NIGERIAN NUCLEAR REGULATORY AUTHORITY (NNRA)

NIGERIA NATURALLY OCCURRING RADIOACTIVE MATERIALS (NORM) REGULATIONS

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, hereby makes the following Regulations-

Part I General

1. Objective

The objective of these Regulations is to establish radiation protection standards for the generation, possession, use, transfer, and disposal of Naturally Occurring Radioactive Materials (NORM) in order to ensure the protection of human health and environment from the hazards associated with NORM in Nigeria.

2. Scope

These regulations shall –

a. apply to any person who generates, possesses, uses, transfers, or disposes of NORM.

b. the regulations address the introduction of NORM into products in which neither the NORM nor the radiation emitted from the NORM is considered to be beneficial to the products.

c. apply to the manufacture and distribution of products containing NORM in which the NORM or its emitted radiation is considered to be a beneficial attribute.

d. not apply to radionuclides defined as source under the Nuclear Safety and Radiation Protection Act of 1995. It is understood that radioactive waste in any concentration regulated by the Nigerian Nuclear Regulatory Authority are not subject to this regulations.

3. Definitions.

In these regulations - the following definitions apply:

"**Authority**" means the Nigerian Nuclear Regulatory Authority;

"**beneficial attribute**" or "**beneficial to the product**" means the radioactivity of the product is necessary to the use of the product;

"**consumer products**" means appliance or device produced, made, manufactured, refined, or beneficiated in which a small amount of radioactive substance has been deliberately incorporated or induced, and which can be supplied to members of the public;

"**containment**" means methods or physical structures that prevent the dispersion of radionuclides;

"**contamination**" means the presence of radioactive substances in or on a material or in the human body or other place where they are undesirable or could be harmful;

"**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:

$$E = \sum_T W_T \cdot \sum_R W_R \cdot D_{T,R}$$

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

"**exempt waste**" means any waste that is released from nuclear regulatory control in accordance with clearance levels because the associated radiological hazard are negligible. The designation should be in terms of activity concentration and/or total activity and may include a specification of the type, chemical/physical from, mass or volume of waste, and its potential use;

"**external radiation**" means, in relation to a person, ionizing radiation coming from outside the body of that person;

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

"**exempt**" means a designation for sources of radiation that are not subject to nuclear regulatory control because they present such a low radiological hazard;

"**exposure**" means irradiation of people or materials. Exposure can either be external exposure from sources outside the body or internal exposure from sources outside the body or internal exposure from sources inside the body;

"**decontamination**" means the removal or reduction of radioactive contamination by a physical and/or chemical process;

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

"**general environment**" means the total terrestrial, atmospheric, and aquatic environments outside the site boundary within which any activity, operation, or process authorized by a general or specific license issued under this Part is performed;

"**institutional control**" means control of a waste site by the authority or an institution designated under regulations;

"**licence**" means an authorization granted by the Authority on the basis of a safety assessment and accompanied by specific requirements and conditions to be complied with by the licensee;

"**monitoring**" means the measurement of radiation or radionuclides for reasons related to the assessment or control of exposure and the interpretation of such measurements;

"**Naturally Occurring Radioactive Material (NORM)**" means naturally occurring materials not regulated under the Authority whose radionuclide concentrations have been increased by or as a result of human practices. NORM does not include the natural radioactivity of rocks or soils, or background radiation, but instead refers to materials whose radioactivity is enhanced by controllable practices (or by past human practices);

"**notification**" means a document submitted to the regulatory authority by a legal person to notify an intention to carry out a practice or any other action described in the general obligations for practices of the standards;

"**product**" means something produced, made, manufactured, refined, or beneficiated;

"**probabilistic analysis**" means a statistical method for studying the expected behaviour of a system defined by parameters, events and features whose values are represented by a statistical distribution;

"**quality assurance**" means all those planned and systematic actions necessary to provide adequate confidence that an item, process or service will satisfy given requirements for quality, for example, those specified in the license;

"**quality control**" means action which provides means to control and measure the characteristics of an item, process, facility or person in accordance with quality assurance requirements;

"**radiation protection"** means measures associated with limitation of the harmful effects of ionizing radiation on people, such as limitation of external exposure to such radiation, limitation of incorporation of radionuclides as well as the prophylactic limitation of injury resulting from either of these;

"r**adionuclide**" means a nucleus (of an atom) that possess properties of spontaneous disintegration (radioactivity). Nuclei are distinguished by their mass and atomic number;

"**requirement**" means a condition defined as necessary to be met by a product, material or process;

"**safety analysis**" means the evaluation of the potential hazards associated with the implementation of a proposed activity;

"**safety criteria**" means safety conditions on which a decision or judgment can be based as set by the authority;

"**shielding**" means a material interposed between a source of radiation and persons, or equipment or other objects, in order to absorb radiation and thereby reduce radiation exposure;

"**source**" means any physical entity that may cause radiation exposure, for example by emitting ionizing radiation or releasing radioactive material;

"**storage**" means the placement of waste in a facility where isolation, environmental protection and human control are provided with the intent that the waste will be retrieved for exemption or processing and/or disposal at a later time;

"**transport**" means, in relation to NORM, carriage of substance on a road within the meaning of, or through another public place, whether on a conveyance or not, or by rail, inland waterway, sea or air and, in the case of transport on a conveyance NORM shall be deemed as being transported from the time that it is loaded onto the conveyance for the purpose of transporting it until it is unloaded from that conveyance, but NORM shall not be considered as being transported if -

(a) it is transported by means of a pipeline or similar means; or

(b) it forms an integral part of a conveyance and is used in connection with the operation of that conveyance;

"**treatment**" means the operations intended to benefit safety and/or economy by changing the characteristics of waste. Three basic treatment objectives are:
(a) volume reduction
(b) removal of radionuclides from the waste
(c) change of composition.
After treatment, the waste may or may not be immobilized to achieve an appropriate waste form;

"**unrestricted use**" means a designation, by the authority that enables the use of equipment, materials, buildings or the site without radiological restriction;

4. Exemptions

(1). a. persons who generate, receive, own, possess, use, process, transfer, distribute, and dispose of NORM are exempted from the requirements of these regulations if the materials contain or are contaminated at concentrations less than 1 Bq/g of uranium or thorium series radionuclides.

b. purposeful dilution to render NORM exempt shall not be allowed.

(2). A Person who receives products or materials containing NORM distributed in accordance with a specific license issued by the Authority pursuant to these Regulations is exempted from these Regulations with regard to those products or materials.

5. Standards for Radiation Protection for NORM

(1). A person licensed under regulations 9 or 10 of these Regulations shall notconduct operations, use or transfer NORM in a manner such that a member of the public will receive an annual Effective Dose in excess of 1 mSv/yr from all licensed sources including NORM.

(2). A Person subject to a license 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). The use, transfer or disposal of NORM shall be done in such a way as to prevent accumulation of radon in residential structures, schools and other public buildings in concentrations exceeding 0.2 Bq/l and 1.0 Bq/l.

(5). No person shall dispose or release NORM for unrestricted use in such a manner that the reasonably maximally exposed individual will receive an annual Effective Dose in excess of 0.25 mSv/yr, excluding natural background.

6. Protection of Workers During Operations.

A licensee under these Regulations shall conduct operations in compliance with the standards for radiation protection set out in the Nigeria Basic Ionizing Radiation Regulations 2003 except for the release of radioactivity in effluents, which shall be governed by the other relevant Regulations and disposal, which shall be governed by Article 8 of these Regulations.

7. Release for Unrestricted Use

Each person subject to a license under these regulations shall -

(a). Ensure that facilities and equipment contaminated with NORM in excess of the levels set forth in Appendix A of these Regulations:

i. shall not be transferred or released for unrestricted use; or

ii. shall be evaluated prior to release for unrestricted use to ensure that the levels in Appendix A are not exceeded.

(b). Not transfer land for unrestricted use where the concentration of uranium or thorium series radionuclides in soil averaged over any 100 square meters exceeds the background level by more than 1 Bq/g, averaged over top 15 cm layer of soil, unless compliance with section 5 . b through e. of these Regulations can be proved..

8. Management and Transfer of Waste for Disposal

(1). A licensee under this regulation shall manage and dispose of wastes containing NORM in accordance with Nigeria Radioactive Waste Management Regulations, 2006 and other applicable requirements of the Ministry of Environment for disposal of such wastes and -

a by transfer of the wastes for disposal to a disposal facility licensed by the Authority; or

b. in accordance with alternate methods authorized by the Authority upon application or upon the Authority's initiative, and consistent with Article 5 of these Regulations.

(2). Equipment contaminated with NORM in excess of levels specified in Appendix A, which is to be disposed of as waste shall be disposed of -

a. to prevent any reintroduction into commercial or unrestricted use; and

b. within disposal areas specifically designed to meet the criteria of Article 8(1) of these Regulations.

(3). Transfers of waste containing NORM for disposal shall be made only to a person specifically authorized by the Authority to receive such waste.

(4). Records of disposal, including manifests, shall be maintained pursuant to the provisions of these Regulations.

(5) Disposal practices and sites shall be subject to institutional control as appropriate and determined by the Authority in accordance with this Article..

General License

9 General License

(1). Subject to the requirements of this Article and Articles 5 – 8 of these Regulations a general license shall be issued upon application to generate, possess, own, use, transfer and dispose of NORM without regard to quantity.

(2). The general licensee shall not authorize the manufacturing or distribution of products containing NORM in concentrations greater than those specified in Article 4(a) of these Regulations nor the receipt and disposal of wastes from other persons.

(3). Decontamination other than that incidental to routine maintenance by a general licensee of its own equipment or facilities shall be conducted pursuant to a specific license.

(4). A person subject to a general license issued by this Article shall notify the Authority and such notification shall include -

a. name and address of the registrant;

b. location and description of the facility or operation;

c. description of the NORM including estimates of the amount and extent of NORM.

10. Transfer of NORM contaminated facilities

(1). The transfer of NORM not exempted from these Regulations from one general licensee to another general licensee shall be authorized by the Authority if -

(a) the equipment and facilities contaminated with NORM are to be used by the recipient for the same purpose; or

(b) the transfer of control or ownership of land contaminated with NORM includes an annotation of the deed records to indicate the presence of NORM; or

(2) The Authority may approve transfers which do not meet the criteria of Article 10(1).

(3) Transfers made under Article 10(1) do not relieve the general licensee who makes the transfer from the responsibilities of assessing the extent of NORM contamination or material present, evaluating the hazards of the NORM, informing the general licensee receiving the NORM of these assessments and evaluations, and maintaining records required by these Regulations.

(4). A general licensee intending to transfer NORM contaminated facilities for unrestricted use shall document compliance with the requirements of Article 7 of these Regulations and records of such compliance shall be kept.

(5). The Authority may, by written notice, require any person authorized by a general permit to apply for and obtain a specific license. The notice shall state the reason or reasons for requiring a specific license.

11. Specific Licenses

Unless otherwise exempted, a specific licensee is required to -

(a). manufacture and distribute any material or product containing NORM unless otherwise exempted under the provisions of section 4 of these Regulations or licensed under the provisions of Nigeria Radioactive Waste Management Regulations,2006;

(b). except as provided in Article 9(3) of these Regulations, decontaminated equipment or land not otherwise exempted under the provisions of Article 4 of these Regulations or facilities contaminated with NORM in excess of the levels set forth in Article 7 of these Regulations, as applicable;

For purposes of this subsection, the term 'decontaminate' includes maintenance which incidentally results in removal of contamination;

(c). receive NORM from other persons for disposal.

12. Application for Specific Licenses

(1). Applications for specific licenses shall be made in a manner and on a form prescribed by the Authority.

(2). The Authority may at any time after the submission of the original application and before the expiration of the licence, require further statements in order to enable the Authority to determine whether the application shall be granted or denied or whether a licence shall be modified or revoked.

(3). An application shall be signed by the applicant or a person duly authorized to act for and on the applicant's behalf.

(4). An application for a licence may include a request for a licence authorizing one or more activities.

(5). An application for a specific licence shall be accompanied by the prescribed fee.

(6). The applicant may incorporate by reference information contained in previous applications, statements or reports provided to the Authority in the application, provided such references are clear and specific.

(7). Applications and documents submitted to the Authority may be made available for public inspection.

13. Requirements for the Issuance of Specific Licenses

(1). A licence application shall be approved if the Authority determines that the -

(a). applicant is qualified by reason of training and experience to use the NORM in question for the purpose requested and in accordance with these Regulations in such a manner as to protect public health, safety and property;

(b). applicant's proposed equipment, facilities and procedures are adequate to protect public health, safety and property;

(c). issuance of the licence will not be inimical to the health and safety of the public;

(d). applicant has satisfied any applicable special requirement in these Regulation; and

(e). applicant has met the financial requirements.

(f). applicant has adequately addressed the following items in the application -

(i) procedure and equipment for monitoring and protecting workers;

(ii) an evaluation of the radiation levels and concentrations of contamination expected during normal operations;

(iii) operating an emergency procedures, including procedures for waste reduction and quality assurance of items released for unrestricted use; and

(iv) a method for managing the radioactive material removed from contaminated equipment and facilities.

(2). An application for a specific license to decontaminate equipment, land, or facilities contaminated with NORM in excess of the levels set forth in Articles 4(a) and 7(b) or Appendix A of these Regulations applicable and the disposal of the resulting waste will be approved if the -

(a). applicant satisfies the general requirements specified in Article 13(1) of these Regulations; and

(b). applicant has adequately addressed the following items in the application -

(i) procedures and equipment for monitoring and protection of workers;

(ii) an evaluation of the radiation levels and concentrations of contamination expected during normal operations;

(iii) operating and emergency procedures, including procedures for waste reduction and quality assurance of items released for unrestricted use; and

(iv) the method of disposing the NORM removed from contaminated equipment, facilities or land.

(3). An application for a specific license to manufacture or initially transfer products or materials containing NORM to persons exempted from these regulations pursuant to Article 4(2) of these Regulations shall be approved if the -

(a). applicant satisfies the general requirements specified in Article 13(1)(a) of these Regulations;

(b). NORM is not contained in any food, beverage, cosmetic, drug, or other commodity designed for ingestion or inhalation by, or application to, a human being; and

(c). applicant submits sufficient information relating to the design, manufacture, prototype testing, quality control procedures, labeling or marking and conditions of handling, storage, usage and disposal of the NORM material or product to demonstrate that the material or product will meet the safety criteria set forth in Article 14 of these Regulations. The information shall include -

(i) a description of the material or product and its intended use or uses;

(ii) the type, quantity, and concentration of NORM in each material or product;

(iii) the chemical and physical form of the NORM in the material or product and changes in chemical and physical form that may occur during the useful life of the material or product;

(iv) an analysis of the solubility in water and body fluids of the NORM in the material or product;

(v) the details of manufacture and design of the material or product relating to containment and shielding of the NORM and other safety features under normal and severe conditions of handling, storage, use, reuse, and disposal of the material or product;

(vi) the degree of access of human beings to the material or product during normal handling, use, and disposal;

(vii) the total quantity of NORM expected to be distributed annually in the material or product;

(viii) the expected useful life of the material or product;

(ix) the proposed method of labeling or marking each unit of the material or product with identification of the manufacturer and/or initial transferor of

the product and the radionuclides and quantity of NORM in the material or product;

(x) the procedures for prototype testing of the material or product to demonstrate the effectiveness of the containment, shielding, and other safety features under both normal and severe conditions of handling, storage, use, reuse, and disposal;

(xi) the results of the prototype testing of the material or product, including any change in the form of the NORM contained in it, the extent to which the NORM may be released to the environment, any change in radiation levels, and any other changes in safety features;

(xii) the estimated external radiation doses and dose commitments relevant to the safety criteria in Article 14 of these Regulations and the basis for such estimates;

(xiii) a determination that the probabilities with respect to doses referred to in Article 14 of these Regulations meet the safety criteria;

(xiv) the quality control procedures to be followed in the production of production lots of the material or product, and the quality control standards the material or product will be required to meet; and

(xv) any additional information, including experimental studies and tests, required by the Authority to facilitate a determination of the radiation safety of the material or product.

(4). An application for a specific license to dispose of NORM received from others will be approved if -

(a). the applicant demonstrates that operation of the facility will comply with the standards of Articles 5 and 8 of these Regulations; and

(b). the applicant demonstrates that adequate institutional controls have been implemented.

5. Notwithstanding the provisions of Article 14(b) of these Regulations, the Authority may deny an application for a specific license if the end uses of the product are frivolous or cannot be reasonably foreseen.

14 Safety Criteria for Products.

An applicant for a license under Article 13 of these Regulations shall demonstrate that the product is designed in such a way that, when manufactured –

(a). the use and disposal of a single exempt item and the handling and storage of the quantities of exempt items likely to accumulate in one location during -

(i) marketing;
(ii) distribution;
(iii) installation; and
(iv) servicing of product

It is unlikely that the external radiation dose in any one year or the dose commitment resulting from the intake of radioactive material in any one year by individuals who are most exposed to radiation or radioactive materials from the product.

(b). In use and disposal of a single exempt item and in handling and storage of the quantities of exempt items likely to accumulate in one location during marketing, distribution, installation, and servicing of the product, the probability is low that the containment, shielding, or other safety features of the product would fail under such circumstances that a person would receive an external radiation dose or dose commitment in excess of the dose to the appropriate organ as specified in Column II of the Table in Appendix B of these Regulations and the probability is negligible that a person would receive an external radiation dose or dose commitment in excess of the dose to the appropriate organ as specified in Column III of the Table in section 14 of these Regulations.

(c) It is unlikely that there will be a significant reduction in the effectiveness of the containment, shielding, or other safety features of the product from wear and abuse likely to occur in normal handling and use of the product during its useful life.

15 Issuance of Specific Licenses

a. where an application meets the requirements of Article 13 of this Regulations, the Authority will issue a specific license authorizing the proposed activity in such form and containing such conditions and limitations as it deems appropriate or necessary.

b. the Authority may incorporate in a license at the time of issuance or thereafter by amendment, such additional requirements and conditions with respect to the licensee's receipt, possession, use and transfer of NORM subject to this regulations as it deems appropriate or necessary in order to -

i. protect public health, safety and property;

ii. provide for such inspections of activities under the license as may be appropriate, require report of the inspections and keep the record of same; and

iii. prevent loss or theft of NORM subject to these Regulations.

16 Conditions For the Issuance of Licenses Under Article 13

(1). General Terms and Conditions

(a). each license issued pursuant to these Regulation shall be subject to all the provisions of the Nigeria Naturally Occurring Radioactive Materials Regulations and to all Rules, Regulations and Orders of the Authority.

(b). any license issued under these Regulations and any right to possess or to utilize NORM granted by any license issued pursuant to regulation shall not be transferred, assigned or disposed of in any manner either voluntarily or involuntarily, directly or indirectly, through transfer of control of any license to any person unless the Authority after securing full information, finds that the transfer is in accordance with the provisions of these Regulations and shall give its consent in writing.

(c). a person licensed by the Authority pursuant to these Regulations shall confine the use and possession of the NORM licensed to the locations and purposes authorized in the license.

(d). a person licensed by the Authority pursuant to these Regulations is subject to the general license provisions of license Articles 6, 7, and 8 of these Regulations.

(2). Quality Control, Labeling, and Reports of Transfer

An applicant under Article 13(3) of these Regulations shall –

(a). carry out adequate control procedures in the manufacture of the product to assure that each production lot meets the quality control standards approved by the Authority;

(b). label or mark each unit so that the manufacturer, processor, producer, or initial transferor of the material or product and the NORM in the product can be identified; and

(c). maintain records of any person to whom NORM is transferred for use under Article 4(2) of these Regulations stating the kinds, quantities, and uses of NORM transferred and an annual summary report stating the total quantity of each radionuclide transferred under the specific license which shall be provided to the Authority. The report shall cover the year ending December 31, and shall be provided to the Authority within 90 days thereafter. If no transfers of NORM have been made pursuant to Article 13 (3) of these Regulations during the reporting period, the report shall so indicate.

17 Expiration and Termination of Licenses

(1). Except as provided in Articles 17(6) and 18(b) of these Regulations, a specific licence shall expire at the end of the specified day in the month and year stated therein.

(2). Each licensee shall notify the Authority in writing and request termination of the license when the licensee decides to terminate all activities involving NORM authorized under the license. This notification and request for termination of the license must include the reports and information specified in section 17.d.i.(4) of these Regulations. The licensee is subject to the provisions of section 17.d and e of these Regulations, as applicable.

(3) No less than 30 days before the expiration date specified in a specific license, the licensee shall either-

(a). submit an application for license renewal under Article 18 of these Regulations; or

(b). notify the Authority in writing, under section 17.(2) of these Regulations, if the licensee decides to discontinue all activities involving NORM.

(4) Where a licensee does not submit an application for license renewal under Article 18 of these Regulations, the licensee shall on or before the expiration date specified in the license-

(a) terminate use of NORM;
(b) remove NORM contamination consistent with the requirements of Article 7 of these Regulations;

(c) properly dispose of NORM; and

(d) submit a report of disposal of NORM and radiation surveys to confirm the absence of NORM or to establish the levels of residual NORM contamination. The licensee shall, as appropriate:

(i) report levels of radiation in units of microsieverts per hour of beta and gamma radiation at one centimeter and gamma radiation at one meter from surfaces and report levels of radioactivity in units of Becquerels per 100 square centimeters removable and fixed on surfaces, Becquerel per milliliter in water, and Becquerels per gram in contaminated solids such as soils or concrete; and

(ii) specify the instruments used and certify that each instrument is properly calibrated and tested.

(5). If no radioactivity attributable to activities conducted under the license is detected, the licensee shall submit a certification that no detectable NORM contamination was found. If the Authority determines that this certification and the information submitted under Article17 (4)(d) of these Regulations is adequate and surveys confirm the findings, the Authority will notify the licensee in writing that the license is terminated.

(6). If levels of residual NORM are not in conformance with criteria established in Article 7 of these Regulations, the license continues in effect beyond the expiration date, if necessary, with respect to possession of residual NORM until the Authority notifies the licensee in writing that the license is terminated. During this time, the licensee is subject to the provisions of Article 17.(7) of these Regulations. In addition to the information submitted under Article 17(4)(d) of these Regulations, the licensee shall submit a plan, if appropriate, for decontaminating the location(s) and disposing of the residual NORM.

(7). A licensee who possesses residual NORM under Article17 (6) of these Regulations, following the expiration date specified in the license, shall-

(a). be limited to actions involving NORM related to preparing the locations for release for unrestricted use; and

(b). continue to control entry to restricted areas until the locations are suitable for release for unrestricted use and the Authority notifies the licensee in writing that the license is terminated.

18 Renewal of Licenses

(a). applications for renewal of specific licenses shall be filed in accordance with Article 12 of these Regulations.

(b) where a licensee, not less than 30 days prior to expiration of an existing license, has filed an application in proper form for renewal or for a new license authorizing the same activities, such existing license shall not expire until final action by the Authority.

19 Amendments of Licenses at Request of Licensee.

Applications for amendment of a license shall be provided in accordance with Article 21 of these Regulations and shall specify in what respect the licensee desires the license to be amended and the grounds for such amendment.

20 Authority Action on Applications to Renew and Amend.

In considering an application by a licensee to renew or amend a license, the Authority shall apply the criteria set forth in Article 13 of these Regulations.

21 Amendment and Revocation of Licenses.

(1). The terms and conditions of a licence shall be subject to amendment, revision, or modification or the license may be suspended or revoked by reason of amendments to the Nigerian Naturally Occurring Radioactive Materials Regulations or by reason of Rules, Regulations, or Orders issued by the Authority.

(2). A licence may be revoked, suspended or modified in whole or in part, for any material false statement in the application or any statement of fact required under provisions of these regulations, or because of conditions revealed by such application or statement of fact or any report, record, or inspection or other means which would warrant the Authority to refuse to grant a license on an original application, or for violation of, or failure to observe any of the terms and conditions of the regulations, or of the license, or of any rule, regulation, or order of the Authority.

(3). Except in cases of willfulness or those in which the public health, interest or safety requires otherwise, the Authority shall not modify, suspend or revoke a license prior to the institution of proceedings unless facts or conduct which may warrant such action shall have been called to the attention of the licensee in writing and the licensee shall have been accorded an opportunity to demonstrate or achieve compliance with all lawful requirements.

22. Offences and Penalties

(a) A person who contravenes any of the provisions of these regulations has committed an offence

(b) A one who commits an offence under this regulations shall be liable to the penalties as established in the enforcement policy issued by the Authority

(c) The Authority shall impose penalties such as suspension or revocation of authorization, imposing administrative fine or closure of facility or any combination of these

(d) A person who, being a holder of authorization under these Regulations who commits an offence shall be liable to prosecution in the court of law and upon conviction be liable to pay fines up to N1,000,000 for an individual and up to N10,000,000 for a corporate body or be given a jail term of up to ten years or both

(e) Any person or organization may appeal to the Board of the Authority against any decision made by the Authority pursuant to these regulations.

23. Effective Date.

The provisions and requirements of these regulations shall take effect on [effective date of the regulations] and shall apply to all facilities or sites owned or controlled by a person on that date.

23. Citation

These regulations may be cited as the Nigerian Naturally Occurring Radioactive Materials (NORM) Regulations 2007

APPENDIX A

ACCEPTABLE SURFACE CONTAMINATION[1] LEVELS FOR NORM

	AVERAGE[2, 3, 6]	MAXIMUM[2, 4, 6]	REMOVABLE[2, 3, 5, 6]
Alpha	80 Bq/100 cm^2	250 Bq /100 cm^2	16 Bq /100 cm^2
Beta gamma	80 Bq/100 cm^2	250 Bq /100 cm^2	16 Bq /100 cm^2

[1] Where surface contamination by both alpha and beta-gamma emitting nuclides exists, the the more restrictive limit applies.

[2] As used in this table, Bequerel (Bq) means the rate of emission by radioactive material as determined by correcting the counts per second observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[3] Measurements of average contamination level should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each object.

[4] The maximum contamination level applies to an area of not more than 100 cm^2.

[5] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

[6] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 2 μGy/hr at 1 cm and 10 μGy/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

Appendix B

Table of Organ Doses

Part of Body	Column I* Dose	Column II* Dose	Column III* Dose
Whole body; head and truck; active blood-forming organs; gonads; or lens of eye	0.05 mSv	5 mSv	150 mSv
Hands and forearms; feet and ankles; localized areas of skin averaged over areas no larger than 1 square centimeter	0.75 mSv	75 mSv	1000 mSv
Other organs	0.15mSv	15 mSv	500 mSv

*Dose limit is the dose above background from the product.