



DRAFT NUCLEAR SECURITY REGULATIONS

2024

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PREAMBLE

In exercise of the powers conferred on the Minister responsible for the Nuclear Regulatory Authority acting on the advice of the Nuclear Regulatory Authority Board by section 91 of the Nuclear Regulatory Authority Act, 2015, (Act 895), these Regulations are made this Day

Preliminary provision

Application

1. (1) These Regulations apply to
 - (a) nuclear and other radioactive material, their associated facilities and associated activities within Ghana; and
 - (b) temporary nuclear and other radioactive material storage facility and final repository radioactive waste.
- (2) These Regulations do not apply to
 - (a) radioactive material below exemption levels as established in Nuclear Regulatory Authority (Basic Ionising Radiation Control Regulations) (LI)
 - (b) any material within military or defence programmes.

General Provisions

Responsibilities of the Authorised Person

2. An authorised person shall

- (a) in compliance with these Regulations, conditions of the authorisation, and any additional requirements enforced by the Authority, ensure the security of nuclear and other radioactive material in storage, use, possession or transport for which the authorisation is granted;
- (b) establish the safety and security interface to ensure that the safety interface and the security interface do not adversely affect each other, and to the degree possible, they are mutually supportive;
- (c) ensure that only authorised personnel are permitted to fulfil required assignments and tasks related to nuclear and other radioactive material;
- (d) cooperate and coordinate with relevant organisations that have a role in response to events related to security of nuclear and other radioactive material;
- (e) ensure that the installed security system and components are appropriate and fulfil their intended functions;
- (f) ensure that a dynamic and effective security culture exists at all levels of management and within the organisation;
- (g) ensure that the nuclear and other radioactive material for which the authorised person is responsible are kept secure and not transferred unless the receiver possesses a valid authorisation from the Authority;
- (h) conduct vulnerability assessment and security culture assessment and implement additional security measures, where required;
- (i) apply appropriate security measures, commensurate with the security levels for facilities, against unauthorised removal of nuclear and other radioactive material for use in explosive device, or as an exposure or dispersal material;
- (j) provide access control to nuclear and other radioactive material location through identification and verification that effectively restricts access to authorised persons only;
- (k) not make any change, additions or modifications to the security measures approved by the Authority unless approval to the changes is obtained from the Authority;
- (l) take into consideration all available threat information, including that provided by the Authority, when implementing security measures;
- (m) provide requested assistance to the Authority and any other competent authorities in order to locate and recover the nuclear and other radioactive material and shall cooperate during any subsequent investigations and prosecution; and
- (n) in the event of any failure to comply with any applicable requirement of these Regulations,

- i. take appropriate action to remedy the circumstances and to prevent a recurrence of similar situations;
- ii. investigate the failure and its causes, circumstances and consequences; and
- iii. within thirty days, or as required, provide the Authority with a report on the cause of the failure, its circumstances and consequences, and on the corrective or preventive actions taken or to be taken.

Notification to Authority

3. (1) A person who intends to engage in the use, storage, transport or both storage and transport of nuclear and other radioactive material, shall submit a prior notification to the Authority before doing so.
- (2) The notification shall contain
 - (a) sufficient information to enable the identification of the nuclear and other radioactive material including the applicable certificate numbers and identification marks; and
 - (b) the names of the nuclear and other radioactive material or nuclides.

Integrated Management System

4. An authorised person shall establish a management system which is commensurate with the size and nature of the authorised activity and which ensures that
 - (a) security goal, policies and procedures that identify security as being the utmost priority, are established;
 - (b) problems affecting security are promptly identified and corrected in a manner commensurate with their importance;
 - (c) the security management measures are established and implemented;
 - (d) clear lines of authority for decisions on security are defined and the security manager role is assigned;
 - (e) organisational arrangements and lines of communications are established that result in an appropriate flow of information on security at and between the various levels in the entire organisation of the authorised person;
 - (f) the physical protection system is designed, implemented, operated and maintained in a condition capable of effectively protecting against the threats identified in the alternate threat statement or design basis threat;
 - (g) the responsibilities of each individual with a role in nuclear security are clearly identified and each individual is appropriately trained, qualified and adequately equipped;
 - (h) there is adequate financial and human resource capacity to operate and maintain the physical protection system;
 - (i) adequate quality assurance that ensures that the specific applicable requirements relating to security exists;

- (j) quality control mechanisms and procedures for reviewing and assessing the overall effectiveness of security measures are satisfied; and
- (k) a dynamic and effective security culture exists at all levels of management and relevant staff.

Information Security

5. (1) The authorised person shall

- (a) ensure existence of an effective information security plan consistent with the cybersecurity programme as stated in regulation 6 herein and national cybersecurity policy and strategy;
- (b) establish organisational policy, plans, and procedures to ensure the confidentiality, integrity and availability of sensitive information;
- (c) identify and assign roles and responsibilities for managing information security;
- (d) submit information security plan to the Authority as part of the cybersecurity plan.

(2) The authorised person shall identify and categorize information as sensitive or non-sensitive based on the impact on confidentiality, integrity and availability of information to nuclear security functions.

(3) The authorised person shall

- (a) protect sensitive information utilizing a risk-informed approach; and
- (b) implement information security controls during the entire lifecycle of the information throughout all facility lifetime stages.

(4) The authorised person shall

- (a) provide training and awareness on information security for all employees; and
- (b) ensure other individuals and entities with access to sensitive information are trained on applicable policies, plans and procedures.

(5) The authorised person shall

- (a) ensure information sharing requirements are established for sharing information with third parties; and
- (b) adhere to reporting requirements, as determined by the Authority, on information security incidents related to confidentiality, integrity and availability of information.

Cybersecurity

6. (1) The authorised person shall

- (a) develop and submit to the Authority for approval, a cybersecurity plan to implement and maintain a cybersecurity programme consistent with the national cybersecurity policy and strategy; and
- (b) submit any modifications to the cybersecurity plan to the Authority for review and approval.

(2) The authorised person shall

- (a) have the capability to implement and maintain a cybersecurity programme in accordance with the cybersecurity plan;
 - (b) identify all roles with access to sensitive digital assets and assign responsibilities for cybersecurity within the cybersecurity programme;
 - (c) establish and maintain awareness and competencies at the appropriate levels of capability to fulfil the cybersecurity responsibilities identified in the cybersecurity programme; and
 - (d) periodically perform validation of the cybersecurity programme to ensure effectiveness at addressing and mitigating cybersecurity risk.
- (3) The authorised person shall identify and protect computer systems associated with cybersecurity objectives and functions which includes:
- (i) safety-related functions, systems and functions important-to-safety;
 - (ii) nuclear security system functions;
 - (iii) emergency preparedness functions, including offsite communications; and
 - (iv) supporting systems and equipment functions which, if compromised, would adversely impact safety, security, or emergency preparedness functions.
- (4) The authorised person shall
- (a) identify all functions relevant to achieving the objective of the cybersecurity programme;
 - (b) identify all systems contributing to the performance of the identified functions as stated in Regulation 6(3) herein; and
 - (c) establish, implement, and maintain an active inventory of sensitive digital assets.
- (5) The authorised person shall identify and protect the confidentiality, integrity, and availability of sensitive information that are processed by sensitive digital assets.
- (6) The authorised person shall
- (a) develop, implement and maintain a process to manage risks to achieve the objectives of the cybersecurity programme;
 - (b) perform risk assessment:
 - (i) in accordance with the cybersecurity plan;
 - (ii) when there is a change to the facility or threat characterisation; and
 - (iii) when there is a change to the security posture of a computer system.
- (7) The authorised person shall develop a cyber threat characterisation and ensure it considers the emergence of new adversarial capabilities and the applicability of existing capabilities to newly identified vulnerabilities consistent with the national cybersecurity policy and strategy.
- (8) The authorised person shall identify and analyse the impact of attacks and actively track, vulnerabilities and plan for their timely remediation.
- (9) The authorised person shall
- (a) implement a defensive cybersecurity architecture as part of the cybersecurity programme consistent with the requirements of the cybersecurity levels and cybersecurity zones; and

- (b) ensure the cybersecurity programme and the defensive cybersecurity architecture provide timely detection, response, and recovery functions to support the cybersecurity programme.
- (10) The authorised person shall apply cybersecurity by design approach to ensure that new systems and modifications to existing systems conform to the defensive cybersecurity architecture and other elements of the cybersecurity programme.
- (11) The authorised person shall
 - (a) establish, implement, and maintain an identity and access management programme to control access to sensitive digital assets consistent with the cybersecurity programme; and
 - (b) establish procedures for the identification, use, control, and protection of digital assets that interface or communicate with sensitive digital assets consistent with the cybersecurity programme.
- (12) The authorised person shall establish, implement and maintain a configuration and change management programme for all sensitive digital assets.
- (13) The authorised person shall develop, implement, and maintain effective supply chain risk management for specifying, monitoring and managing the supply of items, products and services.
- (14) The authorised person shall establish, implement and maintain an incident response plan and shall:
 - (a) ensure that the incident response plan includes coordination between cybersecurity and all relevant plans and programmes to facilitate coordinated response and recovery;
 - (b) identify and assign roles and responsibilities within the incident response plan;
 - (c) periodically evaluate the incident response plan for its effectiveness through assurance activities for response and recovery;
 - (d) the incident response plan includes procedures for reporting of cybersecurity incidents to the Authority; and,
 - (d) establish a mechanism to ensure the use of experiences gathered within each cybersecurity incident response to improve the cybersecurity programme.
- (15) The authorised person shall:
 - (a) ensure that a robust cyber security culture is integrated fully into the overall security culture programme;
 - (b) ensure that the computer security requirement is documented and well understood by staff;
 - (c) ensure that clear and effective processes and protocols exist for operating computer systems both inside and outside the organisation;
 - (d) ensure that staff members are aware and understand the importance of adhering to the controls within the cyber security programme;
 - (e) ensure that the integrity of nuclear sensitive information and the various components forming the instrumentation and control system is a responsibility of all staff; and
 - (f) ensure that contractors working on the computer and digital systems in the nuclear facilities and associated activities are sensitised on cyber security culture and its protocols.

Trustworthiness Determination

7. The authorised person shall:

- (a) take appropriate measures to determine and periodically review the trustworthiness of personnel with access to sensitive information or have unescorted access to nuclear and other radioactive material, facilities and transport commensurate to the security level of the authorised practices or the material;
- (b) ensure that personnel undertake psychological examinations and are subjected to appropriate background checks;
- (c) require that contractors sign a confidentiality undertaking covering their activities at the facility or during transport; and
- (d) ensure that persons including temporary repairers, service workers and visitors whose trustworthiness have not been determined are escorted by persons authorised for that purpose.

Security Plan

8. An authorised person shall

- (a) implement the approved security plan;
- (b) ensure the security plan is based on the threats identified in the alternate threat statement or design basis threat;
- (c) obtain approval from the Authority before making temporary changes;
- (d) prepare a contingency plan commensurate with the security level;
- (e) ensure that the contingency plan responds to emergencies arising out of unauthorised removal of nuclear and other radioactive material or sabotage, or attempts to do any of these;
- (f) test, exercise, review and update the contingency plan; and
- (g) make the emergency and contingency plan available to the relevant authority.

Training and Qualification

9. An authorised person shall

- (a) submit training programme and schedule in addition to other submittals to the Authority for approval;
- (b) provide training to staff engaged in the implementation of the requirements of these Regulations commensurate with their responsibilities, and the training shall be provided or verified upon employment and supplemented by retraining;
- (c) evaluate the training programme and document the corrective actions resulting from the evaluation process and implement the corrective actions promptly;
- (d) update training programmes every five years and whenever deemed necessary by the Authority; and
- (e) ensure that the training covers the following items:
 - (i) the nature of security-related threats;

- (ii) the objective of nuclear security;
- (iii) the awareness of transport security plan, site security plan as well as contingency plan when appropriate, commensurate with the responsibilities of individuals and their roles in implementing these plans;
- (iv) self-defence including use of weapons in public areas from certified organisation; and
- (v) maintain records of all trainings undertaken and make them available, upon request, to the Authority.

Reporting of Nuclear Security Events

- 10.** (1) An authorised person shall report the following types of nuclear security events:
- (a) attempted or actual unauthorised intrusion into installations and conveyances;
 - (b) attempted or actual unauthorised removal, loss of nuclear material or radioactive material, whether involving external adversaries or insiders;
 - (c) attempted or actual acts of sabotage, including tampering with containers, packages, equipment, systems, or devices;
 - (d) loss or unauthorised disclosure of sensitive information;
 - (e) discovery of prohibited items; and
 - (f) deviation from an approved security plan.
- (2) Where there is a detection of an event in subregulation (1), the authorised person shall
- (a) take immediate action, consistent with these regulations to report the event to the Authority and take remedial action when possible;
 - (b) notify the Authority, law enforcement agency, or response agencies promptly;
 - (c) conduct investigation on the event and its causes, circumstances, and consequences;
 - (d) submit a report to the Authority about the results and the compensatory measures or corrective actions taken to remedy the situation; and
 - (e) prepare and submit to the Authority for review and approval, a corrective action plan to prevent the recurrence of similar situations, in accordance with these Regulations.

Categorisation of Radioactive Material and Nuclear Material

11. An authorised person shall categorise the radioactive material or nuclear material for which authorized person is responsible based on the criteria given in the First Schedule or the Third Schedule to these Regulations.

Inspection

12.(1) The Authority shall conduct security inspections involving nuclear and other radioactive material, facilities and associated activities to ensure compliance.

(2) Subject to the guidance of the Authority after the inspection, the authorised person may seek a compensatory measure in addition to any enforcement action.

(3) The authorised person shall give a representative of the Authority prompt access to premises and facilities in which nuclear and other radioactive material are located, to enable that representative obtain information about the status of security and verify compliance with regulatory requirements.

(4) The authorised person shall make available to the Authority, upon request, information and records regarding security as required.

Transfer of Radioactive Material

13.An authorised person shall not transfer radioactive material to another party unless

- (a) the authorised person is authorised by the Authority to do so;
- (b) the recipient possesses a valid authorisation for possessing a radioactive material; and
- (c) the recipient is provided with the relevant technical information to permit the safe and secure management of the radioactive material.

Corrective Actions

14.The authorised person shall

- (a) within twenty-four hours after the discovery of a deficiency in nuclear security systems give the Authority notice of the deficiency;
- (b) within seven days after the discovery of the deficiency, submit a corrective action plan for approval by the Authority; and
- (c) implement the approved corrective action plan within the time specified by the Authority

Sustainability Programme

15. An authorised person shall establish a sustainability programme for the nuclear security system that includes

- (a) operating procedures;
- (b) human resource management, capacity building and training.;
- (c) equipment upgrading, maintenance, repair, and calibration;
- (d) operational monitoring and performance testing;
- (e) configuration management; and
- (f) resource allocation and operational cost analysis.

Security of Radioactive Material – General Requirements

Security System Design and Evaluation

16. An authorised person shall ensure that

- (a) security systems are designed and installed to protect radioactive material against the alternate threat statement; and
- (b) the design of security system includes integrated security measures for detection, delay and response and are based on the principle of defence in depth applied with a graded approach.

Export of Category 1 or 2 Radioactive Sources

17. (1) An authorised person intending to export Category 1 or 2 radioactive sources shall

- (a) apply to the Authority for an export authorisation;
- (b) ensure that the application includes a copy of the authorisation of the recipient to receive and possess the source to be exported and in addition includes at least the following information:

- (i) the name of the recipient;
- (ii) the location and legal address or principal place of business of the recipient;
- (iii) the particulars of relevant radionuclides and radioactivity;
- (iv) the uses of the radioactive source, if appropriate;
- (v) the authorisation certificate of the recipient, if any; and
- (vi) any other information, that is applicable;

- (c) copies of relevant parts of any contractual agreements to re-import the source; and
- (d) provide justification or explanation of any need to use the “exceptional circumstances” provisions in the International Atomic Energy Agency guidance on the import and export of radioactive sources, if applicable.

(2) After receipt of authorisation to export the source, the authorised persons shall ensure that

- (a) the export of the source is conducted in compliance with all applicable national and international transport requirements; and
- (b) the importing State is notified in advance at least seven days, to the extent practicable, of each shipment with the following information in writing:
 - (i) the estimated date of export;
 - (ii) the exporting facility;
 - (iii) the recipient;
 - (iv) the particulars of radionuclide and radioactivity;
 - (v) the aggregate activity level;
 - (vi) the number of radioactive sources and, if available, their unique identifiers; and
 - (vii) a copy of the consent of the importing State to import the source in the case of a Category 1 source.

Import of Category 1 or 2 Radioactive Source

- 18. (1)** The authorised person intending to import Category 1 or 2 radioactive sources shall
- (a) apply to the Authority for an import permit;
 - (b) ensure that the application includes the following information:
 - (i) the name of the exporter,
 - (ii) the location and legal address or principal place of business of the exporter,
 - (iii) the name of the recipient;
 - (iv) the location of the recipient and legal address or principal place of business;
 - (v) the involved radionuclides and their activity, serial number and model number;
 - (vi) the type of packaging;
 - (vii) the uses of the source, if appropriate;
 - (viii) the details of the arrangements for the safe and secure management of the source, including financial provisions where appropriate, once the source becomes disused, and copies of any contractual agreements; and
 - (ix) justification or explanation of any need to use the “exceptional circumstances” provisions, if applicable.
- (1) The authorised person, after receipt of a permit to import a source, shall to the extent possible, ensure that the import of the source is in compliance with the applicable national and international transport requirements.

Inventory and Records

19. The authorised person shall

- (a) maintain and make available for the inspection of the Authority, records of
 - (i) testing of security equipment and verification of compliance including the results of tests carried out;
 - (ii) inventory of all radioactive material in use and storage including disused radioactive sources;
 - (iii) transfer of radioactive material;
 - (iii) training records; and
 - (iv) results of the review of security plan;
- (b) protect records of inventory commensurate with the security level of the radioactive material;
- (c) update the inventories upon transfer or receipt of radioactive material; and
- (d) ensure that the inventory under paragraph (b) includes
 - (i) the location of the source;
 - (ii) the type of radionuclide;
 - (iii) the radioactivity at the specified date;

- (iv) the serial number for radioactive sources or another unique identifier;
- (v) the chemical and physical form;
- (vi) the use history, including recording each movements into and out of the storage location;
- (vii) the receipt, transfer or disposal of the radioactive material; and
- (viii) any other information, as appropriate, to enable the source to be identifiable and traceable.

Determination of Applicable Security Level of Radioactive Material

20. An authorised person shall assign

- (a) Category 1 radioactive material to Security Level A;
- (b) Category 2 radioactive material to Security Level B;
- (c) Category 3 radioactive material to Security Level C; and
- (d) any other radioactive material to Security Level D.

Security of Radioactive Material in Use and Storage

Security Measures for Radioactive Material in Security Level A

21. An authorised person shall, for the purpose of preventing the unauthorised removal of material institute measures for

- (a) detection that
 - (i) provide for immediate detection of any unauthorised access to a secured area or the location of radioactive material through the use of an electronic intrusion detection system or continuous surveillance by personnel of the authorised person;
 - (ii) provide for immediate detection of any attempted unauthorised removal of the radioactive material by the use of electronic tamper detection equipment or continuous surveillance by personnel of the authorised person or a combination of both;
 - (iii) provide immediate assessment of detection by the use of remote monitoring of CCTV or assessment by personnel of the authorised person;
 - (iv) provide for immediate communication to response personnel through rapid, dependable, diverse means of communication fixed phones, cell phones, pagers, and radios; and
 - (v) provide a means to detect loss through verification by daily checking through physical checks, CCTV or tamper indicating devices;
- (b) delay measures that enables response personnel to have sufficient time, after detection, to interrupt the unauthorised removal through a system of at least two layers of barriers and to interdict; and

(c) immediate response to assessed alarm with sufficient resources to interrupt and prevent the unauthorised removal through the capability for immediate response with size, equipment, and training to interdict.

Security Measures for Radioactive Material in Security Level B

22. An authorised person shall, for the purpose of minimizing the unauthorised removal of radioactive material institute measures for

(a) detection that

(i) provide immediate detection of an unauthorised access to a secured area or the location of radioactive material by the use of electronic intrusion detection equipment or continuous surveillance by operator personnel or a combination of both;

(ii) provide detection of any attempted unauthorised removal of the radioactive material through the use of tamper detection equipment or periodic checks by operator personnel or a combination of both;

(iii) provide immediate assessment of detection through remote monitoring of CCTV or assessment by operator personnel;

(iv) provide immediate communication to response personnel through rapid, dependable means of communication such as phones, cell phones, pagers, radio; and

(v) provide a means to detect loss through verification by weekly checking through physical checks or tamper detection equipment;

(b) delay measures to minimize the likelihood of unauthorised removal through a system of two layers of barriers; and

(c) immediate initiation of response to interrupt unauthorised removal through the use of equipment.

Security Measures for Radioactive Material in Security Level C

23. An authorised persons shall for the purpose of reducing the likelihood of unauthorised removal of radioactive material, institute measures for,

(a) detection that

(i) provide detection of unauthorised removal of the radioactive material through the use of tamper detection equipment or periodic checks by operator personnel or combination of both;

(ii) provide immediate assessment of detection through an assessment by operator or response personnel; and

(iii) provide a means to detect loss through verification by monthly checking through physical checks or tamper indicating devices;

(b) delay that reduces the likelihood of unauthorised removal by the use of a barrier; and

(c) the implementation of the appropriate action in the event of unauthorised removal of a source by the use of procedures for identifying necessary actions in accordance with the contingency plans.

Security Measures for Radioactive Sources in Security Level D

24. An authorised person shall

- (a) identify the presence of radioactive sources through physical verification on quarterly basis;
- (b) ensure that the confidentiality of security-sensitive information is maintained; and
- (c) ensure that personnel who have access to radioactive sources are reliable.

Security Plan for Radioactive Sources

25.(1) An authorised person shall prepare a security plan for radioactive material in use or storage in Security Levels A, B, C and associated facilities.

- (2) The authorised person shall ensure that the security plan
 - (a) at a minimum, contains the topics contained in the Second Schedule;
 - (b) is tested and evaluated annually against the security objectives and measures required for Security Level A or B, as applicable;
 - (c) is reviewed based upon the results of the tests, the identified deficiencies in the plan or security systems are promptly remedied and reported to the Authority; and
 - (d) including any modification is submitted to the Authority for approval.

Compensatory Security Measures for Mobile and Portable Radioactive Sources

26. (1) An authorised person shall, where it is not feasible to fully meet the requirements of regulation 21 to 24 for mobile or portable radioactive sources, that include in the application and the security plan a description of the measures that will be used to provide an equivalent level of security.

- (2) The authorised person shall adopt compensatory measures approved by the Authority which shall, at a minimum, include
 - (a) immediate detection, effective delay and timely response by operating or security personnel against unauthorised access to or removal of a radioactive source;
 - (b) availability of two persons, each equipped with an independent communication device, to communicate with the response personnel; and
 - (c) identification of the presence of radioactive sources through physical checks after every use in the field.
- (3) A Compensatory measure is valid only for the period indicated in the specific authorisation, after which the security measures prescribed in the licence shall be re-established.

Specific or Increased Security Threat or Vulnerability

27. In case of a real or a perceived threat targeting radioactive material, the authorised person shall

- (a) conduct vulnerability assessment and if required by the Authority, implement additional security measures;
- (b) follow pre-arranged procedures with the law enforcement agencies regarding intelligence information on increased threat;
- (c) continue increased security measures until it is determined that the specific threat is no longer present; and
- (d) provide increased security measures for Security Level A and B during periods of delivery, shipment, or under other vulnerable conditions.

Reporting of Events for Security Level A and B

- 28.** (1) An authorised person shall in addition to complying with regulation 10,
- (a) take immediate remedial actions and inform local law enforcement agencies;
 - (b) within twenty-four hours, give notice to the Authority;
 - (c) within seventy-two hours, submit a preliminary report to the Authority; and
 - (d) within thirty days, submit a detailed report to the Authority on the causes of the event, its circumstances and consequences, and on the corrective actions taken or to be taken.
- (2) Where the authorised person fails to take the required corrective or preventive actions within thirty days, the Authority shall enforce the appropriate sanction.

Physical Protection of Nuclear Material and Nuclear Installations - General Requirements

Responsibility for Physical Protection

- 29.** An authorised person shall
- (a) be responsible for the design, implementation, operation and maintenance of physical protection systems to secure the nuclear material and nuclear installation;
 - (b) cooperate and coordinate with the Authority and other organisations that have responsibilities relating to the physical protection of nuclear material and nuclear installations;
 - (c) ensure physical protection measures are integrated and effective against unauthorised removal and sabotage, and are designed on the basis of a more stringent applicable requirement; and
 - (d) ensure physical protection measures are based on the principle of defence in depth and a graded approach.

System for Nuclear Material Accounting and Control

- 30.** An authorised person shall
- (a) account for the nuclear material in the facility at all times;

(b) give notice to the Authority of confirmed accounting discrepancies indicated or revealed by accounting and control system within twenty-four hours after the revelation of the discrepancy; and

(c) ensure that physical protection interface with safety, safeguards and nuclear material accounting and control activities are managed in a manner that enables these functions to be mutually supportive and not adversely affect each other.

Security Plan for Nuclear Installations and Nuclear Material in Use and Storage

31. An authorised person shall

(a) ensure there is an approved security plan in place at all times for Categories I, II and III nuclear materials and installations, with potential high radiological consequences due to an emergency;

(b) review the security plan every two years to ensure it is up to date and in accordance with the evolving threat; and

(c) submit a proposed new or amended security plan to the Authority for approval before making modifications that affect the effectiveness of the physical protection system.

Contingency Plan for Nuclear Installations and Nuclear Material in Use and Storage

32. An authorised person shall

(a) prepare a contingency plan to effectively counter the threats identified in the alternate threat statement or design basis threat;

(b) submit the contingency plan for approval by the Authority as a part of the security plan of the entity;

(c) implement and regularly test the contingency plan through simulation exercises, including coordination between the guards and response forces at least once a year with one full scale exercise;

(d) notify the Authority before conducting a simulation exercise on the contingency plan;

(e) ensure that the Authority is represented to observe at least one simulation exercise of the contingency plan each year;

(f) assess the interface of the contingency plan with the emergency preparedness and response plan of the installation through periodic joint simulation exercises; and

(g) ensure that during emergency conditions and exercises, the effectiveness of the physical protection system is maintained.

Compensatory Measures

33. An authorised person shall

(a) identify measures to compensate for degraded or inoperable equipment, systems, and components and for physical protection equipment that is temporarily taken out of service;

- (b) ensure the compensatory measures provide a level of protection that is equivalent to the protection that was provided by the equipment, system, or components before degradation or inoperability; and
- (c) implement compensatory measures as identified in the security plan.

Reportable Security Events

- 34.** An authorised person shall, in addition to complying with regulation 10, report the following types of nuclear security events as required by regulation 35:
- (a) attempted or actual acts of sabotage, including tampering or interference with vital areas of equipment, systems, or devices;
 - (b) events reportable in accordance with the trustworthiness programme; and
 - (c) compromise or attempted compromise of computers or computer systems used for physical protection, nuclear safety, safeguards or nuclear material accounting systems.

Security Event Reporting

- 35.** An authorised person shall, where an event specified in regulation 34 occurs,
- (a) take immediate action to remedy the situation;
 - (b) give notice of the event to the Authority within twenty-four hours;
 - (c) investigate the event and its causes, circumstances, and consequences within fourteen days and
 - (d) submit to the Authority within thirty days, a report on the causes of the event, the circumstances and consequences of the event, and the compensatory measures or corrective actions taken or to be taken in accordance with regulations 13 and 33.

Requirements for Protection Against Unauthorised Removal of Nuclear Material in Use and Storage - Category III Nuclear Material

Limited Access Area

- 36.** An authorised person shall use or store Category III nuclear material within a limited access area that satisfies the requirements specified in regulation 37 to 40.

Intrusion Detection and Response

- 37.** An authorised person shall
- (a) make provisions for detecting unauthorised intrusion into the limited access area; and
 - (b) provide appropriate response action by sufficient guards and /or state level response forces to address a nuclear security event.

Procedures for Nuclear Material Handlers

- 38.** An authorised person shall establish procedures
- (a) required by nuclear material handlers for transferring custody of Category III nuclear material; and
 - (b) that ensure that nuclear material handlers
 - (i) on reporting to duty, ascertain that no interferences with unauthorised removal has taken place; and
 - (ii) report to a senior authority whenever they have reason to suspect that a discrepancy exists.

Protection of Technical Means for Access Control

- 39.** An authorised person shall protect
- (a) the technical means of access control, such as keys and computerized access lists; and
 - (b) against manipulation, falsification or other forms of compromise.

Movements of Nuclear Material within a Limited Access Area

- 40.** An authorised person shall apply prudent and necessary physical protection measures for movements of Category III nuclear material within a limited access area.

Requirements for Protection Against Unauthorised Removal of Nuclear Material in Use and Storage - Category II Nuclear Material

Additional Requirements to be Implemented for Category II Nuclear Materials

- 41.** An authorised person shall, in addition to the requirements specified in regulation 36 to 40, implement the requirements in regulations 42 - 49 for Category II nuclear material.

Protected Area

- 42.** An authorised person shall
- (a) use or store Category II nuclear material within at least a protected area located inside a limited access area;
 - (b) ensure that the protected area perimeter is equipped with
 - (i) a physical barrier that is designed and constructed to prevent unauthorised access into the protected area;
 - (ii) multiple complementary detection devices and tamper-indicating devices which are redundant and diverse to detect intrusion into the protected area; and

- (iii) appropriate protection measures to facilitate an immediate assessment of the cause of the alarm;
- (c) ensure that the protection measures specified in regulation 420,
 - (i) are configured to provide time for assessment of the cause of alarms; and
 - (ii) provide adequate delay for an appropriate response under all operational conditions; and
- (d) ensure that appropriate action is taken based on the alarms generated by the intrusion detection system; and
- (e) ensure that the number of access points into the protected area is kept to the minimum necessary, and that all points of potential access are appropriately secured and fitted with alarms.

Detection and Prevention of Unauthorised Access

43. An authorised person shall

- (a) establish measures under which vehicles, persons and packages entering or leaving a protected area are searched to detect and prevent
 - (i) unauthorised access; and
 - (ii) the introduction of prohibited items or removal of nuclear material;
- and
- (b) strictly minimise the entry of vehicles into a protected area and limit the vehicles to designated parking areas.

Authorised Access to Protected Area

44. An authorised person shall

- (a) establish measures and procedures to allow access to the protected area to persons and vehicles in accordance with the rules on authorised escorted and unescorted access;
- (b) ensure the number of persons entering the protected area are kept to the minimum necessary and all points of potential access are appropriately secured and fitted with alarms;
- (c) ensure that persons authorised for unescorted access to the protected area are part of the trustworthiness programme;
- (d) ensure that persons whose trustworthiness have not been determined are escorted by persons authorised for unescorted access;
- (e) ensure that the identity of authorised persons entering the protected area is verified;
- (f) ensure that passes or badges are issued and visibly displayed inside the protected area; and
- (g) keep a record of persons who have access to or are in possession of keys, key cards or other systems, including computers or computer systems that control access to nuclear material.

Procedures for Nuclear Material Handlers

45. An authorised person shall

- (a) establish procedures required by nuclear material handlers for transferring custody of Category II nuclear material; and
- (b) report any interference with or unauthorised removal of nuclear material.

On-Site Movements of Nuclear Material between Protected Areas

46. An authorised person shall

- (a) establish measures under which on-site movements of Category II nuclear material between two protected areas, are conducted in compliance with the requirements for nuclear material during transport; and
- (b) take into account existing physical protection measures at the nuclear installation.

Alarm Stations

47. An authorised person shall

- (a) establish a permanently staffed central alarm station, for the monitoring and assessment of alarms, initiation of response, communication with guards, response forces and nuclear installation management;
- (b) locate the central alarm station in a protected area, or other area with commensurate protection that is protected by hardening or other means so that its function can be continued in the presence of a threat;
- (c) strictly minimize and control access to the central alarm station;
- (d) provide alarm equipment, alarm communication paths, and the central alarm station with an uninterruptible power supply and tamper-protection equipment against unauthorised monitoring, manipulation and falsification; and
- (e) provide dedicated, redundant, secure and diverse transmission systems for two-way voice communication between the central alarm station and the guards and response forces for activities involving detection, assessment and response.

Guards and Response Forces

48. An authorised person shall

- (a) provide for a twenty-four-hour guard service and response force to effectively counter any attempted unauthorised removal;
- (b) ensure that the central alarm station personnel communicate with response forces at scheduled intervals;
- (c) facilitate the efficient performance of functions and coordinate with response forces by ensuring that they are appropriately trained and adequately equipped for their functions; and
- (d) ensure that guards conduct random patrols of the protected area.

Evaluation of Physical Protection Measures and System

49. An authorised person shall

- (a) regularly conduct evaluations to determine reliability and effectiveness against the threats identified in the design basis threat;
- (b) ensure that the evaluations include
 - (i) performance testing of the physical protection measures and of the physical protection systems; and
 - (ii) timely and efficient response of the guards and response forces;
- (c) conduct the evaluation exercises regularly;
- (d) carry out these evaluations in cooperation with response forces; and
- (e) report any deficiencies identified together with action taken to correct the deficiencies in accordance with Regulation 35.

Requirements for Protection Against Unauthorised Removal of Nuclear Material in Use and Storage - Category I Nuclear Material

Additional Requirements to be Implemented for Category I Nuclear Materials

50. The authorised person shall, in addition to the requirements specified in regulation 36 to 49, implement the following requirements in regulations 51-59 for Category I nuclear material.

Inner Area

51. An authorised person shall

- (a) use or store Category I nuclear material within an inner area inside a protected area;
- (b) ensure that the inner area provides a layer in addition to the protected area for detection, access control and delay against unauthorised removal and is secured and fitted with alarms appropriately;
- (c) ensure that the inner area provides sufficient delay against unauthorised access to allow for a timely and appropriate response to an unauthorised removal; and
- (d) ensure that delay measures are designed and implemented considering both insiders' and external adversaries' capabilities, are taken into account and balanced for all potential means of intrusion.

Detection and Prevention of Unauthorised Access to Inner Area

52. An authorised person shall

- (a) establish measures under which land vehicles, persons and packages
 - (i) are searched on entering and leaving an inner area to detect and prevent unauthorised access and the introduction of prohibited items; and
 - (ii) leaving the inner area are searched to detect and prevent unauthorised

removal;

(b) ensure that the number of access points into the inner area is kept to the minimum necessary and that all potential access points are appropriately secured and fitted with alarms;

(c) install vehicle barriers at an appropriate distance from the inner area to prevent the penetration of unauthorised land and waterborne vehicles, as specified in the design basis threat; and

(d) ensure that private vehicles are strictly prohibited inside the inner areas.

Authorised Access to Inner Areas

53. An authorised person shall

(a) establish additional technical and administrative measures for access control for persons and vehicles requiring access to the inner area;

(b) ensure that the number of persons entering the inner area are kept to the minimum necessary;

(c) ensure that persons authorised for unescorted access to the inner area are part of the trustworthiness programme;

(d) ensure that persons whose trustworthiness have not been determined are escorted by persons authorised for unescorted access;

(e) ensure that identity of persons entering the inner area are verified and passes or badges are visibly displayed inside the inner areas;

(f) establish and implement a programme to ensure the trustworthiness of persons for the purpose of granting authorised access to

(i) sensitive information and sensitive information assets; or

(ii) nuclear materials and their associated facilities and activities;

(g) ensure that trustworthiness programme is approved by the Authority; and

(h) keep a record of all persons who have access to or in possession of keys, key cards and/or other systems, including computers or computer systems that control access to nuclear material.

Continuous Surveillance of Activity in Inner Area

54. The authorised person shall ensure detection of unauthorised action by constant surveillance, through the two-person rule, other equivalent means or alternate means to counter the insider threat, whenever an inner area is occupied.

Access Control Records

55. The authorised person shall:

(a) maintain a record of persons having access to inner areas and of persons who have access to or in possession of keys, key cards and other systems, including computers and computer systems, which control access to nuclear material or to inner areas; and

(b) retain the records of access control for three years.

Hardened Room or Enclosure

56. An authorised person shall

(a) store Category I nuclear material in a hardened room or hardened enclosure inside the inner area that provides an additional layer of detection and delay against unauthorised removal;

(b) ensure that the hardened room or enclosure is locked and alarms activated except during authorised access to the material; and

(c) establish equivalent compensatory physical protection measures when Category I nuclear material is temporarily kept in an unoccupied work area outside the hardened room.

Procedures for Nuclear Material Handlers

57. An authorised person shall establish procedures required among nuclear material handlers for transferring custody of Category I nuclear material and reporting that no interference with or unauthorised removal has taken place.

On-Site Movements of Nuclear Material between Inner Areas

58. An authorised person shall establish measures under which on-site movements of Category I nuclear material between two inner areas are conducted in compliance with the requirements for nuclear material during transport, taking into account existing physical protection measures at the installation.

Evaluation of Physical Protection Measures and System

59. An authorised person shall

(a) conduct evaluations including performance testing of the physical protection system at least annually and whenever there is a major change in the system;

(b) ensure that the performance testing includes appropriate exercises, for example force-on-force exercises;

(c) conduct evaluations to determine reliability and effectiveness against the threats identified in the design basis threat;

(d) ensure that the evaluations includes

(i) performance testing, of the physical protection measures and of the physical protection system;

(ii) timely and efficient response of the guards and response forces; and

(iii) conduct of table-top exercises, modelling and simulation;

(e) carry out the evaluations in cooperation with response forces; and

(f) report any deficiencies identified together with action taken to correct the deficiencies in accordance with regulation 35.

Requirements for Protection Against Unauthorised Removal of Nuclear Material in Use and Storage - Measures to Locate and Recover Missing or Stolen Nuclear Material

Associated Measures

- 60.** An authorised person shall, in addition to regulation 10,
- (a) ensure that the system for nuclear material accounting and control and the physical protection system detect in a timely manner that any nuclear material is missing or stolen;
 - (b) within twenty-four hours after detection of a missing or stolen nuclear material, determine by means of a rapid emergency inventory whether any nuclear material is missing or stolen;
 - (c) ensure that after a nuclear security event, the system for nuclear material accounting and control is capable of providing accurate information about the potentially missing nuclear material in the nuclear installation;
 - (d) take all appropriate measures to locate and recover as soon as possible, any declared missing or stolen nuclear material on site;
 - (f) provide any other necessary assistance to relevant competent authority to locate and recover nuclear material off site and cooperate during subsequent investigations and prosecution;
 - (g) secure the material in situ as soon as possible after it has been located and identified and return it to the nuclear installation or to another installation authorised by the Authority; and
 - (h) include measures to locate and recover missing or stolen nuclear material in its contingency plan prepared in accordance with Regulation 32.

Requirements for Protection Against Unauthorised Removal of Nuclear Material in Use and Storage - Protection of other Nuclear Material

Prudent Management Practice

- 61.** An authorised person shall apply prudent management practices
- (a) for nuclear material which is in a form that is no longer usable for any nuclear activity;
 - (b) that minimise environmental dispersal;
 - (c) that provide for the management of nuclear material that is practicably irrecoverable;
 - (d) for nuclear material having quantities not falling in Category III;
 - (e) natural uranium, depleted uranium and thorium; and
 - (f) that are appropriate to protect nuclear material against unauthorised removal and unauthorised access.

Additional Requirements to Unauthorised Removal of Nuclear Material

62. An authorised person shall, in addition to the requirements for unauthorised removal of nuclear material specified in regulation 36 to 61, comply with the requirements for protection against sabotage in regulation 63.

Sabotage Scenarios

63. The authorised person shall define credible scenarios in the security plan by which adversaries could sabotage its nuclear installation or nuclear material, based on the design basis threat.

Assessment of Consequences and Identification of Vital Areas

64. An authorised person shall
- (a) determine the consequence level for its nuclear installation based on the adopted thresholds for unacceptable radiological consequences and high radiological consequences of the Authority as specified in Table 5 of Third Schedule;
 - (b) depending on the established consequence level, provide the required physical protection measures and, where necessary, identify and designate vital areas; and
 - (c) identify vital areas of its nuclear installation.

Physical Protection System Design

65. An authorised person shall
- (a) design nuclear security system in an integrated manner, using graded and balanced approach and providing defence in depth for the material, associated facilities or activities in addition to requirements specified in regulations 36 to 61;
 - (b) evaluate the effectiveness of the design of the physical protection system, to verify whether or not it complies with the required level of protection for the nuclear installation and nuclear material;
 - (c) ensure that the results of the evaluation are subject to verification by the Authority;
 - (d) in case the applicable nuclear security requirements for protection are of different stringency either due to
 - (i) the presence of different categories of material that are stored, used or transported together, or
 - (ii) potential of unauthorised removal and sabotage,ensure that the more stringent requirements are applied.

Vital Areas

66. An authorised person shall

- (a) locate nuclear material in an amount which if dispersed could not lead to high radiological consequences within one or more vital areas, located inside a protected area;
- (b) locate a minimum set of equipment, systems or devices needed to prevent high radiological consequences within one or more vital areas;
- (c) ensure that the vital areas meet the same requirements for inner areas specified in Regulations 51 to 60, and in addition have the capacity to enable
 - (i) timely detection and reporting to the Authority of tampering or interference with the equipment, systems or devices in the vital area;
 - (ii) strict access control to be maintained during shutdown or maintenance period;
 - (iii) searches and testing to be conducted to detect any tampering that may have occurred before the installation start-up, during shutdown or maintenance; and
 - (iv) delay against unauthorised access to allow for a timely and appropriate response to an act of sabotage consistent with the design basis threat; and
- (d) design the measures for management of vital areas taking into consideration both insider and external threat capabilities and the need to be balanced in tackling all potential points of intrusion.

Requirements for Protection Against Sabotage of Nuclear Facilities and Nuclear Material in Use and Storage - Nuclear Installations and Nuclear Material with Unacceptable Radiological Consequence

Associated Measures

67. An authorised person shall implement the measures specified in Regulations 63 to 66 in a graded manner approved by the Authority.

Requirements for Protection Against Sabotage of Nuclear Facilities and Nuclear Material in Use and Storage - Measures to Mitigate and Minimise Radiological Consequences of Sabotage

Associated Measures

68. An authorised person shall

- (a) establish within the contingency plan, measures that
 - (i) prevent further damage from a sabotage event;
 - (ii) maintain physical protection of the nuclear installation; and
 - (iii) protect emergency equipment and personnel;
- (b) ensure that nuclear installation personnel are prepared to act in full

coordination with guards, response forces, law enforcement agencies and safety response teams for implementing the contingency plan;

(c) on detection of an act of sabotage or attempted sabotage, assess whether that act could lead to radiological consequences;

(d) notify the Authority and any other competent authority of sabotage or attempted sabotage that could lead to radiological consequences immediately; and

(e) immediately following an act of sabotage, implement the measures specified in the contingency plan for mitigating and minimising the radiological consequences of sabotage.

Requirements for Protection Against Sabotage of Nuclear Facilities and Nuclear Material in Use and Storage - Other Nuclear Installations and Nuclear Material Not Resulting in Unacceptable Radiological Consequences

Prudent Management Practice

- 69.** An authorised person shall, where the potential radiological consequences of sabotage are less severe than acceptable radiological consequences, protect safety-related equipment and devices by prudent management practice.

Determination of Security Level of Protection

70. An authorised person shall

- (a) determine the category of nuclear material or radioactive material being transported and assign the security level of protection in accordance with the categorisation rules stipulated in Tables 1 and 2 of the First Schedule and Table 3 of the Third Schedule; and
- (b) aggregate the total amount of nuclear material or activity of radioactive material to be transported in a single conveyance for the purpose of determining the category of particular consignment, in accordance with the aggregation formula stipulated in the First Schedule.

Application for Authorisation to Transport Nuclear and Other Radioactive Material.

71. (1) A person shall not transport nuclear material or other radioactive material if that person does not have a permit granted by the Authority.

(2) The permit may be obtained on application to the Authority.

(3) The application for a permit to transport nuclear material or other radioactive material, other than a permit to transport while in transit, or a permit to transport under special arrangement, shall contain the following:

- (a) the name of the applicant and the address of the facility;
- (b) the activity for which the permit is sought and the purpose of the activity;
- (c) the name, maximum quantity and form of nuclear and other radioactive substance to be encompassed by the permit;
- (d) a description of any nuclear facility prescribed equipment or prescribed information to be encompassed by the permit;
- (e) the proposed measures to control access to the site;
- (f) the proposed measures to prevent loss or illegal use, possession or removal of the nuclear and other radioactive substance, prescribed equipment or prescribed information;
- (g) a description and the results of any test, analysis or calculation performed to substantiate the information included in the application;
- (h) the organisational management structure of the applicant to the extent that that structure has a bearing on the compliance with Act 895 by the applicant and the regulations made under the Act, including the internal allocation of functions, responsibilities and authority; and
- (i) a description of any proposed financial guarantee relating to the activity to be permitted.

(4) The Authority may request the applicant to submit any other information that the Authority considers to be necessary to determine whether the applicant

- (a) is qualified to carry on the activity to be permitted; or
- (b) has the capacity in carrying on that activity, to
 - (i) make adequate provision for the protection of the environment, the health and safety of persons, and the maintenance of national security; and
 - (ii) institute measures required to implement international obligations to which Ghana has agreed.
- (5) An application shall, in addition to any other information required, contain a written transport security plan;
- (6) The transport security plan shall contain
 - (a) the name, quantity, radiation level, chemical and physical characteristics and isotopic composition of the nuclear and other radioactive material;
 - (b) a description of the conveyance;
 - (c) the proposed security measures; and
 - (d) the communication arrangements made among the authorised person, the operator of the land vehicle transporting the nuclear material, the recipient of the material and any offsite response force along the route.

Application for Transit Permit.

72. (1) A person shall not transport a nuclear or other radioactive material in transit, if that person does not have a permit issued for that purpose by the Authority.

(2) The permit may be obtained on application to the Authority.

(3) The application for a permit to transport a nuclear or other radioactive material in transit shall contain, among others, the following:

- (a) the name, address and telephone number of the shipper;
- (b) a description of the nuclear and other radioactive material, including the name, the chemical and physical form, the activity, or in the case of fissile material, the mass of each nuclear material in a package;
- (c) the total quantity of the activity or mass in the consignment;
- (d) the country of origin of the nuclear and other radioactive material;
- (e) the name and address of each receiver;
- (f) the reason for selecting a route through Ghana;
- (g) the name of every carrier;
- (h) the route and schedule;
- (i) the dates, times and locations of arrival into and departure from Ghana;
- (j) the date, time and location of any scheduled stop or trans-shipment in Ghana;
- (k) the number of packages that are to be transported;
- (l) the type of conveyance to be used during transit;
- (m) where a vessel is to be used as a conveyance during transit, the name of the vessel and its flag State;

- (n) where the nuclear material is to be transported by sea, the International Maritime Dangerous Goods Code transport schedule number for the nuclear substance;
- (o) the United Nations number for the nuclear or other radioactive materials; and
- (p) contact information of crew and security measures taken.

Key Control

73. An authorised person shall establish procedures to ensure the security of keys to conveyances and security locks, commensurate with the category of the nuclear material or radioactive material being transported.

Application for International Shipments

74. (1) The authorised person shall submit an application for transport to the Authority,
- (a) in the case of Category III nuclear material, at least thirty days before shipment;
 - (b) in the case of Category II nuclear material at least sixty days before shipment; and
 - (c) in the case of Category I nuclear material at least ninety days before shipment.
- (2) The authorised person shall, before commencing shipment, ensure that the requirements of the Authority in respect of the shipment, and the requirements of other countries through which the material will be transited are met.

Responsibilities of the Authorised Person

75. (1) An authorised person shall be responsible for the security of nuclear material or radioactive material during transport from the departure of the consignment from the facility of the shipper until the delivery of the consignment to the receiver.
- (2) A person who receives nuclear material or radioactive material shall be responsible for the take security of the transported nuclear material or radioactive material upon the delivery, whatever the place of delivery, whether in a facility, on a conveyance or at anywhere else agreed upon.
- (3) The authorised person shall,
- (a) where a package is found to be missing, take immediate action to determine if the missing package has been misplaced but still under its control; and
 - (b) where a package is determined to be missing or to have been tampered with, give notice to the Authority the shipper, and receiver within twenty four (24) hours after the determination.

Provision for Air Transport

76. An authorized person shall ensure that for air transport, shipment is carried out in accordance with the applicable security provisions of annexes 17 and 18 of the Convention on International Civil Aviation and the International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air.

Provision for Maritime Transport

77. An authorised person shall ensure that for maritime transport, shipment is carried out in accordance with the applicable security provisions of the International Ship and Port Facility Security Code and of the International Maritime Dangerous Goods Code as required by the International Convention for the Safety of Life at Sea, SOLAS 74 as amended.

Provision for Rail Transport

78. An authorised person shall, where transportation is by rail, comply with the provisions of the Railways Act 2008, (Act 779) and relevant national regulations for rail transport in addition to the provisions in these Regulations.

Security Measures and Requirements Below Security Level C

79. A person who handles a nuclear or radioactive material below Level C, shall apply prudent management practices.

Prudent Management Practices

80. (1) An authorised person shall

- (a) ensure that an employee who is involved with the transport of nuclear material or radioactive material holds verifiable documentation, including
 - (i) licences, certificates and operating documents where applicable; and
 - (ii) the necessary work permits;
- (b) maintain records associated with the custody and movement of the material;
- (c) provide a person transferring and receiving nuclear material or radioactive materials with a photographic identification card and establish procedures to positively verify the identification document of an individual from another organisation;
- (d) establish the reliability of employees who are involved in the transport of nuclear material or radioactive material;
- (e) provide the driver with the appropriate shipping papers, including a manifest with a schedule and an inventory of the packages;
- (f) track packages by counting and through the use of unique tamper indicating seal numbers;
- (g) employ access control for both the vehicle locks and the cargo compartment locks and restrict access to only those persons that have a need to access the material;
- (h) provide each driver with appropriate operational instructions and training
 - (i) that explain the roles and responsibilities of the driver;
 - (ii) that details the expected security practices and precautions to ensure the safety and security of the driver as well as of the cargo; and

- (iii) to direct the actions of the driver during the transportation of the nuclear material or radioactive material and during planned interim stops including fueling breaks and driver relief;
 - (i) provide the driver with the appropriate equipment including company photographic identification to associate the driver with the shipment;
 - (j) ensure that the transport of nuclear material or radioactive material is only done with authorised vehicles; and
 - (k) ensure that the vehicle used for the transportation of nuclear material or radioactive material is properly maintained, inspected and covered with the appropriate levels of insurance.
- (2) A driver of a vehicle which is transporting nuclear material or radioactive material shall not leave the vehicle unattended in a public place or out of sight.
- (3) The driver shall keep the vehicle and the cargo area locked at all times to prevent unlawful removal of any of the material being transported.
- (4) The driver shall communicate with the control point upon departure, arrival and during any planned or unplanned stops.

Security Measures and Requirements for Security Level Against Unauthorised Removal During Transport

Additional Requirements for Nuclear Material or Radioactive Material with Security Level C

81. An authorised person shall, in addition to the requirements stated in regulation 80, comply with the requirements in regulation 82 to 92, in respect of nuclear material or radioactive material with Security Level C.

Written Procedures

82. An authorised person shall provide crew members engaged in the transportation of nuclear material or radioactive material, with written procedures on security measures required by the Authority and ensure that the procedures include information on how to respond to a security incident during transportation.

Shipper and Carrier Credentials

83. Each crew member of a vehicle that transports nuclear or other radioactive material shall carry a means of positive identification during the transportation which shall include an officially issued photographic identification that uniquely identifies the individual.

Continuity of Security Measures

84. (1) The crew of a vehicle that transports nuclear material or radioactive material shall ensure that where the vehicle

(a) makes an expected or unexpected stop, the security measures appropriate for that category of nuclear or other radioactive material in transit is maintained; and

(b) is left unattended, the conveyance is secured by locking the vehicle and cargo compartment, as applicable;

(3) An authorised person shall ensure that

(a) where nuclear or other radioactive material is stored in transit, in areas within temporary storage terminals, temporary storage sites, vehicle depots, berthing areas and marshalling yards used for the temporary storage during carriage of nuclear or other radioactive material, the areas are properly secured, well-lit and, where possible and appropriate, not accessible to the general public; and

(b) security measures are applied to the material in a manner consistent with the measures applied during use and storage.

Route Selection

85. An authorised person shall

(a) ensure that the route used for transportation of nuclear material or radioactive material is a route that avoids areas of natural disaster, civil disorder or known threat; and

(b) verify availability and security related characters of the selected route before the commencement of the transportation.

Transport Schedule

86. An authorised person shall ensure that the duration of the transportation time, that is the time spent by a vehicle from the point of departure to the destination, and the mode of transport is managed in a manner that

(a) minimizes the total time during which the nuclear and other radioactive material remains in transport;

(b) minimizes the number and duration of nuclear and other radioactive material transfers including transfer from one conveyance to another, transfer to and from temporary storage, and temporary storage while awaiting the arrival of a conveyance;

(c) minimizes the number of transports and re-loading;

(d) avoids the regularity in scheduling of transports;

(e) ensures that where the transport takes more than one day, the transport is arranged without stops by providing for more drivers to be changed, or a guarded and monitored night-time stop meeting and that the security requirements of are arranged in advance; and

(f) ensures that a stop that takes more than twelve hours is avoided and arrangements are made with the Police or other authorised persons along the route to ensure a secure compound is available for temporary or emergency storage.

Advance Notification and Coordination

87.(1) An authorised person shall, before shipping nuclear material or radioactive material, verify with the Authority whether the receiver is authorised to possess the nuclear material or radioactive material.

(2) The authorised person shall provide advance notification to the receiver and the Authority, of the of the planned shipment, mode of transport, expected delivery time and the exact point of handover, if this is to be done at some intermediate point before the ultimate destination.

(3) The advance notice shall be supplied at least thirty days before the shipment, to enable the receiver to make adequate security arrangements for receiving the shipment.

Conveyance Verifications

88.(1) An authorised person shall before the commencement of transportation conduct security verifications of the package and vehicle to ensure that the security measures associated with the vehicle are effective.

(2) the verification shall include a visual inspection of the package and vehicle to ensure that nothing has been tampered with and that nothing has been affixed to the package or vehicle that might affect the security of the consignment.

(3) The authorised person shall

(a) conduct a pre-shipment security verification well in advance of shipments, to ensure that deficiencies are identified and that there is time is available to resolve them;

(b) conduct a pre-shipment verification to ensure that all security measures described in the transport security plan are in place and operational;

(c) ensure that prior to loading and dispatch, conveyance checks for malicious acts or tampering are performed, using a standard set of instructions and check lists;

(d) ensure that corrective actions are taken upon identifying elements that are deficient.

(e) ensure that shipment is not made, if corrective action has not been taken undertaken.

(f) ensure that corrective action that is likely to result in security measures not described in the Transport Security Plan is approved by Authority before the commencement of shipment.

(4) The authorised person shall keep records of verifications and corrective actions taken.

Checks and Notification on Receipt

89. (1) An authorised person shall ensure that a person who receives transported nuclear material or radioactive material, checks the integrity of the packages, locks and seals immediately upon arrival of the transported material to determine if the security of the consignment has not been compromised, before accepting the shipment.

(2) The authorised person shall ensure that the person who receives the material has procedures in place to verify the contents of the package, and to notify the Authority if

(a) nuclear material or radioactive material is discovered to be missing; or

(b) a package is not delivered by the expected time.

(3) The authorised person shall ensure that there is communication between the receiver and the shipper of the material on the arrival or non-arrival of the shipment after the scheduled time of arrival at the destination.

(4) The authorised person shall, where in the course of an examination, it is determined that a package or the contents of a package been lost, stolen or diverted, take action to locate and recover the package or its contents and notify the Authority of the event within one (1) hour after the determination.

(5) The authorised person shall give notice to the shipper and the Authority

(a) within one (1) hour after the arrival of the shipment; and

(b) of the non-arrival within twenty-four (24) hours after the scheduled time of arrival of the material at the destination elapses.

Detection Measures

90. (1) An authorised person shall ensure that the package, vehicle and freight container incorporate seals and Tamper Indicating Devices that are not easily breakable.

(2) The authorised person shall

(a) verify the integrity of the seals of each package before the packages are dispatched and on the arrival of the packages; and

(b) establish procedures for the use of seals and Tamper Indicating Devices.

Delay Measures for Transport

91. An authorised person shall ensure that

(a) unless there are overriding safety or operational considerations, a package that contains nuclear or other radioactive material is carried in secure and closed or sheeted conveyances, compartments or freight containers;

(b) a package which weighs more than 2000 kg and which is to be transported on an open vehicle is locked and secured to the vehicle;

(c) where it is necessary to use an open vehicle the load shall, except where precluded by safety requirements, be covered or hidden from view;

(d) the package or over pack is locked to the compartment or freight container; and

(e) unless the Authority agrees otherwise, locks and seals are applied to conveyances, compartments or freight containers.

Communication with Response Force

92. (1) An authorised person shall establish a dedicated point of contact or a designated person who is responsible for all communications during transport.

(2) The authorised person shall provide a continuous two-way voice communication system between a vehicle that is transporting nuclear material or radioactive material and the guards accompanying the shipment, and the Law Enforcement Agency.

Measures and Requirements for Security Level B

93. An authorised person shall ensure that in addition to the requirements in Regulations 82 to 92, the requirements specified in Regulations 94 to 107 apply to Security Level B.

Advance Notification and Coordination

94.(1) An authorised person shall ensure that a person who is to receive nuclear material or radioactive material confirms before the commencement of transport, the ability and readiness of that person to accept delivery of the material at the expected time.

(2) The person who receives the nuclear material or radioactive material shall give notice to the shipper upon receipt of the material or if the shipment is not received within the expected delivery time frame.

(3) The authorised person shall ensure that the two-person rule applies to access to nuclear material or radioactive material.

(4) The nuclear material or radioactive material shall be transported in a vehicle, which is designed to exclusively transports the given material.

(5) The authorised person shall, in the event that any aspect of the transport is subcontracted, ensure that the subcontractor complies with the transport security plan or has other equivalent security measures in place.

Authorisation of Shipment

95. An authorised person shall apply to the Authority for authorisation of each shipment, at least thirty days before the person to receive shipment is granted authority to commence transportation and the application shall contain the transport security plan.

Communication

96. An authorised person shall

(a) provide redundant capability for crew members of a vehicle engaged in the transportation of nuclear material or radioactive material to communicate with contact points specified in the transport security plan;

(b) avoid the use of open channels for transmission of messages concerning shipments of nuclear material or radioactive material;

(c) when a security-related message is transmitted, ensure that coding and appropriate routing or other equivalent measures are taken to the extent practicable; and

(d) ensure that care is exercised in the handling of transmitted information.

Conveyance Verification

97. An authorised person shall

- (a) take corrective actions upon identifying that one or more elements are deficient and inform the Authority of the corrective action for the purpose of approval;
- (b) ensure that without corrective action, a shipment is not undertaken; and
- (c) keep records of the corrective actions and make the records available to the Authority upon request.

Checks and Notification on Receipt

98. A person who receives transported nuclear material or radioactive material shall give notice to the shipper and the Authority

- (a) within one (1) hour after the receipt; and
- (b) of the non-arrival of the material within twenty-four (24) hours after the scheduled time of arrival of the material at the destination.

Transport Security Plan

99.(1) An authorised person shall, not later than thirty days before the transport of nuclear material or radioactive material submit a transport security plan for approval by the Authority.

(2) The transport security plan shall describe the measures to be implemented to ensure the security of the nuclear material and other radioactive material during transport.

(3) The authorised person shall

- (a) prepare a contingency plan to counter malicious acts effectively and to provide for appropriate response;
- (b) conduct exercises to assess and validate the transport security plan and to train the participants on how to respond to nuclear security events; and
- (c) include the transport schedule in the transport security plan.

Route Selection

100. An authorised person shall submit to the Authority, an alternative route and determine the conditions under which an alternative route would be used.

Detection Measures

101. An authorised person shall

- (a) ensure that
 - (i) the cargo, load compartment or vehicle used for the transportation of nuclear or other radioactive material is under continuous and effective surveillance of guards throughout the entire period of transportation until delivered to the person required to receive the material;
 - (ii) the vehicle used for the transportation is equipped with an access control system that requires the two-person rule, biometric verification or multiple verification to control authorised access to the cargo areas; and
 - (iii) the cargo compartment incorporates active seals;
- (b) apply intrusion detection system or engineered alarm to conveyances containing nuclear material or other radioactive material;

- (c) ensure that an audible or visual indicator which is exterior to the vehicle is used to indicate a breach of the cargo compartment or vault;
- (d) use a real time tracking system to monitor the movement of the conveyance.

Delay Measures

102. An authorised person shall

- (a) apply passive delay measures including the packaging, the cargo compartment and the conveyance doors, to provide sufficient time to intervene to prevent unauthorised removal;
- (b) ensure that the vehicle includes anti-theft systems with an alarm if an unauthorised access into the vehicle occurs; and
- (c) ensure that the vehicle includes a remote vehicle disablement or immobilization system.

Response Measures

103. An authorised person shall

- (a) where two or more vehicles are used for the transportation of nuclear material or radioactive material, provide secure and continuous two-way voice communication system between the vehicles, the guards accompanying the shipment, the police and where appropriate, the shipper and the person to receive the shipment;
- (b) in consultation with the Authority and the Police provide appropriate escort to accompany each shipment; and
- (c) in consultation with the Authority and other appropriate national response agencies provide for appropriate coordination and cooperation with response forces.

Additional Provision for Road Transport

104.(1) An authorised person shall protect the nuclear material or radioactive material during transportation on road which cannot be completed without overnight or extended stops.

(2) The authorised person shall store the material in a manner that is consistent with storage measures required to be employed at a nuclear or radiological facility and where appropriate, the vehicle shall

- (a) park in closed, locked, secure buildings, with the use of camera monitoring;
or
- (b) park in an enclosed fenced secure area under surveillance by guards equipped with instructions and means for contacting the police and the vehicle drivers.

(3) The authorised person shall ensure that temporary storage arrangements for the stops are approved in advance by the Authority as part of the transport security plan.

Additional Provision for Rail Transport

105. An authorised person shall ensure that

- (a) the nuclear material and other radioactive material are protected during rail movements that cannot be completed without overnight or extended stops;
- (b) the material is stored in a manner that is consistent with storage measures employed at a nuclear or other radiological facility; and
- (c) temporary storage arrangements for the stops are approved in advance by the Authority as part of the transport security plan.

Additional Provision for Air Transport

106. An authorised person shall ensure that loading of nuclear material or radioactive material is arranged in a manner that makes it unnecessary for the material to be unloaded at stopovers.

Additional Provision for Maritime Transport

107. An authorised person shall only consign nuclear material for international maritime transport to ships that are flagged to States that have made provisions for the physical protection of the nuclear material or radioactive material.

Security Measures and Requirements for Security Level A Against Unauthorised Removal during Transport

Additional Requirements for Security Level A

108. An authorised person shall, in addition to the requirements in regulation 94 to 107, comply with the requirements specified in Regulations 109 to 115 in respect of Security Level A.

Transport Control Centre

109. An authorised person shall

- (a) use a Transport Control Centre for the purpose of
 - (i) keeping track of the current location and security status of a shipment;
 - (ii) alerting response forces in case of an attack; and
 - (iii) maintaining continuous secure two-way voice communication with the shipment and the response forces;
- (b) maintain continuous, and secure two-way communication systems between a vehicle, the Transport Control Centre, the guards accompanying the shipment, the designated response forces, the shipper and the person required to receive the shipment; and
- (c) ensure that the guards and the crew of a vehicle engaged in the transportation of nuclear material or radioactive material are instructed to report orally to the transport control centre every thirty minutes, at each overnight stopping place, at any place of handover of the shipment, and upon arrival at the final destination.

Detection Measures

110. An authorised person shall apply intrusion detection system or engineered alarm to a vehicle containing nuclear material or radioactive material which shall be capable of being monitored from a Transport Control Centre, through secured channels.

Response Measures

111. An authorised person shall install a duress alarm on each vehicle that transports nuclear material or radioactive material.

Additional Provision for Road Transport

112. An authorised person shall ensure that

- (a) a consignment is shipped in a vehicle under exclusive use conditions;
- (b) during planned stops exceeding one hour, for the purpose of storage or change of route of shipment,
 - (i) a temporary protected area, to which access is restricted and which is under surveillance by guards that are in close communication with response forces,, is used; and
 - (ii) where the material is to remain on the load carrying vehicle, the vehicle is secured in order to deter or delay any unauthorised movement of the vehicle;
- (c) temporary storage arrangements for the stops are approved in advance by the Authority as part of the Transport Security Plan;
- (d) where in the course of the transportation of nuclear material or radioactive material, an overnight stop is necessary, prior arrangements are made for the stop, which shall be at an appropriately equipped and secured road stopover facility;
- (e) during a stop on a road, the vehicle that is carrying the material is immobilized and guarded or parked in a secure, locked and guarded building or facility;
- (f) planned stopover locations and arrangements are organized in advance;
- (g) for road transport, the vehicle that is conveying the material is escorted with at least one additional vehicle.

Additional Provision for Rail Transport

113. An authorised person shall ensure that

- (a) except where overriding safety considerations necessitate alternative measures providing an equivalent level of security, a package that contains nuclear material or radioactive material is carried in enclosed, locked rail vehicles or freight containers under exclusive use conditions;
- (b) where an extended stop is necessary, prior arrangements is made for the stop, which should be at an appropriately equipped and secured rail stopover facility;
- (c) the stopover facility is in a rail siding or terminal area, and the security arrangements for the facility are approved in advance by the Authority; and

(d) during the stop, the rail vehicle that is carrying the material is guarded or positioned in a secure locked and guarded rail yard, building or facility.

Additional Provision for Maritime and Inland Waterway Transport

114. (1) An authorised person shall ensure that

(a) nuclear material or radioactive material is placed in a secure compartment or freight container which is locked and sealed;

(b) a package of nuclear material or radioactive material is situated within the vessel, in a manner that enables the material to be protected by the design of the vessel, and provides for delay against any attack on the material;

(c) where an extended stop is necessary, prior arrangements are made for the stop, which shall be at an appropriately equipped and secured stopover facility;

(d) the security arrangements for a stopover facility are approved in advance by the Authority;

(e) during a stop, the vessel which is carrying the material is docked in a secure port facility;

(f) the appropriate authorities are alerted, as soon as possible, of any unscheduled stop of a shipment; and

(g) a scheduled or unscheduled stop occurs in a country other than the shipping country, the appropriate authorities in both the shipping country and the country where the stop occurs are notified.

Additional Provision for Air Transport

115 .(1) An authorised person shall

(a) arrange loading of nuclear material or radioactive material, as far as operationally practicable, in a manner that ensures that the nuclear material or radioactive material does not have to be unloaded at stopovers;

(b) where a stop or a change of aircraft is necessary, ensure that prior arrangement are made for the security of the consignment during ground operations and any necessary temporary storage, consistent with the security level of the nuclear material and radioactive material; and

(c) where a shipment is made in an aircraft, ensure that the material is kept in a secure compartment or container that is locked and sealed and approved by the Authority.

Transport of Nuclear and Other Radioactive Material - Other Security Measures and Requirements

Security Measures for Elevated Threat and for Protection against Sabotage

116. (1) In addition to the general requirements and requirements for protection against unauthorised removal in Regulations 80 to 115, the Authority may require additional security measures because of the threat or the nature of the material being transported.

(2) Where the Authority requests for additional security measures under sub-regulation (1), the authorised person shall implement the measures, and the measures may include

- (a) postponing the shipment;
- (b) rerouting the shipment to avoid high threat areas;
- (c) enhancing the robustness of the package, freight container or the vehicle;
- (d) increasing the number of escorting vehicles;
- (e) detailed route surveillance to observe the current environment; and
- (f) the provision of additional armed guards.

Miscellaneous

Penalties

117. A person who contravenes any of the provisions of these Regulations commits an offence and is liable to penalty provision in Regulation 80 of the Basic Ionising Radiation Control Regulations.

Appeals

118. A person who is not satisfied with a decision taken by the Authority may appeal in accordance with sections 81, 82, 83, 84 and 85 of the Nuclear Regulatory Authority Act, 2015 (Act 895).

Interpretation

119. In these Regulations, unless the context otherwise requires

“**A₂**” means Activity value of radioactive material, other than special form radioactive material, which is listed in Schedule IV of these regulations;

“**Accounting**” means physically checking the serial number, model number, type of source and the activity with an appropriate equipment to verify that all nuclear material and other radioactive material are present in their expected location;

“**Act**” means Nuclear Regulatory Authority Act, 2015 (Act 895);

“**Activity**” means number of nuclear transformations occurring per unit of time;

“**Administrative measures**” means the use of policies, procedures and techniques that direct personnel to securely and safely manage radioactive materials;

“**Associated activity**” means the possession, production, processing, use, handling, storage, disposal or transport of nuclear material or other radioactive material;

“**Associated facility**” means a facility including associated building and equipment in which nuclear material or other radioactive material is produced, processed, used, handled, stored or disposed off and for which an authorisation is required;

“**Authorisation**” means the granting by a regulatory body or other governmental body of written permission for a person or organisation to conduct specified practices or activities;

“**Authorised person**” means a person who has been granted authorisation;

“Carrier” means a person, organisation or government undertaking the carriage of nuclear and other radioactive material by any means of transport and it includes a carrier for hire or contract and private carrier;

“Central Alarm Station” means an installation which provides for the complete and continuous alarm monitoring, assessment and communication with guards, installation management and response forces;

“Competent Authority” means an organisation or institution that has been designated by Ghana or another country or State to carry out one or more nuclear security functions;

“Computers and Computer Systems” means the computation, communication, instrumentation and control devices that make up functional elements of the nuclear installation;

“Consignment” means a package or a load of nuclear material or other radioactive material, presented by a shipper for transport;

“Contingency Plan” means a plan prepared by the authorised person which incorporates predefined sets of actions for response to unauthorised acts indicative of attempted unauthorised removal or sabotage of, or threats to nuclear material or radioactive material, and designed to effectively counter those acts

“Configuration Management” means the process of identifying and documenting the characteristics of an installation’s physical protection system, together with computer systems and software, and of ensuring that changes to these characteristics are properly developed, assessed, approved, issued, implemented, verified, recorded and incorporated into the facility documentation of the facility;

“Cyber-attack” means an attempt to destroy, expose, alter, disable, steal, or gain unauthorised access to or make unauthorised use of an asset using cyber;

“Defense-in-depth” means the combination of multiple layers of systems and measures that have to be overcome or circumvented before nuclear security is compromised;

“Delay” means the element of a physical protection system designed to increase the time required for an adversary to gain unauthorised access to a nuclear and other radioactive material or sabotage to nuclear installation, generally through barriers or other physical means;

“Design Basis Threat” means the attributes and characteristics of potential insider or external adversaries, who might attempt unauthorised removal of nuclear and other radioactive material or sabotage, against which a physical protection system is designed and evaluated;

“Detection” means a process in a nuclear security system that begins with sensing an attempted malicious or other unauthorised act and that is completed with the assessment of the cause of the alarm;

“Disposal” means the emplacement of nuclear and other radioactive material in an appropriate facility without the intention of retrieval;

“Disused Source” means the radioactive source which is no longer used, and is not intended to be used, for the practice for which a license has been granted;

“Diversion” means the unauthorised movement of nuclear and other radioactive material to a location different from the material’s authorised destination inside or outside of the site at which the material is used or stored;

“Depleted Uranium” means Uranium containing a lesser mass percentage of Uranium-235 than natural Uranium;

“Enriched Uranium” means Uranium in which the percent composition of Uranium-235 has been increased through the process of isotope separation;

“Emergency plan” means A set of procedures to be implemented in the event of a radiation accident;

“Exceptional Circumstance Clause” means the situation where the management of a disused source is not possible and where the Authority may require the authorised person to seek international assistance either from the original supplier or other parties for the return of the disused source on the basis of mutually agreed terms and conditions;

“Exclusive use” means that a single shipper has sole use of the conveyance or large freight container and thus all loading and unloading is carried out in accordance with the directions of the shipper or receiver;

“Export” means the physical transfer of radioactive material or nuclear material and related equipment, information and technology determined by the Authority as originating from the country, into an importing State;

“Force-on-force exercise” means a performance test of the physical protection system that uses designated personnel in the role of an adversary force to simulate an attack consistent with the threat or the design basis threat;

“Fissile material” means Uranium-233, Uranium-235, Plutonium-239, Plutonium-241, or any combination of these radionuclides except

(a) Natural Uranium or Depleted Uranium which is un-irradiated, and

(b) Natural Uranium or Depleted Uranium which has been irradiated in thermal reactors only;

“Freight container” means an article of transport equipment designed to facilitate the transport of goods, either packaged or unpackaged, by one or more modes of transport without intermediate reloading which is of a permanent enclosed character, rigid and strong enough for repeated use, and which is fitted with devices facilitating its handling, particularly in transfer between conveyances and from one mode of transport to another;

“Graded approach” means the application of nuclear security measures proportional to the consequences of a potential malicious act;

“Guard” means a person who is entrusted with responsibility for patrolling, monitoring, assessing, escorting individuals or transports, controlling access and or providing initial response;

“IAEA” means the International Atomic Energy Agency;

“ICAO” means the International Civil Aviation Organization;

“Insider” means one or more individuals with authorised access to nuclear installation, nuclear material, or other radioactive material, associated activities, sensitive information and sensitive information assets, who could attempt unauthorised removal or sabotage, or any other intentional unauthorised act with implications for nuclear security, or who could aid an external adversary to do so;

“Inner Area” means an area with additional protection measures inside a protected area, where Category I nuclear material is used or stored;

“Integrated Management System” means a system that integrates all the systems and processes of an organisation into one complete framework, enabling the organisation to work as a single unit with unified objectives;

“Import”: The physical transfer, into the country, originating from an exporting State, of radioactive sources or nuclear material and related equipment, information and technology, as defined in these regulations;

“Inventory”: Physically checking the identification of each individual nuclear and other radioactive material possessed by the authorised person using appropriate means, such as serial numbers, manufacturer’s name, size, dimension and activity of the source;

“Law Enforcement Agency (LEA)”: Any security enforcement organization that has authority to carry firearms and make arrests, and is authorised and has the capability to provide an armed response in the jurisdiction where the licensed nuclear and other radioactive material is transported, or is in-transit, storage or in use or manufacture;

“Limited Access Area” means a designated area containing a nuclear installation or nuclear material to which access is limited and controlled for physical protection purposes;

“Management” means the administrative and operational activities that are involved in the manufacture, supply, receipt, possession, storage, use, transfer, import, export, transport, maintenance, recycling or disposal of nuclear and other radioactive material;

“Malicious act” means an intentional act or attempt of unauthorised removal of nuclear or other radioactive material or sabotage;

“Nuclear material” means (1) nuclear fuel, other than natural uranium capable of producing energy by a self- sustaining chain process of nuclear fission outside a nuclear reactor, either alone or in combination with some other material; the material categorised in Schedule III of these regulations; radioactive products or waste; nuclear material having quantities not falling in Category III; and natural uranium, depleted uranium and thorium;

“Nuclear security” means the prevention and detection of, and response to, theft, sabotage, unauthorised access, illegal transfer or other malicious act involving nuclear material, other radioactive material or their associated facilities and activities;

“Nuclear Security Culture” means the assembly of characteristics, attitudes and behaviours of individuals, organisations and institutions which serve as a means to support, enhance and sustain nuclear security;

“Natural Uranium” means Uranium containing the naturally occurring distribution of Uranium isotopes (approximately 99.28% Uranium-238 and 0.72% Uranium-235, by mass);

“Nuclear security threat” means a person or group of persons with motivation, intention and capability to commit criminal or intentional unauthorised acts involving or directed at nuclear material, other radioactive material, associated facilities or associated activities or other acts determined to have an adverse impact on nuclear security;

“Nuclear security event” means an event that is assessed as having implications for nuclear security;

“Orphan Source” means a radioactive source which is not under regulatory control because it has never been under regulatory control, or because it has been abandoned, lost, misplaced, stolen, or transferred without proper authorisation;

“Positive Identification” means an identification which positively identifies the individual, and which has been issued by the Government of Ghana or by a legally established organisation or agency;

“Practice” means a human activity that introduces additional sources of exposure or exposure pathways or extends exposure to additional people or modifies the network of

exposure pathways from existing sources, so as to increase the exposure or the likelihood of exposure of people or the number of people exposed;

“Performance Testing” means testing of the physical protection measures and the physical protection system to determine whether or not they are implemented as designed; adequate for the proposed natural, industrial and threat environments; and in compliance with established performance requirements;

“Physical Barrier” means a fence, wall or similar impediment which provides access delay and complements access control;

“Physical Protection Measures” means the personnel, procedures, and equipment that constitute a physical protection system;

“Physical Protection System” means an integrated set of physical protection measures intended to prevent the completion of a malicious act;

“Protected Area” means an area inside a limited access area containing Category I or II nuclear material or sabotage targets surrounded by a physical barrier with additional physical protection measures;

“Package” means the packaging with its radioactive content as presented for transport and for this purpose are in the nature of

- (a) excepted package;
- (b) industrial package Type 1 (Type IP-1);
- (c) industrial package Type 2 (Type IP-2);
- (d) industrial package Type 3 (Type IP-3);
- (e) Type A package;
- (f) Type B (U) package; and
- (g) Type B (M) package;

“Packaging” means one or more receptacles and any other components or materials necessary for the receptacles to perform the containment and other safety functions;

“Quality assurance” means the planned and systematic actions necessary to provide adequate assurance that a structure, system, component or procedure will perform satisfactorily in compliance with agreed standards and quality control;

“Radioactive content” means the radioactive material together with any contaminated or activated solids, liquids and gases within the packaging;

“Radioactive material” means anything containing radio nuclides that may cause radiation exposure or a naturally occurring radioactive material;

“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 and any radioactive material released through the breakage or leaking of the source, which is not nuclear material or radioactive material encapsulated for disposal;

“Radioactive Waste” means material, in whatever physical form, remaining from practices or interventions and for which further use is not foreseen that contains or is contaminated with radioactive substances and has an activity or activity concentration higher than the level set for clearance from regulatory requirements, and exposure to which is not excluded from the Act or Regulations made under the Act;

“Response Force” means a person, on-site or off-site, who is armed and appropriately equipped and trained to counter an attempted unauthorised removal or an act of sabotage;

“Response” means the action undertaken following detection to hinder an adversary from succeeding or to mitigate potentially severe consequences and typically performed by security or law enforcement personnel, and other State agencies, who in the process may interrupt and subdue an adversary while the attempted unauthorised removal or sabotage is in progress, preventing the adversary from using the nuclear and other radioactive material to cause harmful consequences, recovering the material, or otherwise reducing the severity of the consequences;

“Sabotage” means a deliberate act directed against a nuclear or radiological facility or nuclear material or other radioactive material in use, storage or transport that could directly or indirectly endanger the health and safety of personnel, the public and the environment by exposure to radiation or release of radioactive substances;

“Safety” means a measure intended to minimize the likelihood of accidents involving nuclear material and other radioactive material and where an accident should occur, to mitigate its consequences;

“Security Goal” means the overall result that the security system must be capable of providing for a given security level and only addresses unauthorised removal and intended to reduce the likelihood of a successful act of sabotage;

“Security management” means a measure that addresses access control, trustworthiness, information protection, preparation of a security plan, training and qualification, accounting, inventory and security event reporting the stringency of which varies as appropriate based on the graded approach;

“Security Manager” means a person duly designated by the authorised person as the point of contact for the implementation of security requirements;

“Security System” means an integrated set of nuclear security measures;

“Storage” means the holding of nuclear material or other radioactive material in a facility that provides for their containment with the intention of retrieval;

“Security Plan” means a document prepared by the authorised person and required to be reviewed and approved by the NRA that presents a detailed description of the security arrangements in place at an installation or in connection with transport;

“Sensitive Information” means information, in whatever form and encompasses software, the unauthorised disclosure, modification, alteration, destruction, or denial of use of which could compromise nuclear security;

“Sensitive Information Asset” means an equipment or component that is used to store, process, control or transmit sensitive information and encompasses control systems, networks, information systems and any other electronic or physical media;

“Shipment” means the specific movement of a consignment of nuclear material or other radioactive material from its origin to its destination;

“System for Nuclear Material Accounting and Control” means an integrated set of measures designed to provide information on, control of, and assurance of the presence of nuclear material, including those systems necessary to establish and track nuclear material inventories, control access to and detect loss or diversion of nuclear material, and ensure the integrity of those systems and measures;

“Shipper” means a person, organisation or government that prepares or offers a consignment of nuclear or other radioactive material for transport;

“Special arrangement” means special provisions, approved by Authority, under which nuclear material and radioactive material may be transported whenever the consignment does not satisfy all of the requirements of these Regulations;

“Special form radioactive material” means either an indispersible solid radioactive material or a sealed capsule containing radioactive material;

“Threat” means a person or group of persons with motivation, intention and capability to commit a malicious act;

“Threat Assessment” means an evaluation of the threats based on available intelligence, law enforcement, and open source information that describes the motivation, intentions, and capabilities of these threats;

“Timely Detection” means detection of any unauthorised access, which together with delay measures is sufficient to enable guards or response forces to interdict the intruder;

“Transfer” means a process that involves the changes of responsibilities and accountability of the safety and security of nuclear material or other radioactive material from one authorised person to another;

“Trustworthiness” means the characteristics of an individual considered dependable in judgment, character, and performance that ensure that unescorted access to nuclear material or a nuclear installation or access to sensitive information does not constitute an unreasonable security risk;

“Trustworthiness determination” means an assessment of the integrity, honesty and reliability of an individual in pre-employment checks and checks during employment that are intended to identify the motivation or behaviour of persons who could become insiders;

“Transport” means an international or domestic carriage of nuclear and other radioactive material by any means of movement, beginning with the departure from a facility of the shipper and ending with the arrival at a facility of the receiver;

“Transport control centre” means a facility which provides for the continuous monitoring of a transport conveyance location and security status and for communication with the transport, shipper the person who receives, carrier and, when appropriate, its guards and the response forces;

“Two-Person Rule” means a procedure that requires at least two authorised and knowledgeable persons to be present to verify that activities involving nuclear and other radioactive materials and their facilities are authorised in order to detect access or actions that are unauthorised;

“Transit” means the process of being transported through Ghana after being imported into and before being exported from Ghana, in a situation where the place of initial loading and the final destination are outside Ghana;

“Unauthorised removal” means the theft or other unlawful taking of nuclear or other radioactive material;

“Unacceptable radiological consequence” means a level of radiological consequences, established by the Authority (Third Schedule, Table 5), above which the implementation of nuclear security measures is warranted;

“Unescorted Access” means solitary access to packages or the devices that contain the material including unescorted access to the cargo area of a vehicle;

“Vital Area” means an area inside a protected area containing equipment, systems or devices, or nuclear material, the sabotage of which could directly or indirectly lead to high radiological consequences;

“Vehicle” means a machine that is used to transport people or goods;

“Vessel” means a sea-going vessel or inland waterway craft used for carrying cargo;

“Vulnerability” means a feature or weakness that can bring about an unacceptable radiological consequence;

“Worker” means an individual engaged full time or part time in the use, storage and transport of nuclear and other radioactive material.

SCHEDULES

FIRST SCHEDULE

Table-1: Criteria for Categorisation of Radioactive Material

(i) For sealed radioactive sources:

Category	Practices ^(a)	A/D ^{(b)/(c)}
1	Radioisotope thermoelectric generators (RTGs) Irradiators Teletherapy sources Fixed multibeam teletherapy (gamma knife) sources	$A/D \geq 1000$
2	Industrial gamma radiography sources High/medium dose rate brachytherapy sources	$1000 > A/D \geq 10$
3	Fixed industrial gauges that incorporate high activity sources Well logging gauges	$10 > A/D \geq 1$
4	Low dose rate brachytherapy (except eye plaques and permanent implants) Industrial gauges that do not incorporate high activity sources Bone densitometers Static eliminators	$1 > A/D \geq 0.01$
5	Low dose rate brachytherapy eye plaques and permanent implant sources X ray fluorescence (XRF) devices Electron capture devices Mossbauer spectrometry sources Positron emission tomography (PET) check sources	$0.01 > A/D$ and $A >$ exempt ^c

(a) Overriding priority for the categorization of radioactive material shall be given to their use in a certain practice.

(b) In case a radioactive material is not listed in column 2 of the above table, then A/D ratio shall be used for their categorization.

$$A/D = \frac{\sum_i A_i}{D}$$

where A = Activity of a radionuclide and D = D value for radionuclide n. (A list of D values of various radionuclides is specified in Table-2).

(c) Furthermore, for the radioactive material during manufacture and storage, their A/D value shall only be considered for categorization.

(ii) For material unlisted in Table-1 or unsealed radioactive sources:

The unlisted or unsealed radioactive sources shall be categorized based on their A/D ratio.

(iii) In case, same or various types of radioactive sources are placed together, the summed activity of the radionuclide shall be divided by their corresponding D value.

$$\text{Aggregate A/D} = \sum_n \frac{\sum_i A_{i,n}}{D_n}$$

where:

$A_{i,n}$ = activity of each individual source i of radionuclide n .
 D_n = D value for radionuclide n .

(iv) *Short half-life radionuclides*

In some activities, such as nuclear medicine, radionuclides with a short half-life are used in a source form that is unsealed. Examples of such applications include ^{99m}Tc in radiodiagnosis and ^{131}I in radiotherapy. In such situations, the principles of the categorisation system shall be applied to determine a category for the source. These situations shall be considered on a case by case basis.

TABLE 2. Source Activities Corresponding to Category Thresholds

Radionuclide	Category 1		Category 2		Category 3	
	$1000 \times D$		$10 \times D$		D	
	(TBq)	(Ci) ^a	(TBq)	(Ci) ^a	(TBq)	(Ci) ^a
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

Radionuclide	Category 1		Category 2		Category 3	
	1000 × D		10 × D		D	
	(TBq)	(Ci) ^a	(TBq)	(Ci) ^a	(TBq)	(Ci) ^a
Pu-239 ^b /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

^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 safeguards issues will need to be considered for multiples of D.

* 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 those paragraphs of the Code relating to national registries or to import and export controls.

SECOND SCHEDULE

Content of Security Plan for Radioactive Source(s)

A security plan should include all information necessary to describe the security approach and system being used for protection of the source(s). The level of detail and depth of content should be commensurate with the security level of the source(s) covered by the plan. The following topics should typically be included:

- A description of the source, its categorization, and its use.
- A description of the environment, building and/or facility where the source is used or stored, and if appropriate a diagram of the facility layout and security system.
- The location of the building or facility relative to areas accessible to the public.
- Local security procedures.
- The objectives of the security plan for the specific building or facility, including:
 - the specific concern to be addressed: unauthorised removal, destruction, or malevolent use;
 - the kind of control needed to prevent undesired consequences including the auxiliary equipment that might be needed; and
 - the equipment or premises that will be secured.
- The security measures to be used, including:
 - the measures to secure, provide surveillance, provide access control, detect, delay, respond and communicate; and,
 - the design features to evaluate the quality of the measures against the assumed threat.
- The administrative measures to be used, including:
 - the security roles and responsibilities of management, staff and others;
 - routine and non-routine operations, including accounting for the source(s);
 - maintenance and testing of equipment;
 - determination of the trustworthiness of personnel;
 - the application of information security;
 - methods for access authorisation;
 - security-related aspects of the emergency plan, including event reporting;
 - training;
 - key control procedures.
- The procedures to address increased threat level.
- The process for periodically evaluating the effectiveness of the plan and updating it accordingly.

- Computer security
- Any compensatory measures that may need to be used.
- References to existing Regulation or standards.

THIRD SCHEDULE

Categorisation of Nuclear Material

Table 3 categorises nuclear material on the basis of the element, isotope, quantity of material and irradiation (if any). This categorisation provides the basis for specifying appropriate physical protection measures against unauthorised removal.

TABLE 3: Categorisation of Nuclear Material

Material	Form	Category I	Category II	Category III ³
1.Plutonium ¹	Unirradiated ²	2 kg or more	Less than 2 kg but more than 500 g	500 g or less but more than 15 g
2.Uranium-235	Unirradiated ² - uranium enriched to 20% ²³⁵ U or more	5 kg or more	Less than 5 kg but more than 1kg	1 kg or less but more than 15g
	- uranium enriched to 10% ²³⁵ U but less than 20 % ²³⁵ U		10 kg or more	Less than 10kg but more than 1 kg
	- uranium enriched above natural, but less than 10 % ²³⁵ U			10 kg or more
3.Uranium-233	Unirradiated ²	2 kg or more	Less than 2 kg but more than 500 g	500 g or less but more than 15 g
Irradiated fuel			Depleted uranium or natural uranium, thorium or low enriched fuel (less than 10% fissile content)	

¹All plutonium except that with isotopic concentration exceeding 80 percent in plutonium-238.

² Material not irradiated in a reactor or material irradiated in a reactor but with a radiation level equal to or less than 1 Gy/h (100 rad/h) at 1 m unshielded.

³ Quantities not falling in Category III and natural uranium, depleted uranium and thorium should be protected at least in accordance with prudent management practice.

In case of different nuclear materials in the same conveyance, the total amount of nuclear material in a single conveyance should be used in determining the categorization of the conveyance and, hence, in identifying appropriate physical protection measures for the conveyance.

TABLE 4: Content of Security Plan for Nuclear Installations and Nuclear Material

1. ADMINISTRATIVE INFORMATION

- 1.1. Introduction and schedule for implementation
- 1.2. Facility description (operations and layout)
 - 1.2.1. General facility description, mission and operations
 - 1.2.2. Facility layout
- 1.3. Security policy
 - 1.3.1. Management policy
 - 1.3.2. Nuclear security culture
 - 1.3.3. Quality assurance
 - 1.3.4. Trustworthiness policy
 - 1.3.5. Sustainability programme
- 1.4. Security organisation
 - 1.4.1. Security organisation structure
 - 1.4.2. Security management and allocation of responsibilities
 - 1.4.3. Qualification requirements for security personnel
 - 1.4.4. Security personnel training
 - 1.4.5. Guards/response force armament and equipment
- 1.5. Security of nuclear information
- 1.6. Computer security

2. DEFINING THE PHYSICAL PROTECTION SYSTEM

- 2.1. Objectives and requirements of the physical protection system
- 2.2. Target identification
- 2.3. Threat definition
- 2.4. Law enforcement liaison

3. PHYSICAL PROTECTION SYSTEM

- 3.1. Detailed description of the physical protection system
- 3.2. Insider threat mitigation programme
- 3.3. Transport of nuclear material
- 3.4. Physical protection system testing, evaluation and maintenance

- 3.4.1. Types of testing and evaluation
- 3.4.2. Frequency of testing and evaluation
- 3.4.3. Maintenance
- 3.4.4. Expansion and upgrade
- 3.5. Compensatory measures

4. RESPONSE PLANNING

- 4.1. Organisation and responsibilities
- 4.2. Security forces
 - 4.2.1. Guards
 - 4.2.2. On-site response force
 - 4.2.3. Off-site response force
 - 4.2.4. Central alarm station staling
- 4.3. Contingency plan
- 4.4. Incident communications command and control
- 4.5. Response to higher threat conditions

5. POLICIES AND OPERATIONAL PROCEDURES

- 5.1. Documented policies and operational procedures
- 5.2. Review, evaluation, audit and update of the security plan
- 5.3. Reporting of threats or incidents

REFERENCES

ABBREVIATIONS AND GLOSSARY

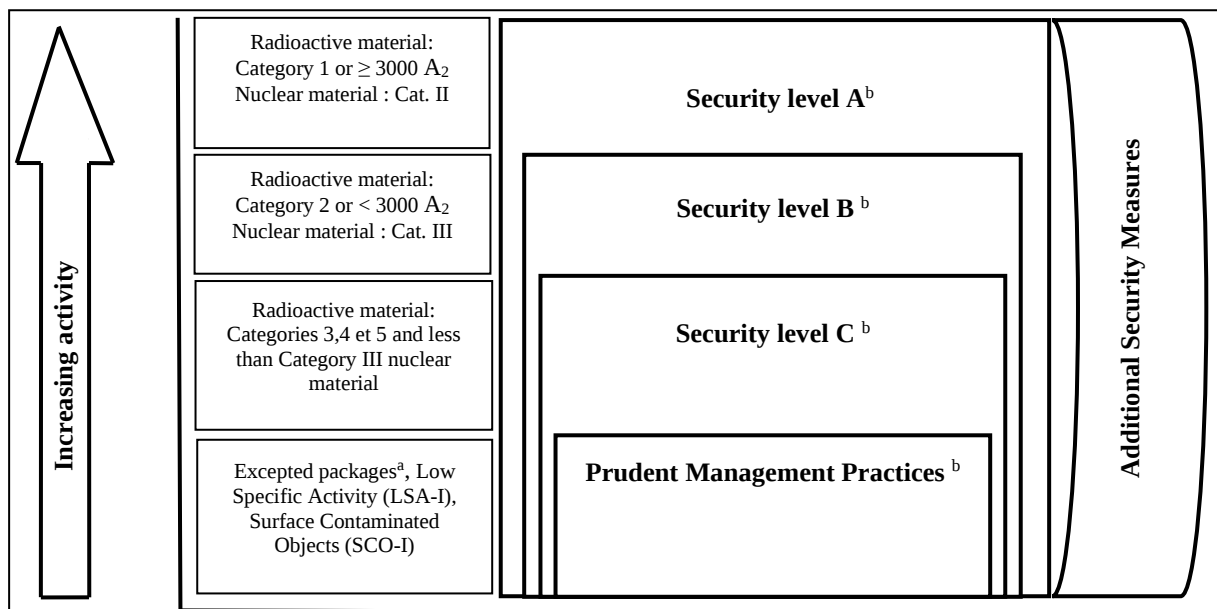
TABLE 5: Unacceptable and High Radiological Consequences

Consequence Level A High Radiological Consequences	Consequence Level B Unacceptable Radiological Consequences	Consequence Level C* Unacceptable Radiological Consequences
Sabotage could give rise to severe deterministic health effects off-site, such as: ❖ Facilities with inventories of dispersible radioactive material sufficient to result in severe deterministic effects off-site. ❖ Reactors with power levels exceeding 100 MWth (e.g. a nuclear power plant, a nuclear powered ship, a research facility) ❖ Spent fuel pools that may contain some recently discharged fuel and a total of more than about 0.1 EBq of Cs-137 (equivalent to the inventory in a 3000 MWth reactor core)	Sabotage could result in doses to persons off-site that warrant urgent protective actions off-site, such as: ❖ Facilities with inventories of radioactive material sufficient to result in doses warranting urgent protective action off-site. ❖ Reactors with power levels of 100 MWth or less, but more than 2 MWth. ❖ Spent fuel pools requiring active cooling ❖ Facilities with potential for uncontrolled criticality within 0.5 km of the site boundary	Sabotage could result in doses or contamination that warrants urgent protective action on-site, such as: ❖ Facilities with inventories of radioactive material sufficient to result in doses warranting urgent protective action on-site. ❖ Facilities with potential, if shielding lost, of direct external (shine) dose rates of more than 100 mGy/h at 1 m ❖ Facilities with potential for uncontrolled criticality more than 0.5 km from the off-site boundary ❖ Reactors with power levels of less than or equal to 2 MWth

FOURTH SCHEDULE

Assignment of Security Levels for Transport

Three security levels, A, B, C are established, which specify requirements for security system performance in a graded manner.



^a Prudent management practices are applicable to:

- (a) Empty packaging – UN 2908;
- (b) Articles manufactured from natural uranium, depleted uranium or thorium – UN 2909;
- (c) Excepted packages with an activity level not exceeding the level permitted for the radionuclide when it is not in special form – UN 2910 and UN 2911;
- (d) LSA-I (low specific activity materials) – UN 2912;
- (e) SCO-I (surface contaminated objects) – UN 2913;
- (f) Uranium hexafluoride, radioactive material, excepted package, less than 0.1 kg per package, non-fissile or fissile excepted – UN 3507;

^b The NRA may require additional security measures in addition to any security measures already prescribed for a given transport security level