**NUCLEAR REGULATORY AUTHORITY,**

**GHANA**

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**DRAFT CONSTRUCTION REGULATION FOR NUCLEAR INSTALLATIONS IN GHANA**

**NRA\_CONSTRUCTION\_**

Nuclear Regulatory Authority (NRA), Ghana

Houses 1 & 2, Neutron Avenue, P.O. Box AE 50, Atomic- Kwabenya, Accra

official.mail@gnra.org.gh

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CONSTRUCTION OF NUCLEAR INSTALLATIONS REGULATIONS

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##

In exercise of the power conferred on the Minister responsible for Nuclear Regulatory Authority (NRA), acting on the advice of the Board of the Authority, by Section 91 of the Nuclear Regulatory Authority Act, 2015 (Act 895), these Regulations are made this day ……… of ………2023

#  Preliminary Provsions

## Application

**1**.These Regulations apply

 (a) to the construction of a new nuclear installation;

 (b) in a graded manner to activities related to the life extension, refurbishment and modification of an existing nuclear installation, including the processes of

 (i) manufacturing and assembling of components;

 (ii) carrying out of architectural and civil works;

 (iii) installation and maintenance of structures, systems and components; and

 (iv) performance of the associated tests to demonstrate their acceptability.

## Construction, Safety and Security Standards of Nuclear Installation

**2**. (1) Where the Authority, in respect of an equipment which is the subject of an application, does not have Regulations or there are no national standards with which to assess the equipment, the Authority may rely on current relevant regulations or standards from the vendor country where the related applicable technology was developed or has been deployed and being regulated effectively as determined by the Authority, for the assessment.

 (2) An authorised person shall, in consultation with the Authority implement the latest revisions of the applicable International Atomic Energy Agency, Safety Standards and Security Guidance.

 (3) Where the authorised person proposes to apply the nuclear safety and security standards of another country the authorised person shall demonstrate to the satisfaction of the Authority that the standards, proposed, offer the same or better standards of safety, security, quality and reliability than would have been offered by the nuclear safety standards and security guidance provided in Regulation 2(1) of these regulations.

 (4) A person shall not erect a nuclear installation or carry out any nuclear related activity,

 (a) without the written authorisation of the Authority specifying, the conditions necessary for safety; or

 (b) unless the installation or activity is explicitly exempted or approved by means of a notice issued by the Authority.

## Management System

**3**. (1) An authorised person shall

 (a) manage construction activities in accordance with the approved management system;

 (b) identify the health,safety, security, environmental, and other requirements applicable to construction activities;

 (c) communicate to the appropriate authorities the relevant requirements that have to be taken into account when establishing, implementing and maintaining management practices and controls;

 (d) identify and resolve conflicting requirements; and

 (e) submit to the appropriate authority, every applicable licence, permit and approval required to initiate construction activities before the construction starts.

(2) The authorised person shall ensure that

 (a) an adequate level of nuclear safety and nuclear security culture is maintained in the supply chain;

 (b) construction processes and methods take into account internal and external hazards;

 (c) where construction on a suspended project is being resumed, special consideration is given to factors including resource requirements that may affect the restart of construction.

 (d) there is effective interaction with each relevant organisation and agency before the start of construction; and

 (e) the interface arrangements with relevant organisations and agencies are specified in the management system documentation and in appropriate contracts.

 (3) The authorised person shall

 (a) develop measures to ensure that contractors and subcontractors meet their respective contractual obligations in accordance with an appropriate management system; and

 (b) maintain records of its oversight activities and report to the Authority relevant contractor performance that has affected, or has the potential to affect, the quality of construction and future operation.

#  Reporting and Communication

## General Requirements for Reporting and Communication

**4**. An authorised person shall

 (a) define procedures for assessment report on the progress of the construction of the nuclear installation and plant modification projects for the approval of the Authority; and

 (b) ensure that the reporting is regular and as approved by the Authority and, where necessary, available to each relevant interested party involved in the project.

## Reporting to the Nuclear Regulatory Authority

**5**. (1) An authorised person shall submit to the Authority,

 (a) a monthly report;

 (b) a quarterly report;

 (c) half year report;

 (d) annual report;

 (e) incident and accident reports; and

 (f) final report.

 (2) The authorised person shall ensure that the monthly report is submitted to the Authority within the last week of every month except for

 (a) the third and the ninth month, where the quarterly report is to be submitted instead of the monthly report within the last week of each month; and

 (b) the sixth month and the twelfth month, where the half year report and the annual report, respectively, are to be submitted instead of the monthly report, within the last week of each of the two months.

 (3) The authorised person shall

 (a) inform the Authority immediately an incident or accident occurs; and

 (b) submit an incident or accident report to the Authority within twenty-four hours after the occurrence of an incident or an accident.

 (4) The authorised person shall, immediately after the commencement of the manufacturing of the components and structures of the nuclear installation prepare regular reports on the status of the project and submit to the Authority reports on potential events that may occur during the construction.

 (5) For the purposes of Sub-regulation (4) , commencement of the material manufacturing of the main components of the nuclear installation, including primary circuit main components and preparation work for starting civil construction work, together with excavation at the site shall be considered as commencement; but the regular reports required to be prepared and submitted by the authorised person to the appropriate authorities during construction shall begin when the Authority has granted the nuclear installation a construction licence.

 (6) The authorised person shall

 (a) submit the relevant reports to the Authority for information;

 (b) step up the reporting interval if the project’s progress so requires; and

 (c) ensure that the reporting is thorough and transparent.

 **Report Content**

 **6**. An authorised person shall ensure that each report submitted within the period of reporting contains information

 (a) on the status and progress of the construction of the nuclear installation encompassing the work done, the delays and deviations from work schedule and an analysis of progress against plans;

 (b) on modifications and changes to design, scope and timelines of the construction activities;

 (c) on overall safety, security and safeguards assessment for the reporting period, with the assessment specifying

 (i) the actions implemented or initiated to ensure and enhance safety and security in the reporting year;

 (ii) the results of safety-significant research and analysis and their effect on the installation’s design and construction;

 (iii) safety and security significant design modifications; and

 (iv) measures relating to service life management and operating experience feedback utilization as well as quality management activities;

 (d) on details of the type of major equipment and Structures Systems and Components received and installed and the time of their receipt and installation which were not received;

 (e) in the case of delays in the delivery of components and Structures Systems and Components, that explains the causes of the delay and indicate when the components and structures and systems were received and installed;

 (f) on the tasks in progress and tasks completed, planned tasks as against actual tasks perfomed, and updated timelines;

 (g) on potential risks, issues, delays and related corrective and preventive action;

 (h) on safety observations and accidents or incident, including records of the accident or incident, who or what was involved, when and where it occurred and how it impacted or is impacting the work;

 (i) on the detailed activities plan for the following period to be reported on;

 (j) on the assessment of quality issues;

 (k) on the assessment of any other issues that need to be addressed and proposals for addressing them; and

 (l) on the details of the contractor and subcontractor and progress of their work.

 (2) The authorised person shall ensure that

 (a) the annual report on construction presents an overall safety assessment for the reporting year;

 (b) the assessment presents the actions implemented or initiated to ensure and enhance safety in the reporting year;

 (c) the assessment include the results of

 (i) safety-significant research and analysis and their effect on the facility’s design and construction;

 (ii) safety-significant design modifications;

 (iii) measures that relate to service life management and operating experience feedback utilisation as well as quality management activities.

**Accident and Incident Report**

**7**. (1) An authorised person shall ensure that

 (a) each incident or accident, however small, that occurs at the installation, is recorded in an incident book to be kept by the authorised person; and

 (b) each major incident or accident that occurs at the installation is reported to the Authority in addition to being recorded in the book as and when they occur.

 (2) The incidents or accidents required to be recorded and reported under subregulation (1) include,

 (a) an injury that prevents an employee from doing normal work for a period of not less than three days;

 (b) major injuries in the nature of broken arms, ribs, legs, and similar injuries;

 (c) fatalities;

 (d) disease;

 (e) dangerous instances that occur at work including the breaking of machinery , collapse of scaffolding or the breaking of any other appliances and damage resulting from any cause.

 (3) The authorised person shall ensure that the report records information and provides details on,

 (a) each incident or an accident including the date, time, and location;

 (b) each injured person and the personal contact of that person including the name, phone number, address, age, and occupation among others;

 (c) each injury including type, body part, whether any work days were lost as a result, whether an ambulance was required, whether the injured person lost consciousness and any other relevant matter;

 (d) each witness details including name, phone number, and address;

 (e) the details of any supporting evidence including CCTV footage, photographs, training records, health and safety check records and cleaning log;

 (f) the reasons for accident including how it occurred, working conditions at the time, personal protection equipment being worn, equipment being used, and events leading up to the accident;

 (g) the response to the accident including first aid provided, whether the area was made safe, and any other direct action;

 (h) each preventative action including training needs, preventative plan put in place, and how recurrences will be prevented;

**Mode of Submission**

**8**. An authorised person shall submit to the Authority

(a) the required reports in softcopies and hardcopies;

(b) data gathered for inclusion in the database of the Authority in separately agreed electronic format, where necessary, considering security and compatibility; and

 (c) where applicable, as part of a report pictures of progress of work done, equipment received and of any other relevant matter.

**Report Format**

**9**. An authorised person shall ensure that each report that is submitted to the Authority as a requirement under these Regulations, provides

(a) facility information which specifies the project name and number, address, report date, and author, and any other relevant information; and

(b) a summary.

#  Programs Supporting Construction Activities

## Nuclear Security

**10**. An authorised person shall ensure that

 (a) the security measures that are instituted for the construction of a nuclear installation include the prevention of, detection of, and response to, criminal or intentional, unauthorized acts involving or directed at construction activities, and other intentional acts that could directly or indirectly produce harmful consequences; and

 (b) the security measures provide for

 (i) physical security of the site;

 (ii) personal security;

 (iii) protection of information; and

 (iv) cyber security.

## **Nuclear Safeguards**

**11**. An authorised person shall ensure that the International Atomic Energy Agency has access to

 (a) the site;

 (b) information about the buildings and structures on the site, operational parameters, flow and storage of nuclear material, and the installation of safeguards surveillance; and

 (c) monitoring equipment consistent with the Ghana and International Atomic Energy Agency safeguards agreements.

## Personnel Training and Qualification

**12**. An authorised person shall ensure that personnel engaged in construction activities have the appropriate training, qualifications and competence to perform their assigned tasks effectively and safely.

## Effect on and from Existing Facilities

**13**. An authorised person shall ensure that

 (a) for adjacent installations or those with common buildings or services, the following boundaries are identified:

 (i) physical;

 (ii) system;

 (iii) controlled areas;

 (iv) security access; and

 (v) clean zones;

 (b) in the use of the resources of an existing nuclear installation, including water, electric power and security, clear interfaces are defined so as not to jeopardize operating installations;

 (c) emergency plans take full account of the presence of other parties in the area; and

 (d) procedures are implemented for the endorsement of change of status of common buildings or services, before the construction organisation puts the plans into effect.

## Emergency Management and Fire Protection

**14**. An authorised person shall ensure that

 (a) an appropriate plan approved by the Authority is in place for managing emergencies during construction;

 (b) fire protection controls, including temporary measures to mitigate potential fires, are available until final systems for plant fire detection, protection and suppression are installed and become operational; and

 (c) details of the controls are included in the emergency preparedness arrangements.

## Readiness Review

**15**. An authorised person shall,

 (a) in the preparation for construction, ensure that the contractors are ready to proceed with the construction by verifying that

 (i) management systems are in place;

 (ii) adequate planning has been conducted;

 (iii) procedures and training are complete; and

 (iv) construction hazards are adequately evaluated and control measures identified; and

 (b) ensure that the verification process is accomplished through a construction readiness review.

#  Construction Programme

## Planning, Scheduling and Construction Sequencing

**16**. An authorised person shall, in the planning, scheduling and construction sequencing identify and include provisions for hold and witness points by various parties, including architects, engineers, authorised inspection agencies and the Authority.

## Long-Lead Items

**17**. An authorised person shall ensure that any differences between the original purchasing requirements, the licence-to-construct design basis and the as-built items are evaluated, reconciled and reported to the Authority.

## Manufacture and Assembly

**18**. An authorised person shall ensure that right of access to facilities and records for witness points are submitted for audit by the Authority.

#  Receipt of Components Important to Safety

## Protection of Systems, Structures, and Components Important to Safety

**19**. An authorised person shall

 (a) establish measures to ensure that the structures, systems and components that are important to safety are protected from construction activities; and

 (b) ensure that the measures to be established under paragraph (a), include

 (i) the conduct of preventative and corrective maintenance to maintain the functionality of the structures, systems and components that are important to safety, as required by the design, until operational maintenance programs are initiated;

 (ii) taking steps to prevent the fabrication, manufacturing, construction and installation processes from adversely affecting aging performance of the structures, systems and components important to safety or adjacent reactor unit;

 (iii) the conduct of periodic monitoring of environmental conditions to confirm that they remain within allowable limits throughout the construction;

 (iv) the implementation of housekeeping, cleanliness and foreign material exclusion activities that are necessary to protect sensitive mechanical, electrical and control equipment from internal and external contamination; and

 (v) the authorisation by the Authority of temporary use of the structures, systems and components that are important to safety and that are to become part of the completed facility except that the temporary use should not subject the Structures, Systems and Component to conditions for which they were not designed.

## Storage

**20**. An authorised person shall provide storage as specified by the designers and manufacturers, to protect components important to safety before their installation.

## Onsite Manufacturing and Testing

**21.** An authorised person shall ensure that

 (a) anonsite manufacturing structure is not located at a place where it will affect structures, systems and components that are important to safety or affect construction activities; and

 (b) rules and procedures are established for onsite testing facilities to ensure that industry codes and standards are met.

#  Turnover of Work

## Turnovers and Documentation

**22**. An authorised person shall ensure that

 (a) a process for turnover of the structures, systems and components that are important to safety is established; and

 (b) the turnover requirements and responsibilities are documented.

#  Configuration Control

## Facility Configuration Information

**23**. An authorised person shall ensure that recorded information that describes, specifies, certifies, or provides data or results created during construction, as part of the facility configuration information, is agreed to, planned and processed so as to facilitate its turnover to commissioning and operations in the agreed form, format and required quality.

## Changes to Facility Configuration Information

**24**. An authorised person shall ensure that

 (a) the changes that occur in the course of construction are processed to maintain conformance among the design requirements, the physical configuration and the facility configuration information;

 (b) the Authority is notified, where configuration changes have an impact on the submitted design and licensing basis information.

#  Roles and Responsibilities of the Operating Organisation

## Establishment of a Safety Organisation under Top Management

**23**. An authorised person shall ensure that the senior management of the authorised person establishes a safety organisation that makes safety an overiding priority in the operations of the authorised as required in the Integrated Management System Regulations.

## Evaluation of Suppliers and Procurement related Requirements

**24**. An authorised person shall conduct evaluation of each supplier and each procurement activity as required in the Integrated Management System Regulations.

## Marking of Goods

**25**. An authorised person shall set up a procedure for marking of goods procured as required in the Integrated Management System Regulations.

## Management System Quality Assurance Program for Construction

**26**. An authorised person shall ensure that a management system is established and a quality assurance programme is planned, implemented, and maintained during construction in accordance with the requirements of the Integrated Management System Regulations.

## Procurement Related Requirements

**27**. An authorised person shall ensure that

(a) measures are instituted that assure compliance with applicable regulatory requirements, design basis, and other requirements which are necessary to provide adequate quality in the procurement of material, equipment, and services, whether purchased by the applicant or by its contractors or subcontractors;

 (b) to the extent necessary, procurement documents require contractors or subcontractors to provide a quality assurance programme consistent with the regulations of the Authority;

 (c) procurement documents issued at all tiers of procurement include, where considered necessary by the purchaser, provisions for

 (i) a statement of the scope of the work to be performed by the supplier;

 (ii) the technical requirements to be specified in the procurement documents, where necessary, by reference to specific drawings, specifications, codes, standards, regulations, procedures, or instructions, including revisions to the technical requirements that describe the items or services to be furnished;

 (iii) the identification of test, inspection, and acceptance requirements of the purchaser for monitoring and evaluating the performance of the supplier;

 (iv) the supplier to have a documented quality assurance program that implements portions or all of the requirements, with the extent of the program required depending upon the type and use of the item or service being procured;

 (v) the supplier to incorporate appropriate quality assurance programme requirements in subtler procurement documents;

 (vi) access to the plant facilities of the supplier and records for inspection or audit by the purchaser, the designated representative of the purchaser or other parties authorised by the purchaser;

 (vii) the identification of the documentation required to be submitted for information, review, or approval by the purchaser and the time for submission of the information; and

 (viii) the retention times and disposition requirements, where the purchaser requires the supplier to maintain specific quality assurance records;

 (d) the procurement documents include the requirements of the purchaser for reporting and approving disposition of nonconformances; and

 (e) the procurement documents require the identification of appropriate spare and replacement parts or assemblies and the appropriate delineation of the technical and quality assurance related data required for ordering the parts.

# Miscellaneous

## Penalties

**28.** 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

**29.** 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

**30**. In these Regulations, unless the context otherwise requires,

“commissioning” means the measures to verify the appropriateness of the authorised person's organisation of an authorised person, as well as the planned operation and safe use of the plant and its systems, structures and components;

“contractor” means a supplier that has a direct contractual relationship with the authorised person;

“construction of a nuclear facility” means the measures that the holder of a construction licence has taken in order to construct a nuclear facility that conforms to the requirements set until the end of the commissioning of the facility;

“modification” means introducing changes to a system, structure or component so that it no longer corresponds to previous specifications.

“plant modification” means a modification to the safety-classified systems of an operating nuclear facility that calls for the reassessment of the design bases and safety requirements of systems, the renewal of the design basis analyses, and considerable equipment acquisitions; E

“product” means a result of a process (ISO 9000) in the nature of a nuclear facility, plant modification, system delivery, single component or part of a component, plan or design, service, processed material, and information productamong others;

“project” means a unique process consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost and resources (ISO 9000);

“risk register” means the records of identified risks, including results of analysis and planned responses;

 “subcontractor” means a supplier that is not in a direct contractual relationship with the authorised person;

 “supplier” means an organisation or person manufacturing or providing a product; and

“supply chain” means all resources, processes and functions that are required to create products. These may include the design of the product, and the manufacture, assembly and delivery of material and components.

 “System performance tests” means tests that ensure that systems and their components function as planned. System performance tests include both the testing of single systems and the joint functional tests of multiple systems.