Experience on Fellowship Training at the NNRA on regulatory control activities in the oil and gas industry in Nigeria

Prof. Augustine Faanu & Mr Theophilus Adjirackor

Nuclear Regulatory Authority

Ghana
Content of presentation

- Background
- Regulatory Framework of Ghana
- Purpose of the Fellowship
- Objective of the fellowship
- Programme of activities for the fellowship
- Knowledge acquired and experiences
- Summary
- Conclusion
- Acknowledgements
Background

- Radioactive sources are widely used in various sectors of the Ghanaian economy (*medicine, agriculture, industry, research and academics*).

- Medical - *radiotherapy, diagnostics, etc*
- Food processing (*food preservation*): *Gamma irradiation*
- Mining companies - *nuclear gauges, radiography machines*
- Oil and gas - *nuclear gauges, neutron sources, etc*
- Construction companies - *nuclear gauges*
- R&D laboratories – *Reactor, calibration sources, etc*
Background - Radiation Devices
Background - Effects of exposure

ATOMS which will affect MOLECULES which may affect CELLS which may affect TISSUES which may affect ORGANS which may affect THE WHOLE BODY
Background - Effects of exposure

- **Deterministic**: threshold for effect to be evident –
  - below, no effect;
  - above, certainty, and severity increases with dose

- **Stochastic**: probability of effect related to dose
  - (may or may not occur but the likelihood of occurrence is dependent on increasing dose)

- **Genetic** effect
  - assumed stochastic incidence, however, manifests itself in future generations
The use of radiation required legal and regulatory framework for the control of the use of radiation sources from cradle to grave

- From 1993 to December 2015 the Ghana Atomic Energy Commission (GAEC) was the regulatory authority.
- There was conflict of interest since GAEC also uses radiation sources and devices.
- In view of that the Nuclear Regulatory Authority (NRA) was created through an Act of Parliament in August 2015 (Act 895, 2015).
- The first management Board of the NRA was inaugurated in January 2016.
- The NRA is completely independent of GAEC.

With the current system NRA is the body with the statutory regulatory authority in Ghana that regulates all practices involving radiation.
NRA Organogram
NRA Act, 895 of 2015

AN ACT to establish a Nuclear Regulatory Authority; to provide for the regulation and management of activities and practices for the peaceful use of nuclear material or energy, radioactive material or radiation; to provide for the protection of persons and the environment against the harmful effects of radiation hazards; to ensure the effective implementation of the country's international obligations and for related matters.
Application

1. (1) This Act applies to the

(a) regulation and management of activities and practices for the peaceful use of nuclear energy and radiation under the jurisdiction and control of the country, including the production, possession, use, import, export, transportation, transfer, handling and management of radioactive material, decommissioning or other related activity or practice identified by the Authority;
Establishment of the Authority

3. (1) There is established by this Act a body corporate to be known as the Nuclear Regulatory Authority.

(2) Where there is a hindrance to the acquisition of property by the Authority, the property may be acquired for the Authority under the State Lands Act, 1962 (Act 125) and the cost of the acquisition shall be borne by the Authority.

Objects of the Authority

4. The objects of the Authority are to

(a) ensure that radiation and nuclear energy is used by only persons authorised under this Act, for peaceful purposes;

(b) provide protection of persons and the environment against the harmful effects of radiation hazards; and

(c) pursue and ensure strict compliance with this Act and the Regulations.
NRA Regulatory control Programme

• The core mandate NRA covers the following:
  ➢ Notification
  ➢ Application for authorisation
  ➢ Inspection
  ➢ Authorisation
  ➢ Enforcement
  ➢ Development of regulations, guides and procedures

• The Regulatory controls are to ensure: Safety, Security and Safeguards requirements are complied with by the authorised Person.

• NRA is fairly new hence the need to learn from the best practices around the world to ensure its regulatory processes and procedures are well established
• The NRA has experience in the regulatory control in the following areas:

- Medical facilities: x-ray, radiotherapy, nuclear medicine, Linear accelerators, etc.
- Industrial facilities: nuclear gauging in mines, Industrial radiography, gauges for road construction, Research and development, etc

- BUT

• Very little experience in regulatory activities in the oil and gas industry.
• Ghana started commercial production of oil in 2010.
• This has resulted in an increased in the use of radiation sources in this area and is becoming a challenge to NRA.
Purpose of the Fellowship

• As a result, NRA made a request to the IAEA for 2 weeks Scientific Visit to a regulatory Authority with experience in this field.

• Following that the NNRA with a lot of experience in this area was contacted and we were readily accepted but for 1 month fellowship.

• The fellowship training started on 18\textsuperscript{th} March 2019 to 17\textsuperscript{th} April 2019.

• Supervisor: Dr Yau Idris.

• Fellows: Prof. Augustine Faanu and Mr. Theophilous Adjirackor.

• This is the last activity on the fellowship training.

• A detailed programme of activities was put in place by our Supervisor together with his team as follows:
Main Objective

• To **understudy** the **regulatory control activities** and processes implemented **by the NNRA** in the oil and gas industry in Nigeria and **compared with that of the NRA of Ghana** in order to **identify areas of good practices** that can be **implemented to help improve the regulatory infrastructure** for the oil and gas industry in Ghana.
Programme of activities for the fellowship

- 18 -March-19: General orientation within the NNRA premises.
- 19-20- March- 19: Placement in the Legal Unit of NNRA
  Facilitators: Mr John Adamu and Mr Jamil Salau.
  (Discussions covered the NNRA Act and other supporting regulations, guides and minimum requirements that have be established to provide the legal basis for all of NNRA activities).

Observations: Well logging regulations and minimum requirements established

- 21-22 March- 19: Placement in the Department of Nuclear Safety,
- Facilitators: Mr Jamil Salau supported by other technical staff
  (Discussion covered the measures applied by the NNRA in the following areas : Security controls of well logging sources, Physical security measures, Accounting for well logging sources, Defense-In-depth measures, Sources movement records and means audit)

Observations: Use of police bomb squat, source movement records, security inspections, etc, by NNRA
• 25-26 March 2019: Placement in the Department of Authorization and enforcement:

➢ Facilitators: Mr. Olasinde Surajudeen Tayo and Mr Effiong Ubong

(the discussion in this Department focused on the authorization process including review and assessment and enforcement for non-compliance and the minimum requirements for granting or acquiring and Authorization on well logging activities)

Observations: (Difference in the process for R/A (independent review of R/A report) as well as process of approval authorization)

• 27-28 March 2019: Placement in the Licensing section.

➢ Facilitators: Mr Effiong Ubong

(The discussions focused on the elements of the NNRA regulatory control programme, authorization procedures, responsibilities and obligations of the licensees, management and organizational requirements, appointment and roles and responsibilities of RSOs, RSAs and well logging supervisors……………….the well logging regulations clear makes provisions for all these to be complied with by the applicant.

Observation: Some requirements are same as Ghana but some differences identified: use of RSA, DPR license, etc)
• 1-3 April 2019: Placement in the Division of Enforcement in the Department of Authorization and enforcement.

   Facilitator: Mr Mfon and Mr. Olasinde Surajudeen Tayo

   (The following areas were: statutory basis for enforcement actions, the enforcement policy document and procedures for enforcements as well as some examples of enforcement actions undertaken by NNRA)

   Observations:

   - NRA has a policy but more details in the NNRA enforcement policy worth adopting by NRA.
   - Enforcement actions are graded in 4 levels with 1 the highest with immediate threat health.
   - Enforcement actions are carried on case by cases to arrive at decision the penalty.
   - The National Nuclear Security Committee play vital roles in enforcement actions for level 1 enforcement class.

• 4-5 April 2019: Placement in the Department of radiological safety.

   Facilitator: Mr. Wada Abdulai Adamu and his team
(The discussions focused the NNRA regulations for radiological safety for well logging, radioactive waste management, NORM regulations. The discussions were extended to cover safety assessment requirements, planning and inspection, inspection report, review of the inspection report of well logging facilities. Similar discussions were done to cover drilling site and temporal storage facility).

• Observations:
  ➢ Difference in the review process of inspection report (independent review by another inspector), concordant (preliminary) report and final inspection reports.
  ➢ Different types of inspection: pre-authorization, pre-shipment, TSF of Rig, compliance, etc

• 8-9 April 2019
  ➢ Facilitator: Mr. Wada Abdulai Adamu and his team & Mr Sabo Yabaya and his team

Discussions focused on: Planning and conduction of inspection on drill rig, marine transport and inspection report and the reviews and communication of corrective actions to the applicant as well as the requirements for the accreditation of Waste Management adviser)

• Observations:
  ➢ Accreditation of Waste Management Consultant,
  ➢ vessels for transport must register with NIMASA (for Ghana GHAPoHA) and the Maritime Authority.
12 April 2019: Placement in the Emergency Preparedness and Response (EP&R) Division:

- **Facilitator:** Dr. Isa Sambo;

(Discussion covered the provisions for emergency preparedness and response requirements in the Nuclear Well Logging Regulations. The applicant is required to submit a detailed emergency preparedness and response plan covering all potential emergency issues that could arise during use, storage, transport and stuck in hole of radiation sources. Inspectors are required to verify documents submitted during inspection and all staff had mandatory training on all these)

- **Observations:**
  - Mandatory training of all staff at 4 levels (Level 1: Induction, level 2: BPTC, Level 3: area specific e.g. EP&R, Level 4: management training). All inspectors have undertaken levels 1 & 2 training and required to verify the EP&R plan of the applicant.
  - Every facility is required to submit an EP&R plan.
  - Submission of drill rehearsal report prior to authorization.
  - Emergency contact incase of emergency
• 15 April 2019: Placement in the licensing section of Department of Authorization and Enforcement.

Facilitator: Mr Ubong Effiong

(Discussions focused on the procedures for drafting, approving of terms and conditions of authorization for oil well drilling facilities and activities: registration of wells, import and export, land and marine transport, TSF, drilling Rig, nuclear gauges, accreditation of NORM consultant, etc)

• Observations:

NNRA has very details conditions of authorization and a well outlined procedure for drafting and approval process for issuing and authorization license as compared to NRA of Ghana.

All licenses to be issued are reviewed by the Legal Unit of NNRA

Only the DG approves the license and signs the final approved license.
16 April 2019: Placement in the RAIS section of Department of Authorization and Enforcement.

- Facilitator: Mr Francis Ademloa

(Discussion what activities RAIS is used in NNRA)

- Observations:
  - The use of RAIS in NNRA starts from the point of receipt of application referred by the DG to the Director of Authorization through Inspections until the Licensed is issued.
  - The (Status of application can be monitored through RAIS).
Establishment of Law and development of Regulations, Guides, requirements and procedures.

- Both NNRA (Act 19 of 1995) and NRA (Act 895 of 2015) have established nuclear laws
- Regulations on well logging: NNRA has well logging and NORM regulations in place but NRA does not have yet.
- The Justice Dept is engaged during the development of regulations to sort out all technical and interpretation issues to enable a smooth process (to obtain Clearance letter).
- Guides: Some guides exist but more needs to developed by NRA
- Requirements: NRA has some generic requirements but non specifically for the oil and gas industry as compared NNRA (requirements for well logging, registration of storage facility, TSF, Rig, drilling rig of well for operations, import and export, nuclear gauges, transport, marine transport, RSA, notification for lost, incidents, abandonment, etc)
- Procedures: NRA is still development its processes and procedures as part of the organization’s IMS.
• Requirements for Notification and Authorization.

- Notification required by NRA for use of any radiation facility by completing a form.
- Notification of movement of sources and the use of source movement book for records.
- Some differences exist between the NNRA Review & Assessment step in the authorization process with that of NRA:
  ✓ Review and assessment (R/A) ➔ Report from R/A ➔ Independent review of the report.
  ✓ More detailed conditions of authorization license.
  ✓ NNRA has regulatory requirements section and the section works with all Depts in the Authority to ensure requirements are developed and approved by the DG.
  ✓ Details of minimum requirements (administrative and Radiation Protection) to be complied with before authorisation: RSA, RSO, dosimetry service provider agreement, DPR permit, etc.
Knowledge acquired and experiences

• Inspection facilities

- NNRA already established Inspection procedures and plan as well as details of responsibilities of inspectors prior to inspection (yet to be done NRA)
- Schedule for by the RS Department is formally communicated to the facility management to schedule for inspection (schedules done by phone or email).
- Types of inspection: pre-authorization, pre-shipment, TSF of Rig, Compliance, transport (land and marine), waste management, commissioning, etc
- Types of inspection reports: concordant (preliminary signed by inspectors and licensee) report and final inspection reports (NRA Inspection protocol signed by both)
- Inspection report by inspectors
- Independent review of the report by experience inspectors
- All inspection reports includes and appendix of all supporting documents received.
- Final inspection not submitted to the applicant (in house use)
- Only a letter of corrective actions and recommendations communicate to the applicant

• Norm regulations in place but actual monitoring and management aspect yet to start.
• Vessels used for transport must be inspected and license and destination of sources being transport must have TSF.
• Inspection of inventory and source movement register (compare book inventory with physical inventory and in RAIS)
Licensing: (licenses and Registration certificates and conditions)

- License of storage facility both onshore and offshore (on rig) (Offshore storage not done by NRA).
- Registration of premises where radiation sources are used (Premises include land, sea, building etc).
- Registration of wells.
- Transport License for all mode of movement of RS ie. Trucks, Vehicles, vessels, boat etc.
- License to import and export license (No fees charged for export License by NNRA).
- License is given to both temporal and permanent premises (NRA issues license for bunker storage)
- License for export of scrap metals and through designated port only (Not yet implemented by NRA).
- At the licensing stage the applicant is expected to provide details of security arrangements for the use of the sources (security arrangements verify only during inspection by NRA).
- Approximately 30 days required for license to be issued with a details steps of the process by NNRA (2 weeks for inspection report and about 3 days max. for license to be ready by NRA).
- NNRA has very details conditions of authorization and a well outlined procedure for drafting and approval process for issuing and authorization license as compared to NRA of Ghana (legal Unit vetting all licenses drafted).
- Only the DG approves the license and signs the final approved license.
Enforcements:

- The NNRA has an Enforcement Division and detailed Enforcement policy and procedures which are already being implemented (NRA has draft not yet approved)
- Enforcement actions are graded in 4 levels with 1 the highest with immediate threat health.
- Enforcement actions are carried on case by cases to arrive at decision the penalty.
- The National Nuclear Security Committee play vital roles in enforcement actions for level 1 enforcement class

- Regulatory compliance section within the Division carries out compliance inspection on corrective actions and also ensure conditions of authorization are complied with.
- Non-compliance issues identified during inspection are referred for enforcement action.
- Frequency of compliance monitoring: (quarterly for high risk facilities and annually for other facilities e.g. NDT, well logging activities)
- NNRA does not charge fees for compliance monitoring (inspection)
- Conditions of authorization covers both administrative and Radiation Protection requirements
- Non-compliance with the conditions could results in administrative fines or court action or both.
Knowledge acquired and experiences

• Other NNRA requirements (Not done by NRA):
  ➢ Transportation radiation sources (RS) is done between 6am-6pm and accompanied by police bomb squat and a certified RPO is involved in transportation of RS
  ➢ Qualified experts (RSA) outside the country need to submit all necessary documentations for authorization to carry out any work in the country
  ➢ The transportation vehicles by land must be accompanied by police bomb squat.
  ➢ Medical certificate of fitness of all occupationally exposed workers is required.
  ➢ All freight forwarders and clearing agent who are directly involved in clearing or exporting RS must register with the Regulatory Authority and receive training in radiation safety.
  ➢ On radioactive waste management: Agreement of return of sources from supplier specifying each RS prior to authorization is strictly enforced by NNRA.
  ➢ Requirement for notification of stuck in hole (within 24 Hrs) and report for actions to be taken by the licensee.
• Other NNRA requirements (Not done by NRA):

- Detailed security arrangements during transport on land and offshore required.
- For NDT services, use of movement log book and security arrangement is required.
- Policy on female workers with respect to radiation exposure as part of the RPP.
- For export of DSRS: notice of export, port of exit, pre-shipment inspection and report, date of shipment and receipt of shipment and letter from consignee that shipment has been received, shipper declaration and bill of lading are required.
- RSO must have a direct line of communication with management on RP issues
- Evidence of emergency drill report based on emergency plan is required for authorisation
The 1 month fellowship training covered the following areas:

- NNRA Act 19 of 1995 and the supporting regulations.
- Minimum requirements in place for various facilities and activities covering administrative and Radiation Protection.
- Security requirements for authorization.
- Transportation requirements.
- Process to obtaining and authorization including Review and Assessment
- Types of inspection, inspection reports and the review process
- Different types of licenses issued and their terms and conditions.
- Enforcement for offenses against the requirements, incidents and accidents reporting requirements and procedures for abandonment or fishing of radiation sources.
• The objectives of the fellowship were clearly achieved judging from the amount of information received and documents reviewed and shared.

• The knowledge gained during this fellowship will help the NRA of Ghana as starts with the development of various documents: Regulations, requirements, guides, procedures, etc.

• The fellowship has provided us with substantial amount of information and documents that will guide us in putting together the structures.

• I have doubt in my mind that, the NNRA has a wealth of experience in this field that NRA of Ghana will continue to make use of experience in different.

• The fellowship training was an opener to the many of the good things NNRA is doing and NRA of Ghana shall adopt or adapt some of your structures already in place.

• Areas of improvement in the regulatory control programme of NRA of Ghana in the oil and gas industry has been identified for consideration by management.

Conclusion
Acknowledgements

- NNRA and the Federal Republic of Nigeria for accepting to host us for this fellowship training.
- IAEA for the sponsorship to attend the fellowship training
- Ghana Government for allowing us to attend the programme
- Our Supervisor: Dr. Yau Idris and all the dedicated staff for the excellent arrangements put in place for a successful completion of the fellowship training.
- All facilitators (long list of people)
- Supporting staff (especially the Drivers for picking us and dropping us daily)
- You are all highly appreciated for the diverse support to us during our 1 month stay with you.
THANK YOU FOR YOUR ATTENTION