant pursuant to sub regulation (1) (*p*) (*iv*) of this regulation.

(3) The information referred to in sub regulation (1) (*p*) (*v*) of this regulation shall include—

(*a*) the quantities, the chemical composition , the use or intended use of such material whether in nuclear or non nuclear use for each location at

which the material is present in quantities exceeding ten metric tons of uranium or twenty metric tons of thorium and for other locations with quantities of more than one metric ton ;

(*b*) the quantities, chemical composition and destination of each export of such material for specifically non-nuclear purposes in quantities exceeding—

(*i*) ten metric tons of uranium, or for successive exports for uranium from Nigeria to the same state, each of less than ten metric tons, but exceeding a total of ten metric tons for the year, and

(*ii*) twenty metric tons of thorium, or for successive exports of thorium from Nigeria to the same state, each of less than twenty metric tons but exceeding a total of twenty metric tons for the year ; and

(*c*) information regarding—

(*i*) the quantities, uses and locations of nuclear material exempted from safeguards,

(*ii*) the quantities and uses at each location of nuclear exempted from but not yet in a non-nuclear end –use form in quantities exceeding set out,

(*iii*) the location or further processing of intermediate or high level waste containing plutonium, high enriched uranium or uranium-233 on which safeguard has been terminated, and

(*iv*) general plans for the succeeding ten year period relevant to the development of the nuclear fuel cycle, including planned nuclear fuel cycle related research and development activities.

Employees.

6.—(1) Employees who may be exposed to radiation, or perform duties which may affect the radiation exposure of others, to the extent to which they are capable, shall comply with all reasonable measures to control and assess exposure to radiation, or to manage radioactive waste.

(2) The employee shall—

(*a*) follow radiation protection and waste management practices specified in approvals or authorisations, and other regulatory requirements ;

(*b*) comply with the legitimate instructions of the employer, or the employer's agents ;

(*c*) participate in training programs required under these Regulations, and make proper use of such training ;

(*d*) construct and operate all facilities in accordance with the approved RMP and RWMP, and any other requirements of these Regulations ;

(*e*) make proper use of plant and equipment supplied for radiation protection, or for the monitoring or assessment of radiation exposures ;

(*f*) not engage in any careless or reckless action which might result in unnecessary radiation exposure to themselves or others, or compromise the management of radioactive waste ;

(*g*) report to the employer any defects of which they are aware, in plant equipment or procedures, which may compromise radiation protection or the management of radioactive waste ;

(*h*) report all incidents or accidents to the employer ; and

(*i*) advise the employer of previous employment involving occupational exposure to radiation, and cooperate in obtaining records of such previous exposure.

(3) Female employees shall notify their employer when they are pregnant.

Licence applications.

7.—(1) No person shall mine, mill, process or handle any ore mineral or other material from which any one or more of the prescribed substances can be extracted, without obtaining a licence from the Authority and except in accordance with the terms and conditions of such licence.

(2) Any person already engaged in mining, milling, processing or handling of prescribed substances before the coming into force of these Regulations, shall within a period of 90 days from the date of commencement of these Regulations, make an application in the prescribed form to the Authority for the issuance of the requisite licence.

(3) The person referred to in sub regulation (2) of this regulation may continue the operations until the Authority takes a decision on his application and thereafter shall abide by the decisions.

(4) Prior to the commencement of any stage of an operation to which these Regulations apply, the operator must obtain approval for the Radiation Management Plan and the Radioactive Waste Management Plan appropriate for the proposed activities at that stage.

(5) An operator shall not commence construction of any part of a mine, processing plant or waste management facility to which these regulations apply without an authorisation from the Authority.

(6) An operator shall not commence operation of any part of a mine, processing plant or waste management facility to which these Regulations apply without an authorisation from the Authority.

(7) An operator shall not commence decommissioning or rehabilitation of any part of a mine, processing plant or waste management facility to which these regulations apply without an authorisation from the Authority.

(8) The Authority shall be informed of any proposal for significant changes to an operation to which an approved Radiation Management Plan or Radioactive Waste Management Plan applies.

(9) The Authority may, on receipt of the information referred to in sub regulation (8) of this regulation, direct that a new Radiation Management Plan or Radioactive Waste Management Plan or part thereof shall be submitted, and that those changes shall not be brought into operation without authorisation.

(10) The operator shall review the Radiation Management Plan and the Radioactive Waste Management Plan, and submit any revised plans for approval, at intervals determined by the Authority.

(11) Radioactive material, above exemption limits defined by the Authority, shall not be removed from or brought into any operation to which these Regulations apply without authorisation from the Authority.

(12) An applicant shall pay the fees as prescribed by the Authority.

(13) The licensee shall comply with all limits and conditions specified in the licence including the amounts and characteristics of waste which may be generated, treated, conditioned and stored, and any specific radiation protection and physical security measures.

(14) Any licence issued under this regulation shall be—

(*a*) valid for such a period as the Authority may determine ;

(*b*) renewable by the Authority if the licensee complies with the licence conditions ; and

(*c*) subject to supervision or revocation as notified in writing if in the view of the Authority, the licensee has failed to comply with licence conditions.

Radiation Management Plan

8.—(1) Before the commencement of any stage of an operation to which these Regulations apply, a Radiation Management Plan (RMP) for that stage shall be developed and presented to the Authority for approval.

(2) The RMP shall have a description of the operations to which it applies and the measures that are intended to be taken to control the exposure of employees and members of the public to radiation at or from the practice including—

(*a*) demonstrated access to appropriate professional expertise in radiation protection ;

(*b*) a plan for monitoring radiation exposure and for assessing the doses received by exposed employees ;

(*c*) the provision of appropriate equipment, staffing, facilities and operational procedures ;

(*d*) details of induction and training courses ;

(*e*) record keeping and reporting ;

(*f*) a plan for dealing with incidents, accidents and emergencies involving exposure to radiation ; and

(*g*) a system of periodic assessment and review of the adequacy and effectiveness of procedures instituted under the RMP to ensure currency and to facilitate a process of continual improvement.

Radioactive Waste Management Plan

9.—(1) A Radioactive Waste Management Plan (RWMP) shall be developed to provide for the proper management of radioactive waste arising from the operations.

(2) Before the commencement of any stage of an operation, a RWMP for that stage shall be presented to the Authority for approval.

(3) The Radioactive Waste Management Plan shall provide for the proper management of radioactive waste arising from the operation and shall include—

(*a*) an outline of the processes generating waste, and a description of the waste generated ;

(*b*) a description of the environment into which the waste will be discharged or disposed, including the baseline radiological characteristics ;

(*c*) a description of the proposed system for waste management including the facilities and procedures involved in the handling, treatment, storage and disposal of radioactive waste ;

(*d*) prediction of environmental concentrations of radionuclides and radiation doses to people from the proposed waste management practices, including demonstration that the radiation protection requirements of these Regulations shall be met, both now and in the future, as determined by the Authority ;

(*e*) a program for monitoring the concentration of radionuclides in the environment and assessment of radiation doses to members of the public arising from the waste management practices ;

(*f*) contingency plans for dealing with accidental releases, or circumstances which might lead to uncontrolled releases of radioactive waste, to the environment ;

(*g*) a schedule for reporting on the operation and results of monitoring and assessments required by this plan ;

(*h*) a plan for decommissioning the operation and the associated waste management facilities and rehabilitating the site ; and

(*i*) a system of periodic assessment and review of the adequacy and effectiveness of procedures instituted under the Radioactive Waste Management Plan

PART III—REPORTING TO THE AUTHORITY

Reporting.

10.—(1) A licensee shall prepare and maintain an inventory of existing and anticipated radioactive material containing radionuclide with half-lives above 50 days and an activity greater than 10MBq.

(2) A record of the inventory shall be submitted to the Authority annually and whenever any significant changes in radioactive material amount or characteristics occur.

(3) The inventory shall have information on important physical, chemical and radiological characteristics in addition to the quantity of radioactive material.

(4) The radioactive material inventory shall be submitted in the format stipulated by the Authority.

(5) Every licensee shall report to the Authority after its occurrence becomes known to him, any lost, stolen or missing radioactive material and the circumstances under which such an occurrence took place.

(6) Within 48 hours after such occurrence, the licensee shall make a written report with a description of the radioactive material involved, quantity, its probable disposition, the circumstance under which the loss occurred, and actions that have been taken.

(7) Every licensee shall immediately report to the Authority any event involving radioactive material possessed by the licensee that may have caused or threatens to cause the release of radioactive material, inside or outside of a restricted area, so that an individual could have received an intake in excess of one occupational annual limit on intake as specified in the Second Schedule to these Regulations.

(8) The Licensee shall submit to the Authority by the end of each year a report that specifies details of quantities and type of—

(*a*) the exempt waste disposal at a municipal landfill, discharged into the public sewage system or to the atmosphere ;

(*b*) the effluents discharge into the environment within authorized release limits ;

(*c*) the radioactive material in storage ; and

(*d*) the radioactive material dispatched.

Emergency Preparedness.

11.—(1) A licensee, shall establish written procedure and have equipment to—

(*a*) deal with any emergency involving radioactive material at his facility ; and

(*b*) inform the Authority without delay of any emergency in relation to radioactive material.

(2) A licensee shall establish written procedures and have equipment available to deal with emergencies involving transport of radioactive material and fulfill the requirements set by the Nigerian Transport of Radioactive Material Regulations, 2006.

PART IV—INSPECTION AND ENFORCEMENT

Right of Entry and Inspection.

12.—(1) Any person appointed by the Authority as an Inspector to control the safety of radioactive material management may enter at any reasonable time the premises of any licensee, and any other premises where he has reason to suspect that radioactive material is present, to—

(*a*) carry out inspections and tests ;

(*b*) take samples and photographs ; and

(*c*) bring in equipment or other experts,

if he has a reason to believe the waste may endanger human health or environment.

(2) The inspector may recommend to the Authority and to the management of the facility that generates or process radioactive material to shut down if he believes that safety is jeopardized.

(3) Every licensee shall assist an inspector in the discharge of his duties.

PART V—MISCELLANEOUS

Offences and Penalties.

13.—(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 guidelines made pursuant to the Act.

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

Appeals.

14. Any person or organization may appeal to Governing board of the Authority against any decision made by the Authority pursuant to these Regulations.

SECOND SCHEDULE

[*regulation* 10 (7)]

WASTE CLEARANCE

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

1. GASEOUS WASTE

(1) Each waste generator or the Designated Radioactive Waste Management Facility may discharge gaseous waste in quantities not exceeding 10 ALI_{min} per year directly into the atmosphere. The Table provided in yhis schedule give the numerical values of ALI_{min} for the most frequently used radionuclides.

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

$$E\frac{A_k}{ALI_{mink}} < 10 \quad \text{.....(1)}$$

Where A_k is the activity of radionuclide. ALI_{min} values are in Table AI for radionuclide k

2. LIQUID WASTE

(1) Each 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 ALI_{min} per month and 0.1 ALI_{min} or 5MBq, which ever 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 (1)

$$E\frac{A_k}{ALI_{mink}} < 1 \quad \text{.....(2)}$$

The total activity, however, must not exceed 100MBq per month.

3. SOLID WASTE

(1) Each 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. The maximum activity in waste package shall not exceed 0.1 ALI_{min} or 5MBq.

(2) If the waste contains more than one radionuclide the highest activity shall be calculated in accordance with equation (1). For the activity in one individual package, equation (3) shall apply—

$$E\frac{A_k}{ALI_m} < 0.1 \quad \text{.....(3)}$$

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

(4) When 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 and radiological control according to the Radiation Waste Management Regulations" ;

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

(*c*) signature of sender.

(5) Records of discharged exempt waste shall be established by the waste generator and kept for at least 3 years, the records shall be available for inspection by the Authority.

TABLE A1. VALUES OF ALI_{min} FOR CERTAIN COMMON RADIONUCLIDES

Nuclides	ALI_{min} (*Bq*)	*Nuclides*	ALI_{min} (*Bq*)
^{3}H eau	3×10^{9}	^{85m}Sr	8×10^{9}
^{14}C	3×10^{8}	^{85}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}Cl	9×10^{6}	^{99m}Tc	3×10^{9}
^{38}Cl	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	3×10^{7}	^{125}I	1×10^{6}
^{51}Cr	7×10^{8}	^{129}I	2×10^{5}
^{52}Mn	3×10^{7}	^{130}I	1×10^{7}
^{52m}Mn	1×10^{9}	^{131}I	1×10^{6}
^{54}Mn	3×10^{7}	^{132}I	1×10^{8}
^{56}Mn	2×10^{8}	^{109}Cd	1×10^{6}
^{52}Fe	3×10	^{115}Cd	3×10^{7}
^{55}Fe	7×10^{7}	^{111}In	2×10^{8}
^{59}Fe	1×10^{7}	^{129}Cs	9×10^{7}
^{56}Co	7×10^{6}	^{130}Cs	2×10^{9}
^{57}Co	2×10^{7}	^{131}Cs	8×10^{8}
^{58}Co	3×10^{7}	^{134}Cs	3×10^{6}
^{60}Co	1×10^{6}	^{134m}Cs	4×10^{9}
^{63}Ni	1×10^{8}	^{137}Cs	4×10^{6}
^{64}Cu	4×10^{8}	^{131}Ba	1×10^{8}
^{67}Cu	2×10^{8}	^{133m}Ba	9×10^{7}

^{62}Zn	5×10^{7}	^{135m}Ba	1×10^{8}
^{65}Zn	1×10^{7}	^{140}La	2×10^{7}
^{69m}Zn	2×10^{8}	^{169}Yb	2×10^{7}
^{67}Ga	3×10^{7}	^{192}Ir	8×10^{6}
^{68}Ga	6×10^{8}	^{198}Au	4×10^{7}
^{73}As	8×10^{8}	^{197}Hg	2×10^{8}
^{71}As	8×10^{7}	^{203}Hg	2×10^{7}
^{75}Se	6×10^{7}	^{201}Tl	2×10^{8}
^{76}Br	1×10^{8}	^{204}Tl	7×10^{7}
^{77}Br	6×10^{8}	^{210}Pb	9×10^{3}
^{82}Br	1×10^{8}	^{212}Pb	1×10^{6}
^{81m}Rb	9×10^{9}	^{210}Po	2×10^{4}
^{81}Rb	1×10^{9}	^{226}Ra	2×10^{4}
^{86}Rb	2×10^{7}	^{232}Th	4×10^{1}
^{88}Rb	7×10^{8}	^{238}U	2×10^{3}
^{89}Rb	1×10^{9}	^{241}Am	2×10^{2}
^{244}Cm	4×10^{2}	^{252}Cf	1×10^{3}

MADE in Abuja this 11th day of January, 2021.

MUHAMMADU BUHARI
President of the Federal Republic of Nigeria
and Minister of Petroleum Resources