

# NUCLEAR SAFETY AND RADIATION PROTECTION ACT

(1995 No. 19)

## Nigerian Safety and Security of Radioactive Sources Regulations, 2006

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*Regulation*

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### SCHEDULE

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S. I. of 2006

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

**Nigerian Safety and Security of Radioactive Sources  
Regulations, 2006**

*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, hereby makes the following Regulations -**

**PART I - GENERAL**

**1. Interpretation**

In these Regulations, unless the context otherwise requires –

“**the Act**” means the Nuclear Safety and Radiation Protection Act 1995;

“**the Authority**” means the Nigerian Nuclear Regulatory Authority established under Section 1 of the Act;

“**authorization**” means a permission granted in a document by the Authority 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, prescribed substances or any apparatus emitting ionizing radiation and the authorization may take the form of a registration or a license;

“**calendar year**” means a period of 12 calendar months beginning from the 1<sup>st</sup> of January of the year;

“**contamination**” means the contamination by any radioactive substance of any surface including any of the body or clothing or any part of the absorbent objects or materials or the contamination of liquids or gases by any radioactive substances;

“**disposal**” means the emplacement of waste in an approved, specified facility including near surface or geological repository without the intervention of retrieval and includes the approved direct discharge of airborne or liquid effluents into the environment with subsequent dispersion;

**“disused source”** means radioactive source no longer intended to be used, and is not intended to be used for the practice of which an authorization has been granted;

**“dose assessment”** means the dose assessment made and recorded by an authorized dosimetry service provider;

**“dose limit”** means in relation to persons of a specified class, the limit on effective dose or equivalent dose as specified in NiBIRR;

**“dose rate”** means, in relation to a place, the rate at which a person or part of a person would receive a dose of ionizing radiation from external radiation if he were at that place being a dose rate at that place averaged over one minute;

**“dose record”** means in relation to a person, the record of the doses received by that person as a result of his exposure to ionizing radiation, being the record made and maintained on behalf of the employer by an authorized dosimetry service provider;

**“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  $J \cdot kg^{-1}$ , termed the Sievert (Sv);

**“excluded”** means any exposure whose magnitude or likelihood is essentially unamenable to control through the requirements of NiBIRR (e.g. exposure from K-40 in the body, from cosmic radiation at the surface of the earth and from unmodified concentrations of radionuclides in most raw materials);

**“export”** means the physical transfer, originating from an exporting state, into an importing state or to a recipient in an importing state, of one or more radioactive source(s) covered by these Regulations;

**“exporting facility”** means the natural or legal person in an exporting state, from which one or more radioactive source(s) are exported to an importing state or to a recipient in an importing state;

**“exporting state”** means the state of origin of an export of one or more radioactive source(s) to an importing state or a recipient in an importing state;

**“hazardous substance or “hazardous waste”** means a substance or waste, other than a nuclear substance, that is used or produced in the course of carrying on a licensed activity and which may pose a risk to the environment or the health and safety of persons;

**“import”** means the physical transfer into an importing state or to a recipient in an importing state, originating from an exporting state, of one or more radioactive source(s) covered by these Regulations;

**“importing state”** means the state of final destination for a physical transfer of one or more radioactive source(s) from an exporting state or an exporting facility;

**“industrial gamma radiography”** is a non-destructive method of inspecting materials for hidden flaws by utilising the ability of gamma radiation to penetrate various materials;

**“ionizing radiation”** means energy in the form of particles or electromagnetic waves of a wavelength of 100 nanometers or less or a frequency of  $3 \times 10^{15}$  hertz or more capable of producing ions directly or indirectly;

**“legal person”** means any organisation, corporation, partnerships, firm, association, trust, estate, public or private institution, group, political or administrative entity or other persons designated in accordance with national legislation, who or which has responsibility and authority for actions taken under these 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;

**“licensee”** means the holder of a current licence granted by the Authority for a practice or source who has recognized rights and duties for the practice or source, particularly in relation to radiation protection, safety and security;

**“limit”** means the value of a quantity used in certain specified activities or circumstances that must not be exceeded;

**“management”** means the administrative and operational activities that are involved in practices entailing radioactive sources;

**“monitoring”** means the measurement of radiation or radionuclides for reasons related to the assessment or control of exposure and the interpretation of such measurements. Monitoring can be continuous and non-continuous;

**“nationally tracked source”** means a sealed source containing a quantity equal or greater than Category 1 or 2 levels of any radioactive material listed in Schedule I of these regulations;

**“NiBIRR”** means the Nigeria Basic Ionizing Radiation Regulations 2003;

**“notification”** means a document submitted to the 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;

**“orphan source”** means a radioactive source which poses sufficient radiological hazard to warrant regulatory control but is not under regulatory control, either because it has never been under regulatory control, or because it has been abandoned, lost, misplaced, stolen or transferred without prior authorization;

**“practice”** means work involving –

- (a) the production, processing, handling, use, holding, storage, transport or disposal of radioactive substances; or
- (b) the operation of any electrical equipment emitting ionizing radiation and containing components operating at a potential difference of more than 5kV;

which can increase the exposure of individuals to radiation from an artificial source, or from a radioactive substance containing naturally occurring radionuclides, which are processed for their radioactive, fissile or fertile properties;

**“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;

**“radiation accident”** means an accident where immediate action would be required to prevent or reduce the exposure to ionizing radiation of employees or any other persons;

**“radioactive discharges”** means radioactive substances arising from a source within a practice which are discharged as gases, aerosols, liquids or solids to the environment, generally with the purpose of dilution and dispersion;

**“radioactive source”** means radioactive material that is permanently sealed in a capsule or closely bonded, in a solid form and which is not exempt from regulatory control. It also means any radioactive material released if the radioactive source is leaking or broken, but does not mean material encapsulated for disposal, or nuclear material within the nuclear fuel cycles of research and power reactors;

**“radioactive substance”** means any substance, which contains one or more radionuclides whose activity cannot be disregarded for the purposes of radiation protection;

**“radioactive waste”** means material, whatever its physical form, remaining from practices or interventions and for which no further use is foreseen,

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

(ii) exposure to which is not excluded from these regulations;

**“radionuclide”** means a nucleus (of an atom) that possesses properties of spontaneous disintegration (radioactivity). Nucleus are distinguished by their mass and atomic number;

**“recipient”** means the natural or legal person in an importing state that receives one or more radioactive source(s) exported by an exporting state or a facility in the exporting state;

**“regulatory control”** means any form of control applied to facilities or activities by the Authority for reasons related to radiation protection or the safety or security of radioactive sources;

**“safety”** means measures intended to minimise the likelihood of accidents with radioactive sources and, should such an accident occur, to mitigate its consequences;

**“safety assessment”** means a review of the aspects of design and operation of a source that are relevant to the protection of persons or the safety of the source, including the analysis of the provisions for safety and protection established in the design and operation of the source and the analysis of risks associated with normal conditions and accident situations;

**“safety culture”** means the assembly of characteristics and attitudes in organizations and individuals, which establishes that, as an overriding priority, protection and safety issues receive the attention warranted by their significance;

**“sealed source”** means a source containing any radioactive substance whose structure is such as to prevent, under normal conditions of use, any dispersion of radioactive substances into the environment, but it does not include any radioactive substance inside a nuclear reactor or any nuclear fuel element;

**“security”** means measures to prevent unauthorized access or damage to, and loss, theft or unauthorized transfer of, radioactive sources;

**“security culture”** means characteristics and attitudes in organizations and of individuals, which establish that security issues receive the attention warranted by their significance;

**“storage”** means the placement of radioactive waste in a suitable facility where isolation, environmental protection and human control (e.g. monitoring) are provided with the intent that the waste will be retrieved for clearance or treatment and conditioning and/or disposal at later time;

**“transport”** means, in relation to a radioactive substance, 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 a substance 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 a substance 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 immobilised to achieve an appropriate waste form;

**“waste inventory”** means a detailed, itemised record maintained by the operator or Authority in accordance with these regulations, and may contain data such as physical quantity, the activity of the waste, the radionuclide content, and other characteristics;

**“waste management”** means all activities, administrative and operational, that are involved in the handling, treatment, conditioning, storage and disposal of waste. Transportation is taken into account;

**“waste package”** means the product of conditioning that includes the waste form and any container(s) and internal barriers (e.g. absorbing materials and liner), as prepared in accordance with requirements for handling, transportation, storage and /or disposal;

**“waste form”** means the waste in its physical and chemical form after treatment and/or conditioning (resulting in a solid product) prior to packaging. The waste form is a component of waste package;

**“worker”** means any person who works, whether full time or temporarily, for an employer and who has recognized rights and duties in relation to occupational radiation protection (a self employed person is regarded as having the duties of both an employer and a worker);

## **2. Objective**

To achieve and maintain high level safety and security of radioactive sources by preventing unauthorized access, damage, loss, theft and or unauthorized transfer of radioactive sources so as to reduce the likelihood of accidental harmful exposure or the malicious use or act to cause harm to individual, society or the environment and to prevent intentional or inadvertent recycling of radioactive metals for other uses.

## **3. Scope**

These regulations shall apply to all radioactive sources that may pose a significant risk to individuals, society and the environment, that is the sources referred to in Schedule I or any other potentially harmful radioactive sources so determined by the Authority.

## **4. Application**

(1) The application of these Regulations shall be in addition to the Nigeria Basic Ionizing Radiation Regulations 2003 (NiBIRR) and any other existing ionizing radiation and nuclear regulations as well as any transport regulations in force at the commencement of these regulations.

(2) These Regulations shall apply to further the promotion of safety and security of radioactive sources and of the protection of individuals, society and the environment from the harmful effects of possible accidents and malicious acts involving radioactive sources.

## **PART II - RESPONSIBILITIES AND ADMINISTRATIVE MEASURES**

## **5. Responsibilities**

(1) The Authority:

- (a) shall maintain records of holders of authorizations to possess or use radiation sources, with clear indication of the types of sources and records for transfer and disposal of the sources on termination of the authorization;
- (b) shall implement an inspection programme to verify that facilities and programmes are maintained to adequately manage the radiation sources;



- (c) shall establish and maintain a National Radioactive Source Tracking System with database of registry of sources belonging to Category 1 and 2 as described in Schedule 1; and
- (d) shall have in place strategies including rapid response for gaining or regaining control over orphan sources, provide for measures to reduce likelihood of malicious acts, mitigate or minimize the radiological consequences of accidents or malicious acts involving radioactive sources and provide for continuous improvement of the strategies.

(2) The Licensee -

- (a) shall have the prime responsibility for the safe management of, and the security of radioactive sources involved for which the licensee is authorized;
- (b) shall emplace and implement programs and procedures for security of radioactive sources within his practice and for the administration of radiation safety;
- (c) shall ensure that any transfer of sources to another person is documented and that the person is authorized and that sources are imported and received in accordance with regulatory requirements; and
- (d) shall ensure that there is a procedure for communicating routinely to the Authority on status of source and reports promptly of unusual events that may affect safety and security of sources. (Unusual events include loss of control over a radioactive source, unplanned exposures, unauthorized access or use of a source, failures of equipment containing sources and discovery of an unaccounted source).

(3) The radiation worker assigned responsibility by the licensee shall ensure that the requirements for safety and security of sources given in these regulations are implemented.

## **6. Licence Applications**

(1) No person or organisation shall import, transport, use, transfer ownership, dispose or export a radioactive source without an appropriate licence from the Authority.

(2) All proposals from applicants to import, transport, use, transfer ownership, dispose or export a radioactive source shall specify the following in a written application to the Authority:

- (a) the applicant's name, address and telephone number;
- (b) the description of the source or source containing equipment, including its quantity and unique identifiers, radionuclide and aggregate activity;

- (c) the name and address of the supplier;
- (d) the country of origin of the source or source containing equipment;
- (e) the name and address and telephone number of the consignee;
- (f) a safety assessment;
- (g) a security plan for the source and/or the facility in which the source is to be managed; and
- (h) such other details as the Authority may consider necessary.

(3) An applicant shall be prepared to pay the fee or fees prescribed by the Authority to cover the cost of the licensing procedures.

(4) The licensee shall comply with all limits and conditions specified in the licence, and any specific radiation protection and physical security measures.

(5) Any licence issued pursuant to sub regulations (2) and (3) of these regulations shall be:

- (a) valid for such a period as the Authority may determine;
- (b) renewable by the Authority if the licensee complies with the license 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 license conditions.

## **7. Exemptions**

(1) These regulations do not apply to nuclear materials as defined in the convention on the Physical Protection of Nuclear Material, except for sources incorporating plutonium-239.

(2) These regulations do not apply to radioactive sources within military or defense programmes.

## **8. Safety and security requirements for radioactive sources**

(1) A licensee who possesses sealed sources, shall conduct a physical inventory of all such sealed sources semi-annually, unless another interval is specified in the license.

(2) The records should be kept appropriately secured and shall be retained for 3 years.

(3) Inventory records shall contain the following:

- (a) the model and serial number of each sealed source;
- (b) the identity of each sealed source;
- (c) radionuclide and its activity on a specified date;
- (d) the location of each sealed source;
- (e) receipt or transfer or disposal of the source;
- (f) the date of the inventory; and
- (g) the signature of the radiation safety officer or designee.

(4) The storage and transportation of sources shall comply with Nigerian Regulations for the Transportation Radioactive Sources and the IAEA -TS-R-1.

(5) Each sealed source of radioactive material shall be provided with a storage or transport container which shall be equipped with a lock or tamper seal to prevent unauthorized removal of or exposure to the source of radiation.

(6) Sealed sources shall have a minimum of two locks between the device and the public when being transported or stored.

(7) Transport containers shall be physically secured in the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal and the sealed source shall be located as far away from occupied areas of the vehicle as possible.

(8) Sealed sources not in storage or being transported shall be under the constant surveillance and immediate control of the licensee.

(9) Transportation of sources shall be between 6.00 am and 6.00 pm and local transportation should be accompanied by policemen.

(10) The Authority shall be notified within 24 hours by the licensee for loss of control of sources, unauthorized access to, or unauthorized use of a source, malevolent acts threatening authorized activities, failures of equipment containing sources which may have security implications and discovery of unaccounted source.

## **9. Training requirements for authorized users**

(1) Radioactive materials shall be used by individuals who are qualified by training and experience to protect public, health, property and the environment.

(2) A radiation safety and security program for the training of workers shall be submitted for approval by the authority for its content and the trainer, person or organization.

(3) For licensees who propose to train their own personnel, detailed training program with course content, duration, instructor qualification and method of assessment shall be submitted to the Authority for approval.

(4) Records of training shall be maintained during the period of employment of the individual.

#### **10. Training requirements, duties and responsibilities of the Radiation Safety Officer**

(1) The licensee shall appoint a radiation safety officer with the authority to fulfill the duties and responsibilities listed in this part.

(2) The radiation safety officer shall have sufficient training and experience with radioactive materials to be a user of the requested licensed materials, unless otherwise specified in the license, the training under paragraph (b) shall include practical experience in the safe use of radioactive materials and knowledge of procedures, facilities and equipment.

(3) The duties and responsibilities of the radiation safety officer shall include the following:

- (a) ensure that all terms and conditions of the license and these regulations are complied with;
- (b) ensure that the sealed sources are leak tested timely and as prescribed by the manufacturer or by the license;
- (c) ensure that radioactive materials are used only by individuals who are authorized by the license and that all individuals wear required personnel monitoring equipment;
- (d) maintain all records required by the license and these regulations. (These records shall include personnel monitoring records, leak test records, inventory records, training records for users and receipt, transfer and disposal records);
- (e) ensure that radioactive materials are properly secured against unauthorized access or removal;
- (f) serve as a contact with the Authority for events such as the loss, theft or damage of radioactive material; and
- (g) ensure that all users read and understand the licensee's emergency, operating and radiation safety procedures.

## **11. Radiation Safety Committee**

(1) For licensees using radioactive sources of categories 1 and 2, the employer shall appoint a Radiation Safety Committee.

(2) The Radiation Safety Committee whose membership shall be drawn from the management of the organization including the Radiation Safety Adviser and the Radiation Safety Officer shall have the following responsibilities:

- (a) ensure the safe use and security of radioactive sources;
- (b) develop and recommend policies for the control and safe use of radioactive sources;
- (c) provide technical oversight, advice, and assistance on matters concerning security, safety and radiation protection;
- (d) determine that all activities involving radioactive sources are being conducted safely and in accordance with the provisions of the Act, Nigeria Basic Ionizing Radiation Regulations and these regulations;
- (e) receive and review periodic reports from the RSO on incidents, personnel, monitoring, inspections and other security, safety and radiation protection matters; and
- (f) investigate all instances of alleged infractions of safety rules and security regulations and violations of Authority requirements and decide the course of corrective action to be taken.

## **12. Personnel monitoring**

(1) No licensee shall permit any individual to use or to assist in the use of sealed sources of radiation in portable devices unless such individual wears a personal dosimeter.

(2) No licensee shall permit any individual to perform installations, maintenance or service, initial radiation surveys, relocations or removal from service of sealed sources in fixed devices unless such individual wears a personal dosimeter.

(3) Licensees who use iodine 125, iodine 131, hydrogen 3, uranium 234, uranium 235 or uranium 238 and similar radionuclides and are required to have a bioassay program and must submit a description of their bioassay program for approval by the Authority.

(4) A personal dosimeter shall be worn by any individual using or assisting in the use of unsealed sources of radioactive materials of any gamma-emitting isotope with a gamma ray energy greater than 50 kiloelectron volts or the use of any beta-emitting isotope with a maximum beta energy of 300 kiloelectron volts or more.

(5) A personal dosimeter shall be worn by any individual using or assisting in the use of unsealed sources of radioactive materials of 1,000 microcuries (37 MBq) or more of beta-emitting isotopes with maximum beta energy of 1,000 kiloelectron volts.

(6) Each personal dosimeter shall be assigned to and worn by only one individual.

(7) Personal dosimeter shall be replaced at a specified interval and after replacement must be promptly processed.

### **13. Leak test requirements for possession of sealed sources**

(1) A licensee in possession of a sealed source shall ensure that:

- (a) (i) the sealed source is tested for leakage before its first use, unless the licensee has a certificate from the supplier indicating that the sealed source was tested before transfer to the licensee; and
- (b) (ii) the sealed source shall be tested for leakage using a procedure and at intervals as approved by the Authority.

(2) A licensee shall retain leak test records for 3 years and the records shall contain the manufacturer's name, the model and serial numbers of each sealed source tested, the identity of each sealed source radionuclide and its estimated activity, the measured activity of each test sample expressed in microcuries (becquerels), the date of the test, and the signature of the radiation safety officer or designee.

(3) If the leak test reveals the presence of 0.005 microcurie (185 Bq) or more of removable contamination, the licensee shall:

- (a) immediately withdraw the sealed source from use and cause it to be decontaminated and repaired or to be disposed of in accordance with these regulations; and
- (b) file a report with the Authority within 5 days of receiving the leak test results describing the equipment involved, the test results and the action taken.

(4) The licensee shall not open sealed sources under any circumstances.

### **14. Operating and emergency procedures**

(1) The licensee's operating and emergency procedures shall be posted in accordance within the area of operations and shall accompany portable devices at all times.

(2) The procedures shall include instructions in the following as applicable to the type of use:

- (a) the uses of sources of radiation so that exposures are maintained as low as reasonably achievable and no individual is likely to be exposed to radiation doses in excess of the standards in Nigeria Basic Ionizing Radiation Regulations;
- (b) methods and occasions for conducting radiation surveys;
- (c) methods and occasions for locking and securing sources of radiation;
- (d) personnel monitoring and the use of personnel monitoring equipment;
- (e) minimizing exposure of individuals in the event of an accident;
- (f) notifying proper personnel in the event of damage, loss, theft, or accident involving sources of radiation;
- (g) general guidelines for the safe handling and use of unsealed sources of radioactive materials;
- (h) maintenance of records;
- (i) procedures for picking up, receiving and opening packages containing radioactive materials; and
- (j) the transportation of radioactive sources to temporary job sites, including the packaging, marking, labeling and placing of such sources in vehicles, placarding of vehicles, securing the sources during transportation and possessing proper shipping papers and emergency response information.

## **15. Abandonment**

(1) For a sealed source considered irretrievable after reasonable efforts at recovery have been expended, the Authority shall be immediately notified giving details of the incidence and detail information on the source identification including licence and serial numbers, circumstances that resulted in the inability to retrieve the source and obtain approval to implement abandonment procedures.

(2) With the approval of abandonment from the Authority, the licensee shall within 30 days immobilize the source and seal in place with a cement plug, provide means to prevent inadvertent intrusion on the source, install a permanent identification plaque at the surface of the well and submit details of the abandonment procedures to the Authority.

**16. Additional requirements for sealed sources in fixed devices**

(1) A licensee authorized to perform installations, maintenance or service, initial radiation surveys, relocations or removal from service of sealed sources in fixed devices shall possess portable radiation survey instruments. The instruments shall be operable and calibrated to a standard laboratory.

(2) A licensee shall post and provide to personnel lock-out procedures that prevent employees from entering the radiation beam during maintenance, repairs, or other work in, on, or around a bin, tank, hopper or pipe on which a device is mounted.

**17. Import and export of radioactive source**

All licensees prospective of importing or exporting radioactive sources shall in addition to other requirements for the appropriate authorizations in cases of Categories 1 and 2 of Schedule 1 to these regulations provide:

- (a) an export license from the regulatory body of the country of origin in the case of application for authorization to import the source;
- (b) a written agreement from the source manufacturer or an authorized handler that the source shall be accepted back when in a state of disuse or spent;
- (c) an import license from the regulatory body of the country of origin in the case of application for authorization to export a source.

**18. Screening of scrap metal**

(1) The export of scrap metal shall only be done through designated ports where portal monitors are provided.

(2) A certified document indicating that the consignment does not contain high level of radioactivity arising from incorporation of radioactive source should be part of the documents to be provided to the customs services before export.

(3) For industries that are using scrap metal as raw materials for products to be used in the country, provision of radiation monitors for screening of radioactivity shall be provided and with approved procedures from the Authority.

**19. Transfer of radioactive source**

(1) No license issued or granted pursuant to the regulations or any right under a license shall be transferred, assigned, or in any manner disposed of, either voluntarily or involuntarily, directly or indirectly through transfer of control of any license to any person unless the authority shall, after screening full information, find that the transfer is in accordance with the provisions of the Act and shall give consent to issuance of a licence.



(2) The licensee shall provide to the authority description of the transaction, changes of personnel, changes of location, equipment, procedures, surveillance records, decommissioning processes and related records of transfers, transferee's commitment to abide by the transferor's commitments.

## **20. Source tracking system**

(1). For the purposes of the National Radioactive Source Tracking System (Regulatory Authority Information System), a licensee shall report to the authority on all information of manufacture, transfer, receipt, export or disposal of sources.

(2) The information in 12 (1) shall include manufacturer's name and address, radioactive material activity, activity and transaction dates.

(3) The licensee shall provide also the facility name, license number, address, name of individual that prepared the report and any other information the authority may consider necessary.

(4) Each licensee shall reconcile and verify the inventory of nationally tracked sources possessed by the licensee against the licensee's data in the National Source Tracking System.

(5) The verification shall be conducted during the month of January in each year. The reconciliation process must include resolving discrepancies in filed reports.

## **PART III – OFFENCES, PENALTIES AND APPEAL**

### **21. Offences and penalties**

(1) Any person who contravenes any of the provisions of these regulations has committed an offence.

(2) Any person who commits an offence under these regulations shall be liable to the penalties as established in the enforcement policy issued by the Authority.

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

(4) Any person or body corporate who, being a holder of authorization under these regulations, commits an offence, and shall be liable to prosecution in the court of law and upon conviction be liable to pay fines not exceeding ₦1,000,000 for an individual and not exceeding ₦10,000,000 for a corporate body or be given a jail term not exceeding ten years or both.

### **22. Appeal**

Any person or organisation may appeal to the Board of the Authority against any decision made by the Authority pursuant to these Regulations.

**23. Citation**

These Regulations may be cited as the Nigerian Safety and Security of Radioactive Sources Regulations, 2006.

## SCHEDULE

### CATEGORY 1 SOURCES

If not safely managed or securely protected would be likely to cause permanent injury to a person who handled them, or were otherwise in contact with them, for more than a few minutes. It would probably be fatal to be close to this amount of unshielded material for a period of a few minutes to an hour. These sources are typically used in practices such as radiothermal generators, irradiators and radiation teletherapy.

### CATEGORY 2 SOURCES

If not safely managed or securely protected, could cause permanent injury to a person who handled them, or were otherwise in contact with them, for a short time (minutes to hours). It could possibly be fatal to be close to this amount of unshielded radioactive material for a period of hours to days. These sources are typically used in practices such as industrial gamma radiography, high dose rate brachytherapy and medium dose rate brachytherapy.

### CATEGORY 3 SOURCES

Category 3 sources, if not safely managed or securely protected, could cause permanent injury to a person who handled them, or were otherwise in contact with them, for some hours. It could possibly — although it is unlikely — be fatal to be close to this amount of unshielded radioactive material for a period of days to weeks. These sources are typically used in practices such as fixed industrial gauges involving high activity sources (for example, level gauges, dredger gauges, conveyor gauges and spinning pipe gauges) and well logging.

**TABLE 1**

Provides a categorization by activity levels for radionuclides that are commonly used. These are based on D-values, which define a dangerous source i.e.: a source that could, if not under control, gives rise to exposure sufficient to cause severe deterministic effects. A more complete listing of radionuclides and associated activity levels corresponding to each category, and a fuller explanation of the derivation of the D-values, may be found in eight schedule of Nigeria Basic Ionizing Radiation Regulations, which also provides the underlying methodology that could be applied to radionuclides not listed. Typical source uses are noted above for illustrative purposes only.

### ACTIVITIES CORRESPONDING TO THRESHOLDS OF CATEGORIES

Radionuclide	<i>Category 1</i>		<i>Category 2</i>		<i>Category 3</i>	
	1000 x D		10 x D		D	
	(TBq)	(Ci) <sup>a</sup>	(TBq)	(Ci) <sup>a</sup>	(TBq)	(Ci) <sup>a</sup>
Am-241	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Am-241/Be	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Cf-252	2.E+01	5.E+02	2.E-01	5.E-00	2.E-02	5.E-01
Cm-244	5.E+01	1.E+03	5.E-01	1.E+01	5.E-02	1.E+00

Co-60	3.E+01	8.E+02	3.E-01	8.E+00	3.E-02	8.E-01
Cs-137	1.E+02	3.E+03	1.E+00	3.E+01	1.E-01	3.E+00
Gd-153	1.E+03	3.E+04	1.E+01	3.E+02	1.E+00	3.E+01
Ir-192	8.E+01	2.E+03	8.E-01	2.E+01	8.E-02	2.E+00
Pm-147	4.E+04	1.E+06	4.E+02	1.E+04	4.E+01	1.E+03
Pu-238	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Pu-239b/Be	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Ra-226	4.E+01	1.E+03	4.E-01	1.E+01	4.E-02	1.E+00
Se-75	2.E+02	5.E+03	2.E+00	5.E+01	2.E-01	5.E+00
Sr-90 (Y-90)	1.E+03	3.E+04	1.E+01	3.E+02	1.E+00	3.E+01
Tm-170	2.E+04	5.E+05	2.E+02	5.E+03	2.E+01	5.E+02
Yb-169	3.E+02	8.E+03	3.E+00	8.E+01	3.E-01	8.E+00
Au-198*	2.E+02	5.E+03	2.E+00	5.E+01	2.E-01	5.E+00
Cd-109*	2.E+04	5.E+05	2.E+02	5.E+03	2.E+01	5.E+02
Co-57*	7.E+02	2.E+04	7.E+00	2.E+02	7.E-01	2.E+01
Fe-55*	8.E+05	2.E+07	8.E+03	2.E+05	8.E+02	2.E+04
Ge-68*	7.E+02	2.E+04	7.E+00	2.E+02	7.E-01	2.E+01
Ni-63*	6.E+04	2.E+06	6.E+02	2.E+04	6.E+01	2.E+03
Pd-103*	9.E+04	2.E+06	9.E+02	2.E+04	9.E+01	2.E+03
Po-210*	6.E+01	2.E+03	6.E-01	2.E+01	6.E-02	2.E+00
Ru-106 (Rh-106)*	3.E+02	8.E+03	3.E+00	8.E+01	3.E-01	8.E+00
Tl-204*	2.E+04	5.E+05	2.E+02	5.E+03	2.E+01	5.E+02

These radionuclides are very unlikely to be used in individual radioactive sources with activity levels that would place them within Categories 1, 2 or 3 and would therefore not be subject to the paragraph relating to national registries (11) or the paragraphs relating to import and export control (23 to 26).

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- a The primary values to be used are given in TBq. Curie values are provided for practical usefulness and are rounded after conversion.
- b Criticality and safeguard issues will need to be considered for multiples of D.

**MADE** at Abuja this

day of

2006

**PROFESSOR SHAMSIDEEN BABATUNDE ELEGBA**  
*Director-General*