NUCLEAR REGULATORY AUTHORITY, GHANA

DEVELOPMENT OF REGULATORY INFRASTRUCTURE FOR NUCLEAR POWER PROGRAMME IN GHANA

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“Ensuring the protection of people and the environment from radiation hazards.”
ORDER OF PRESENTATION

• INTRODUCTION

• NUCLEAR REGULATION IN GHANA

• HUMAN RESOURCE & COMPETENCE DEVELOPMENT

• REGULATION DEVELOPMENT

• COLLABORATION WITH OTHER INSTITUTIONS

• INTERNATIONAL COOPERATION
INTRODUCTION
GHANA’S CURRENT POWER POSITION

Currently situation
❖ Installed Capacity – 4662.5 MW Peak
❖ Demand- 2,525.0 MW
 ✓ Hydro (36%)
 ✓ Thermal (63.9%)
 ✓ Solar (<0.01%)
Fig. 3: Organogram of Ghana Nuclear Power Programme Organisation (GNPPO)
OTHER ORGANISATIONS OF GNPPO

- Environmental Protection Agency
- National Security Council Secretariat
- Ministry of Environment, Science, Technology and Innovation (MESTI)
- Volta River Authority/Bui
- Customs Division of Ghana Revenue Authority
- Ministry of Finance and Economic Planning
- Association of Ghana Industries
- Graduate School of Nuclear and Allied Sciences, University of Ghana
- Ghana Grid Company Limited
- Ministry of Education
- Kwame Nkrumah University of Science and Technology
- University of Cape Coast
- Energy Commission
- Ministry of Trade & Industry
- Institute of Industrial Research, Council for Scientific and Industrial Research
- Information Services Department
- Nuclear Power Ghana (NPG)
THE THREE MAIN PLAYERS AND THEIR FUNCTIONS

• Owner/Operator – Government of Ghana represented by Nuclear Power Ghana

• Technical Support Organisation – Ghana Atomic Energy Commission

• Regulator: Nuclear Regulatory Authority, Ghana
Fig. 4: Roadmap for first Nuclear Power Plant in Ghana
NUCLEAR REGULATION IN GHANA
GHANA’S NUCLEAR REGULATORY HISTORY

• 1952 - Radioactive Sr for experiment in University College of Gold Coast
• 1958 - Physics Department- UG measurement of fallouts for MoD
• 1960 - National Research Council formed Health Physics and Radioisotope Unit
• 1963 - GAEC established by Act 204
• 1993 - RPB and start of Regulatory activities (LI 1559)
• 2007 – Prof. Adjei Bekoe Committee
• 2015 - NRA Act
• 2016 - NRA established
OVERVIEW OF NUCLEAR LAW

• The Nuclear Regulatory Authority Act, 2015 (Act 895) established the Nuclear Regulatory Authority (NRA) as the competent authority for nuclear regulation in Ghana

• The Scope of the Law:
  - regulations and management of activities and practices for the peaceful use of nuclear energy and radiation;
  - management of radioactive waste resulting from civilian applications in Ghana;
  - management of spent fuel resulting from the operation of civilian nuclear reactors in Ghana
Fig. 5: Organogram of NRA
Functions of NRA (1/2)

- Facilitate the development of national policies in
  - Nuclear safety and research
  - Security of nuclear and radioactive materials, associated facilities and activities
  - Implementation of international obligations in nuclear field

- Issue, modify, suspend or revoke authorisation, and determine conditions for authorisation
Functions of NRA (2/2)

- Public awareness creation on nuclear and radiation matters

- Establish and maintain a national register of radiation sources and of persons authorised to carry out any activity or practice related to a source of radiation

- Collaborate with agencies responsible for emergency, security and environment to establish plans and procedures for coping with radiological, abnormal occurrence, and development of environmental impact assessments

- Exchange information and co-operate with regulatory authorities of other countries and relevant international organisations on matters of nuclear safety, nuclear security and safeguards
The Legal Pyramid

Fig. 6: Legal Hierarchy
• The NRA has adopted a hybrid approach between prescriptive and performance approaches to regulatory infrastructure development.

• The hybrid is adopted to optimize the number of staff and the roles to ensure effective use of experiences of other regulatory bodies in similar roles.

• The NRA has a Regulatory Strategy which is currently being reviewed after two years of implementation.

• The review is focused on the revisions in the structure of regulations to be developed at different stages of the nuclear power programme.
MANAGEMENT SYSTEM OF NRA

• NRA Management System is being patterned after requirements in IAEA Safety Standard GSR-Part 2

• Committee constituted to draft IMS Manual for NRA

• NRA Management seeks to ensure that authorised persons operate their facilities at all times in a safe, secured and safeguarded manner

• NRA seeks to be open and transparent in its development and implementation of regulations and decisions

• The Board of NRA ensures prudent management of resources and implementation of functions conferred by Act 895
HUMAN RESOURCE &
COMPETENCE DEVELOPMENT
STAFFING AND CAPACITY POLICY

• In building capacity through staffing, NRA ensures that

✓ the right persons are in the right roles

✓ competent and sustainable workforce are developed

✓ succession planning and knowledge transfer strategies are developed

✓ Staff are motivated appropriately
Manpower Requirements for the NRA

Fig. 7: NRA Staffing Projection
Human Resource Development (1/2)

• An HR Department sees to HRD with active participation of Management

• NRA is focusing on preservation of nuclear knowledge as a top priority and is set to ensure that knowledge and skills of the experienced nuclear professionals are transferred effectively to the younger generation

• NRA considers its employees as the most valuable asset and firmly believes that enhancing their knowledge and skills is an investment for the future of the Authority

• Basic Professional Training Course (BPTC) held in May and June 2018 to provide Level 1 Training on Nuclear Safety, Regulatory Control and Radiation Safety
• NRA is conducting TNA for its employees based on the IAEA four-quadrant competency model given in TECDOC-1254 and TECDOC-1794

• Fig. 8 below presents the Recruitment and Training process of NRA

• NRA currently has 52 staff including non-technical staff; 18 involved in nuclear installations

• School of Nuclear and Allied Sciences (SNAS) trains relevant personnel to aid NRA recruitment efforts
PhD, MPhil, MSc, BSc, HND Engineering & Sciences

Level – I Course
Nuclear Safety + Regulatory Control + Radiation Safety + Nuclear Security + Safeguards & Non-Proliferation

Qualified?

Yes

No

Level – II Course
Radiation Protection + Waste Management

Level - II Course
PWR

Qualified?

Yes

No

Level – II Course
Nuclear Security

Level – II Course
Safeguards & Non-Proliferation

Qualified?

Yes

No

Level – III Course
Review & Assessment

Level – III Course
Inspection & Enforcement

Level – III Course
Simulator & Dev of Regulatory Tools

Qualified?

Yes

No

Level – IV Course
Leadership & Management

Fig 8: Recruitment and Training Process of NRA
REGULATION DEVELOPMENT
REQUIRED REGULATIONS

- The NRA is responsible for development of regulations and associated guidelines

- Stakeholders are involved adequately (Fig. 9)

- An Action Plan based on Act 895 has been developed to prepare and promulgate the required regulations, guidelines and procedures

- Licensing and Guidance During Construction and Operating Phases of a Nuclear Facility has been approved by the Board

- The draft regulations undergoing review and those yet to be drafted are presented below
Fig. 9: Process for Review and Approval of Regulations
Draft Regulations Undergoing Review of Stakeholders

- Draft Radioactive Waste Management
- Draft Basic Radiation Control
- Draft Safeguards
- Draft Siting
- Draft Requirements for Technical Services
- Draft Regulation on the Security of Radioactive Sources
Regulations Drafted in 2018 and under internal review

- Design of Nuclear Installations
- Licensing of Nuclear Installations
- Physical Protection of Nuclear Installations
- Transport Security
- Security of Radioactive Sources, Physical Protection of Nuclear Installations, and Transport Security are being combined into Nuclear Security Regulations
## Status of Review for Draft Regulations

<table>
<thead>
<tr>
<th>Regulation</th>
<th>STATUS</th>
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<tbody>
<tr>
<td>Safeguards</td>
<td>Response received from Ghana Immigration Service, Customs Division of GRA, National Security Coordinator, Ministry of Finance, International Nuclear Safeguards Programme (INSEP) of DOE</td>
</tr>
<tr>
<td>Siting</td>
<td>Response received from Volta River Authority, Ghana Immigration Service, Petroleum Commission, Ministry of Finance, University of Ghana, MESTI, UMAT, United States Nuclear Regulatory Commission, IAEA review ongoing</td>
</tr>
<tr>
<td>Security of Radioactive Sources</td>
<td>Response received from Customs Division of GRA, Ghana Immigration Service, Petroleum Commission, Ghana Civil Aviation Authority, MESTI, Ghana Ports and Harbours Authority, IAEA, Office of Radiological Security of USDOE</td>
</tr>
<tr>
<td>Design</td>
<td>Undergoing internal review</td>
</tr>
<tr>
<td>Nuclear Security</td>
<td>Merging of Security of Radioactive Sources, Physical Protection and Transport Security ongoing</td>
</tr>
<tr>
<td>Licensing</td>
<td>Fine-tuning for internal review to start</td>
</tr>
</tbody>
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INTERNATIONAL COOPERATION

“nuclear accident anywhere is nuclear accident everywhere”
INTERNATIONAL REGULATORY COOPERATION

• Obtaining support and training through Ghana’s membership of the International Atomic Energy Agency (IAEA)

• FNRBA - Ghana Coordinating the TWG5 on Upgrading of Nuclear Safety in Research Reactors

• US NRC

• US DOE in the area of Nuclear Security (INS, ORS) and Safeguards (INSEP)

• EC’s INSC for support in 2019 and beyond; and benefitting from ENSTTI Training & Tutoring Programmes

• Regulatory Cooperation Forum