EPREV REPORT

IAEA

Emergency Preparedness Review

EPREV

PEER APPRAISAL OF THE ARRANGEMENTS IN THE FEDERAL REPUBLIC OF NIGERIA REGARDING THE PREPAREDNESS FOR RESPONDING TO A NUCLEAR OR RADIOLOGICAL EMERGENCY

2015-06-15 to 2015-06-23

International Atomic Energy Agency

This project/activity is conducted by the IAEA, with funding by the European Union

FOREWORD

Within the United Nations system, the International Atomic Energy Agency (IAEA) has the statutory functions of establishing standards of safety for the protection of health against exposure to ionizing radiation, and of providing for the application of these standards. In addition, under the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention), the IAEA has a function, if requested, to assist Member States in preparing emergency arrangements for responding to nuclear accidents and radiological emergencies.

In response to a request from the Government of the Federal Republic of Nigeria, the IAEA fielded an Emergency Preparedness Review (EPREV) mission to conduct, in accordance with Article III of the IAEA Statute, a peer review of Nigeria's radiation emergency preparedness and response arrangements vis-à-vis the relevant IAEA standards.

The number of recommendations, suggestions and good practices is in no way a measure of the status of the emergency preparedness and response system. Comparisons of such numbers between EPREV reports from different countries should not be attempted.

Contents

Executive Summary

An Emergency Preparedness Review (EPREV) mission was conducted by the International Atomic Energy Agency (IAEA) in the Federal Republic of Nigeria from 15 to 23 June 2015. EPREV missions are designed to provide a peer review of emergency preparedness and response (EPR) arrangements in a country based on the IAEA safety standards. The purpose of this EPREV mission was to conduct a review of the Nigerian nuclear and radiological EPR arrangements and capabilities, with the consideration that Nigeria is embarking on a nuclear power programme.

The nuclear and radiological EPR framework in the Federal Republic of Nigeria is being effectively built on an existing national emergency management system that is clear, well defined and tested. This all-hazards approach is consistent with IAEA safety standards and is a key to the future success of the nuclear and radiological EPR programme. In addition, the EPREV identified strengths in the following areas:

- Specific arrangements for responding to nuclear and radiological emergencies are well integrated into the country's all-hazards emergency management system.
- The roles of the Nigerian Nuclear Regulatory Authority and the National Emergency Management Agency are recognized and appreciated by relevant response organizations.

The EPREV identified some areas in which improvements should be considered, or where progress in implementation should be sustained. These include the following key elements:

- Capabilities to respond to a nuclear emergency should be strengthened in line with the progress being made in embarking on a nuclear power programme.
- State and local government levels need to be better involved in EPR.
- The roles of all response organizations and arrangements for appropriate coordination need to be clarified.
- The capabilities of first responders with regard to training, competence and the procurement and maintenance of equipment need improvement.
- Arrangements for providing instructions and keeping the public informed during emergencies need to be enhanced.
- Arrangements for a medical response to nuclear or radiological emergencies require improvement.

The EPREV team noted the excellent cooperation of all organizations involved in the review mission. In particular, the team commended the openness and transparency of all parties met during the mission.

This report serves as the final record of the EPREV mission. The IAEA will continue to work with the Federal Republic of Nigeria to further develop and improve nuclear and radiological EPR arrangements. It is expected that the Federal Republic of Nigeria will develop an action plan to implement the recommendations and suggestions contained in this report, and will invite the IAEA for an EPREV follow-up mission within two to four years to review its implementation.

1. Introduction

1.1. Objective and Scope

The purpose of this Emergency Preparedness Review (EPREV) mission was to conduct a review of the Nigerian nuclear and radiological emergency preparedness and response (EPR) arrangements and capabilities.

The EPREV mission was a full scope review and covered current facilities and activities. The EPREV focused on emergency preparedness categories III and IV as per the forthcoming IAEA Safety Standards Series No. GSR Part 7, Preparedness and Response for a Nuclear or Radiological Emergency (General Safety Requirements Part 7; hereinafter referred to as GSR Part 7). Considering that Nigeria is embarking on a nuclear power programme, additional considerations were given to the national preparations and arrangements for emergency preparedness category I. The review was carried out by comparing existing arrangements in Nigeria against the IAEA safety standards on EPR.

It is expected that the EPREV mission will facilitate improvements in the EPR arrangements of Nigeria and those of other States on the basis of the knowledge gained and the experiences shared between Nigeria and the EPREV team and through the evaluation of the effectiveness of the Nigerian arrangements, capabilities and good practices.

The key objectives of this mission were to enhance nuclear and radiation safety and emergency preparedness and response by:

- Providing Nigeria with an opportunity for self-assessment of its activities against IAEA safety standards on EPR;
- Providing Nigeria with a review of its EPR arrangements;
- Providing Nigeria with an objective evaluation of its EPR arrangements with respect to IAEA safety standards and guidelines;
- Contributing to the harmonization of EPR approaches among IAEA Member States;
- Promoting the sharing of experience and exchange of lessons learned;
- Providing reviewers from IAEA Member States and the IAEA staff with opportunities to broaden their experience and knowledge of EPR;
- Providing key Nigerian counterparts with an opportunity to discuss their practices with reviewers who have experience with different facilities and activities in the same field;
- Providing Nigeria with recommendations and suggestions for improvement; and
- Providing other States with information regarding good practices identified in the course of the review.

1.2. Preparatory Work and Review Team

At the request of the Government of the Federal Republic of Nigeria, a preparatory meeting for an EPREV was conducted from 5 to 6 August 2014. The preparatory meeting was chaired by the appointed IAEA EPREV team coordinator, Mr. Genaro Rodrigo Salinas Mariaca.

During the preparatory meeting, an agreement was reached on the terms of reference for the EPREV mission and the tentative composition of the EPREV team of experts.

The composition of the review team is listed in Appendix 1.

1.3. Reference for the Review

In March 2015, the IAEA Board of Governors approved the revised General Safety Requirements on EPR (GSR Part 7) [1] for publication. This document served as the main reference for the review. Two other IAEA safety standards were used as a basis for the EPREV: GSG-2, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency [2], and GS-G-2.1, Arrangements for Preparedness for a Nuclear or Radiological Emergency [3].

The terms used in this report are consistent with those found in the aforementioned IAEA Safety Standards.

2. DETAILED FINDINGS ON GENERAL REQUIREMENTS

The intentions of Nigeria to embark on a nuclear power programme were considered in the review whenever possible. In this regard, it has to be noted that the currently existing all-hazard emergency management system of Nigeria is a good basis for also dealing with the hazard related to a nuclear power plant (emergency preparedness category I). However, major improvements should certainly be implemented to improve the arrangements that may be needed to respond to nuclear emergencies.

Several governmental agencies have started to develop scientific programmes under the leadership of the Nigeria Atomic Energy Commission (NAEC). These programmes are related to the nuclear power plant site selection and the collection of data related to natural background radiation. There is even a regulation on the siting of nuclear power plants prepared by the Nigerian Nuclear Regulatory Authority (NNRA) that is awaiting government approval. EPR regulations have also been developed and are pending approval.

All response organizations that were visited by the EPREV team expressed their strong commitment to improve and/or develop their emergency preparedness and response arrangements in line with the development of a national nuclear power programme.

Recommendation 1.
Observation: Considering the current Nigerian intentions to embark on a nuclear power programme, the existing national capabilities for coping with nuclear emergencies caused by facilities under emergency preparedness category I are limited.
Basis for recommendation: GSR Part 7, paragraph 4.5, states: "The government shall make adequate preparations to anticipate, prepare for, respond to and recover from a nuclear or radiological emergency at the operating organization, local, regional and national levels, and also, as appropriate, at the international level. These preparations shall include adopting legislation and establishing regulations for effectively governing the preparedness and response for a nuclear or radiological emergency at all levels."
Recommendation: The Government of Nigeria should strengthen its capabilities to respond to a nuclear emergency, in line with the process for embarking on a nuclear power programme by following the requirements of GSR Part 7.

The following points describe the EPREV team's findings in relation to existing hazards in Nigeria, which are under emergency preparedness categories III and IV as per GSR Part 7.

2.1. Emergency management system

The National Emergency Management Agency (NEMA) has the primary responsibility for coordinating emergency preparedness, planning, management and disaster assistance functions at federal, state, local and community levels. NEMA also has been delegated the responsibility for establishing federal disaster assistance policy; it assumes the leading role in developing and maintaining the National Disaster Response Plan (NDRP).

NEMA, in collaboration with stakeholders, has developed several plans which constitute the basic tools for preparedness. In addition, NEMA has developed the National Disaster

Management Framework (NDMF), which provides a mechanism that serves as a guideline for effective and efficient disaster management in Nigeria. The framework defines measurable, flexible and adaptable coordinating structures, and assigns key roles and responsibilities of disaster management stakeholders across the nation. Among other plans, NEMA, in collaboration with stakeholders, has developed the NDRP, National Contingency Plan, National Pandemic Plan, National Integrated Infrastructure Master Plan and Search and Rescue (SAR) and Epidemic Evacuation Plan for Nigeria.

NEMA has made arrangements to coordinate emergency response at the national level. At the state, local and community levels, arrangements to coordinate the response to nuclear and radiological emergencies are not in place.

Suggestion 1.
Observation: NEMA has been establishing arrangements for preparedness and response at the national level, but there are no specific arrangements for managing nuclear and radiological emergencies at the state and local levels.
Basis for suggestion: GSR-Part 7, paragraph 4.1, states: "The government shall ensure that an emergency management system is established and maintained on the territories and within the jurisdiction of the State for the purposes of emergency response to protect human life, health, property and the environment in the event of a nuclear or radiological emergency."
Suggestion: NEMA should consider establishing clear arrangements for the participation of the state and local governments in the preparedness and response to nuclear and radiological emergencies.

The arrangements for nuclear and radiological emergencies are an integral part of the current mechanisms to respond to all kinds of hazards, following the all-hazard approach.

Good practice 1.
Observation: The current Nigerian system for addressing nuclear and radiological emergencies follows the all-hazards approach.
Basis for good practice: GSR Part 7, paragraph 4.3, states: "The emergency management system shall be integrated, to the extent practicable, into an all-hazards emergency management system …"
Good practice: NEMA, NNRA and other response organizations have arrangements in place to respond to nuclear and radiological emergencies, which are integrated into the all-hazards emergency management system of Nigeria.

NNRA is the regulatory body for nuclear safety and radiation protection. It has a key role in case of a radiological and nuclear emergency as part of the emergency management system. NNRA has been empowered to establish a National Nuclear and Radiological Emergency Plan (NNREP), which has been prepared in coordination with NEMA and the involvement of other relevant organizations. The NNREP is at the final stage of approval.

2.2. Roles and responsibilities

The NNREP addresses the allocation of responsibilities of a number of participating organizations.

There are no responsibilities in the NNERP related to the compensation of victims of a nuclear or radiological emergency.

Recommendation 2.
Observation: There are no provisions for compensation of victims of a nuclear or radiological emergency.
Basis for recommendation: GSR-Part 7, paragraph 4.6, states: "The government shall ensure that arrangements are in place for effectively governing the provision of prompt and adequate compensation for victims of damage caused by a nuclear or radiological emergency."
Recommendation: The Government of Nigeria should establish adequate provision for compensation for victims of the damage caused by a nuclear or radiological emergency.

The NNREP describes the roles and responsibilities of governmental and non-governmental organizations. These responsibilities do not cover clearly all functional elements in a nuclear or radiological emergency.

Recommendation 3.
Observation: Not all critical nuclear or radiological emergency response tasks have been assigned to at least one organization. Some functional elements of the response are not covered in the National Nuclear and Radiological Emergency Plan (NNREP).
Basis for recommendation: GSR-Part 7, paragraph 4.7, states: "The government shall ensure that all roles and responsibilities for preparedness and response for a nuclear or radiological emergency are clearly allocated in advance among operating organizations, the regulatory body and response organizations."
Recommendation: NEMA, in coordination with NNRA and other organizations, should ensure that responsibilities are clearly allocated in the NNREP and cover all functional requirements of the GSR Part 7.

NEMA has established a coordinating mechanism at the national level to develop the planning process and plans to cope with emergencies. This mechanism is based on the creation of national committees, with the involvement of stakeholders in the preparations and development of the plans.

NNRA is empowered to prepare and enforce regulations on preparedness and response to nuclear and radiological emergencies. NNRA's Authorisation and Enforcement Department is in charge of reviewing operators' license applications, including emergency plans. The Unit of Emergency Preparedness and Response deals with the arrangements for preparedness and response at the international, national and regional levels, but its involvement in the review is limited.

Suggestion 2.
Observation: NNRA's Emergency Preparedness and Response Unit and the Authorisation and Enforcement Department do not coordinate during the review of operators' emergency plans to ensure their harmonization with arrangements at the national level.

Suggestion 2.
Basis for suggestion: GSR-Part 7, paragraph 4.14, states: "Before commencement of operation of the facility or commencement of the activity, the regulatory body shall ensure, for all facilities and activities under regulatory control that could necessitate emergency response actions, that the on-site emergency arrangements: a) are integrated with those of other response organizations as appropriate; b) are integrated with contingency plans in the context of Ref. [9][1] and with security plans in the context of Ref. [10][2]; c) provide, to the extent practicable, assurance of an effective response to a nuclear or radiological emergency."
Suggestion: NNRA should consider reviewing its internal processes in order to ensure that, when assessing an emergency plan of an operator before granting the licence, all aspects of integration of the response with other response organizations have been considered, and the arrangements at national, state and local levels are fulfilled during the preparation of the plan.

According to the Nigerian Basic Ionizing Radiation Regulations of 2003, the operators are required to prepare emergency plans and submit them to NNRA when applying for licences for operation. There are other regulations for specific practices that require the operator to prepare emergency plans (Diagnostic and Interventional Radiology, Radiotherapy, Nuclear Medicine, Industrial Radiography, Waste Management and Well Logging). The Nigerian Nuclear and Radiological Emergency Preparedness and Response Regulations of 2014 are currently in draft stage.

Suggestion 3.
Observation: Different regulations for specific facilities and activities are available. A general regulation is now being drafted on emergency preparedness and response that will be valid for all facilities and activities. These regulations have not yet been approved.
Basis for suggestion: GSR-Part 7, paragraph 4.12, states: "The regulatory body is required to establish or adopt regulations and guides to specify the principles, requirements and associated criteria for safety upon which its regulatory judgements, decisions and actions are based [7][3]. These principles, requirements and associated criteria shall include principles, requirements and associated criteria for emergency preparedness and response of the operating organization ..."
Suggestion: NNRA should consider improving and finalizing the draft regulation, taking into consideration GSR Part 7, to cover in a general and comprehensive manner the regulatory requirements in EPR.

[1] Ref. [9] refers to: INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), IAEA Nuclear Security Series No. 13, IAEA, Vienna (2011).

[2] Ref. [10] refers to: INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Security Recommendations on Radioactive Material and Associated Facilities, IAEA Nuclear Security Series No. 14, IAEA, Vienna (2011).

[3] Ref. [7] refers to: INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal and Regulatory Framework for Safety, IAEA Safety Standards Series No. GSR Part 1 (Rev. 1), IAEA, Vienna (in preparation).

2.3. Hazard assessment

NNRA has performed the hazard assessment based on the emergency preparedness categories of GSR Part 7.

It has been identified that the existing facilities and activities in the country are in emergency preparedness categories III and IV. In addition, the future nuclear power plant projects have been considered as facilities in category I.

There are no specific arrangements to continuously update the national hazard assessment.

Suggestion 4.
Observation: There are no arrangements in place to carry out periodic reviews of the national hazard assessment.
Basis for suggestion: GSR-Part 7, paragraph 4.25, states: "The government shall ensure that a review of the hazard assessment is performed periodically with the aims of: (a) ensuring that all facilities and activities, on-site areas, off-site areas and locations where events could occur that would necessitate protective actions and other response actions are identified, and (b) taking into account any changes to the hazards within the State and beyond its borders, any change in assessments of threats for nuclear security purposes, the experience and lessons from research, operation and emergency exercises, and technological developments …. The results of this review shall be used to revise the emergency arrangements as necessary."
Suggestion: NNRA, NEMA and the Office of the National Security Adviser should consider updating continuously the national hazard assessment for radiological emergencies.

2.4. Protection strategy for an emergency

For facilities in emergency preparedness category III, protection strategies have been developed as part of their emergency plans. They are based mainly on the following urgent protective actions: isolation of the affected area, evacuation, respiratory protection and protective clothing, decontamination of individuals and medical management. For emergencies in emergency preparedness category IV, a set of operational intervention levels, emergency worker dose guidance levels, action levels for food and examples of initial safe distances in radiological accidents were proposed based on IAEA Safety Standards Series No. GS-R-2, Preparedness and Response for a Nuclear or Radiological Emergency (hereinafter referred to as GS-R-2) [4].

3. DETAILED FINDINGS ON FUNCTIONAL REQUIREMENTS

3.1. Managing emergency response operations

In case of a radiological emergency, the structure of the responding organization follows the general layout of the Incident Command System. Upon arrival, the senior first responder on scene takes the role of the Incident Commander until relieved by another qualified individual arriving later. Shifting of the role of Incident Commander follows the type and status of the emergency and is clear for the involved organizations. First arrivals can be, among others, the officers of the Federal and State Department of Fire Services, Federal Road Safety Corps, Civil Defence, etc.

Once notified, the local officials of NEMA's emergency response team are dipatched to the scene and take the role of Incident Commander. When a potential or a real nuclear or radiological emergency is identified, NEMA initiates an alert of other organizations with specific roles in response.

NNRA can be alerted by NEMA or directly by the operator of a nuclear or radiological facility. NNRA Headquarters alerts its nearest zonal office for activation. Radiological experts of NNRA's zonal office will then proceed to the scene in the function of Radiological Assessor; NNRA Headquarters serves as Technical Support. NNRA does not make decisions on protective actions, and it is not specifically responsible for implementing them.

A response at the national level will begin upon receipt of notification and consists of various steps depending on the circumstances of the emergency. Once notified, each agency will assess the need to initiate its response based on the situation reported. The basis for, and the procedure of, involvement of response organizations and the decision making process concerning the allocation of resources are not well defined in the relevant documents.

Recommendation 4.
Observation: There are no well defined arrangements to identify available resources; their deployed location and to know what resources may be missing during an emergency situation.
Basis for recommendation: GSR-Part 7, paragraph 5.8, states: "Arrangements shall be made for obtaining and assessing the information necessary for making decisions on the allocation of resources for all response organizations throughout a nuclear or radiological emergency."
Recommendation: NEMA should establish arrangements to have necessary information for making decisions on the allocation of resources during nuclear or radiological emergency situations.

3.2. Identifying, notifying and activating

The operator of a facility or activity in emergency preparedness categories III and IV is required by NNRA to make arrangements for the prompt identification of an actual or potential nuclear or radiological emergency and the determination of the appropriate level of response. The emergency classes that are introduced in Nigeria meet the requirements of GSR Part 7. After identifying an emergency, the operator classifies its severity. Additionally, the operator of a facility is required to notify the off-site authorities and to provide updated

information regarding the emergency. Upon receiving a notification NNRA conducts an independent verification of the emergency classification reported by the operator of the affected facility or activity. NNRA initiates the notification of other organizations in the national system.

NNRA's Emergency Preparedness and Response Unit serves as a notification point to be contacted by all operators in case of a nuclear or radiological emergency. NNRA is the nominated National Warning Point, the National Competent Authority for Domestic Emergencies and the National Competent Authority for Emergencies Abroad under the Early Notification and Assistance Conventions. Upon receipt of a notification on nuclear or radiological emergency warranting a national response, NNRA notifies NEMA, which is responsible for notifying other response organizations. From this point of view, NNRA plays a key initiating role in the notification system.

NNRA's Emergency Preparedness and Response Unit is staffed only during working hours. Outside working hours, only NNRA's Director General and some of the staff of the Emergency Preparedness and Response Unit can be contacted. Personal mobile phone numbers and email addresses are given as additional means of contact at national and international level. These arrangements are not commensurate with the high significance of the role NNRA plays in the notification system and do not provide a high level of certainty and reliability for performing the role of a notification point.

Recommendation 5.
Observation: The arrangements that are in place to receive and provide notification of emergency situations are not commensurate with the high significance of the role of the NNRA in the notification system and do not provide a high level of certainty and reliability for performing the role of a notification point.
Basis for recommendation: GSR Part 7, paragraph 5.11, states: "Off-site notification point(s) shall be established to receive notification of an actual or potential nuclear or radiological emergency. The notification point(s) shall be maintained continuously available to receive any notification or request for support and to respond promptly or to initiate a preplanned and coordinated off-site response appropriate to the emergency class or the level of emergency response. The notification point(s) shall have immediate communication with the response organizations that are providing support using suitable, reliable and diverse means of communication."
Basis for recommendation: GSR Part 7, paragraph 5.19, states: "The State shall make known to the IAEA and to other States, directly or through the IAEA, its single warning point responsible for receiving emergency notifications and information from other States and information from the IAEA. This warning point shall be maintained continuously available to receive any notification, request for assistance or request for verification and to initiate promptly a response or verification. The State shall promptly inform the IAEA and, directly or through the IAEA, inform other States of any changes that occur in respect of the warning point. The State shall make arrangements for promptly notifying and for providing relevant information to, directly or through the IAEA, those States that could be affected by a transnational emergency."

Recommendation 5.
Basis for recommendation: GSR Part 7, paragraph 5.90, states: "Governments and international organizations shall put in place and maintain arrangements to respond in a timely manner to a request made by a State, in accordance with established mechanisms and respective mandates, for assistance in preparedness and response for a nuclear or radiological emergency."
Recommendation: NNRA should improve its arrangements to receive national and international notification of an actual or potential nuclear or radiological emergency and request for assistance made by a State directly or through the IAEA.

3.3. Taking mitigatory actions

Operators of facilities and activities are responsible for taking mitigatory actions. NEMA is responsible for ensuring that arrangements for provision of emergency services are made with response organizations to support response at facilities upon request.

The National Institute of Radiation Protection and Research (NIRPR), Ibadan, the Centre for Energy Research and Training (CERT), Zaria, and the Centre for Energy Research and Development (CERD) can provide expertise and services in radiation protection.

According to its regulatory functions, NNRA ensures that operators of facilities in emergency preparedness categories III and IV make adequate arrangements for mitigatory actions during a nuclear and/or radiological emergency. NNRA provides on-call advice and dispatches to the scene of the event an emergency team including radiation specialists who are capable of assessing threats involving radioactive or fissile material, assessing radiological conditions, mitigating the radiological consequences and managing the dose of responders. NNRA is responsible for determining when additional assistance is necessary for dealing with the radiological aspects of the event and how to obtain such assistance.

3.4. Taking urgent protective actions and other response actions

NNREP describes elements regarding taking urgent protective action. The national intervention levels for urgent protective actions are listed in Appendix 6 of NNREP. These levels are not consistent with IAEA safety standards (i.e. GSR Part 7 and GSG-2).

Recommendation 6.
Observation: The National Nuclear and Radiological Emergency Plan (NNREP) contains national intervention levels that are not consistent with the IAEA safety standards.
Basis for recommendation: GSR Part 7, paragraph 5.38, states: "Within emergency planning zones and distances, arrangements shall be made for the timely monitoring and assessment of contamination, radioactive releases and doses for the purpose of deciding on or adjusting the protective actions and other response actions that need to be taken or that are being taken. These arrangements shall include the use of pre-established operational criteria in accordance with the protection strategy."

Recommendation 6.
Recommendation: NNRA should review and revise national intervention levels that are contained in the NNREP and make them consistent with GSR Part 7.

3.5. Providing instructions, warnings and relevant information to the public

The operators of facilities and activities in Nigeria belonging to emergency preparedness categories III and IV are not prepared for providing instructions, warnings and relevant information to the public in case of an emergency. NNRA should develop regulatory requirements for the operators of facilities and activities on providing instructions, warnings and relevant information to the public (see Suggestion 2 on further efforts to be devoted by NNRA to improve and finalize the draft regulation).

The responding governmental organizations provide instructions, warnings and relevant information to the public on a case by case basis. Standard procedures do not exist, and only ad-hoc arrangements are available.

Recommendation 7.
Observation: The responding governmental organizations provide instructions, warnings and relevant information to the public on a case by case basis; standard procedures do not exist, and only ad-hoc arrangements are available.
Basis for recommendation: GSR Part 7, paragraph 5.44, states: "For facilities in category III and category IV, arrangements shall be made to provide the public with information and instructions in order to identify and locate people who may have been affected by a nuclear or radiological emergency and who may need response actions such as decontamination, medical examination or health screening. These arrangements shall include arrangements for issuing a warning to the public and providing information in the event that a dangerous source could be in the public domain as a consequence of its loss or unauthorized removal."
Recommendation: With the involvement of other relevant national organizations, NEMA should formalize arrangements to provide clear and timely instructions, warnings and relevant information to the public.

3.6. Protecting emergency workers and helpers in an emergency

The National Emergency Management Agency, the Federal and State Department of Fire Services, the Nigerian Security and Civil Defence Corps, the Federal Roads Safety Corps, the Nigerian Armed Forces and the Police are the most likely organizations to arrive first at the scene of a nuclear or radiological emergency. These national organizations have provided their first responding organizational units with specialized capabilities in terms of human resources, training and appropriate administrative and technical means to deal with emergencies. However, the specialized units of first responder organizations lack basic equipment, including personal protective equipment for nuclear and radiological emergencies, detectors for alpha, beta and gamma rays, dosimeters and radiation badges to be used by emergency workers to detect radiation and radioactive materials and measure radiation doses.

Recommendation 8.
Observation: The specialized units of first responder organizations lack basic personal protective and necessary detection equipment for nuclear and radiological emergencies.
Basis for recommendation: GSR Part 7, paragraph, 5.49 states: "The operating organization and response organizations shall ensure that arrangements are in place for the protection of emergency workers and of helpers in an emergency for the range of anticipated hazardous conditions in which they might have to perform response functions. These arrangements, as a minimum, shall include: (a) training those emergency workers designated as such in advance; (b) providing emergency workers not designated in advance and helpers in an emergency immediately before the conduct of their specified duties with instructions on how to perform the duties under emergency conditions ('just in time' training); (c) managing, controlling and recording the doses received; (d) provision of appropriate specialized protective equipment and monitoring equipment; (e) provision of iodine thyroid blocking, as appropriate, if exposure due to radioactive iodine is possible; (f) obtaining informed consent to perform specified duties, when appropriate; (g) medical examination, longer term medical actions and psychological counselling, as appropriate."
Basis for recommendation: GSR Part 7, paragraph 6.22, states: "Adequate tools, instruments, supplies, equipment, communication systems, facilities and documentation (such as procedures, checklists, manuals, telephone numbers and email addresses) shall be provided for performing the functions specified in Section 5. These items and facilities shall be selected or designed to be operational under the conditions (such as radiological conditions, working conditions and environmental conditions) that could be encountered in the emergency response, and to be compatible with other procedures and equipment for the response (e.g. compatible with the communication frequencies of other response organizations), as appropriate. These support items shall be located or provided in a manner that allows their effective use under the emergency conditions postulated."
Recommendation: The Government, through the Office of the National Security Adviser, should ensure that adequate resources are available for the provision, maintenance and regular renewal of personal protective and detection equipment for first responders and helpers who are involved in the response to a nuclear or radiological emergency.

In case of a severe nuclear or radiological emergency, various non-governmental organizations may offer their humanitarian services (such as the Nigerian Red Cross/Red Crescent, the Accident Victim Rescue and Information, the Save Accident Victims Association of Nigeria and the Fire Disaster Prevention and Safety Awareness Association of Nigeria). Procedures and conditions for the safe and efficient integration of these organizations in the response arrangements for nuclear and radiological emergencies have not been established yet.

Recommendation 9.
Observation: Procedures and conditions for the safe and efficient integration of non-governmental organizations and other helpers in the response activities have not yet been established for nuclear and radiological emergencies.
Basis for recommendation: GSR Part 7, paragraph 5.47, states: "Arrangements shall be made to register and to integrate into the emergency response operations those emergency workers who were not designated as such in advance of a nuclear or radiological emergency and helpers in an emergency. This shall include designation of the response organization(s) responsible for ensuring the protection of emergency workers and the protection of helpers in an emergency."
Recommendation: NEMA should establish arrangements and provide the necessary conditions for coordinating the integration of non-governmental organizations and other helpers in nuclear or radiological emergency response operations.

3.7. Medical response

The NNREP assigns responsibility for providing or obtaining appropriate medical care to overexposed or contaminated individuals to the Federal Ministry of Health. The Nigerian Red Cross/Red Crescent and competent NGOs in all major cities are in charge of emergency first aid service, i.e. assist in rescue operations, triage and first aid (until relieved by emergency medical service).

The medical first aid service is also provided by paramedics in the Civil Defence Corps and in the Federal Fire Service and other services. There is no unified medical first aid response throughout the country. Paramedics in the Civil Defence Corps and in Federal Fire Service units are provided with instructions and trained to ensure their personal safety in all emergencies, including radiological emergencies. They have a basic knowledge of protective measures and of the precautions to take. However, they would not be able to recognize clinical symptoms of radiation exposure or other indications of a possible nuclear or radiological emergency, and they have no equipment for radiation detection or contamination monitoring.

General practitioners across the country are not aware of the symptoms of radiation induced injuries and would not consider acute radiation syndrome in differential diagnostic procedures.

Recommendation 10.
Observation: Arrangements are not in place for medical practitioners to be aware of the symptoms of radiation induced injuries.
Basis for recommendation: GSR Part 7, paragraph 5.60, states: "Arrangements shall be made for medical personnel, both general practitioners and emergency staff, to be made aware of the clinical symptoms of radiation exposure and of the appropriate notification procedures and other response actions that are warranted if a nuclear or radiological emergency has occurred or is suspected."
Recommendation: The Federal Ministry of Health, in coordination with NEMA, NNRA, the National Universities Commission and the Medical and Dental Council of Nigeria should ensure that general practitioners and emergency staff are aware of the clinical symptoms of radiation exposure.

The NNREP lists several institutions responsible for providing the initial medical response, advising medical transport and the local hospitals on the risk and the appropriate protective actions to take, and on establishing a temporary morgue area.

The draft plan envisages the designation of referral hospitals, which are to provide highly specialized treatment to exposed and/or contaminated people, as well as for people with combined injuries as a result of a radiation emergency.

The National Hospital, Abuja, and the five designated teaching hospitals will serve as referral hospitals. These hospitals have limited resources for performing the monitoring of possible external contamination and no designated area for decontamination. Provisions for initial treatment, including properly trained personnel, do exist, but there are no guidelines for effective diagnosis. Training on radiation protection is performed in-house and by NNRA, and some staff members were trained by the IAEA on medical response in a nuclear or radiological emergency. No exercise has been held so far.

Recommendation 11.
Observation: There are no arrangements, such as guidelines for effective diagnosis and treatment, to provide contaminated or overexposed individuals with appropriate medical care.
Basis for recommendation: GSR Part 7, paragraph 5.64, states: "Arrangements shall be made to identify people with possible contamination or having possibly been exposed sufficient to result in radiation induced health effects and to provide them with appropriate medical attention including longer term medical follow up. These arrangements shall include: (a) guidelines for effective diagnosis and treatment; (b) designated medical personnel trained in clinical management of radiation injuries; (c) designated institutions for evaluating radiation exposure (external and internal), for providing specialized medical treatment and for longer term medical actions. This shall also include the use of pre-established operational criteria in accordance with the protection strategy … and arrangements for consultation on treatment following any exposure that could result in severe deterministic effects … with medical practitioners experienced in dealing with such injuries."
Recommendation: The Federal Ministry of Health, in coordination with NEMA and NNRA, should make arrangements for providing appropriate medical care to contaminated or overexposed individuals.

3.8. Communicating with the public throughout an emergency

The NNREP envisages the Joint Information Co-ordination System (JICS) to be activated in a nuclear or radiological emergency. JICS is defined as a process of linking information sources in order to ensure that only designated spokespersons communicate to the public on behalf of the government. For minor accidents, information might be provided by a spokesperson for the site where the accident occurred. For large scale emergencies, when various organizations are involved, a Joint Information Centre (JIC) comprising representatives of relevant organizations would be formed. The JIC would serve as a single focal point collecting and

disseminating the latest information, in order to provide timely, consistent and accurate information to the media and the public. Individual agencies participating in emergency response should convey emergency information in their respective areas of responsibility to the JIC. NEMA will implement procedures for providing information to, and for obtaining information from, all agencies participating in the response. The Nigerian Television Authority and the Federal Radio Corporation of Nigeria are recognized as institutions that would support the response by providing instructions on recommended protective action, communicating factual information on the radiological accident to the general public and using its facilities to respond to rumours that are creating concern with the public.

While NEMA has capabilities to establish a joint information centre for conventional emergencies, there is lack of coordination in the area of public information among different institutions for nuclear and radiological emergencies.

Recommendation 12.
Observation: There is a lack of coordination among different institutions in communication with the public in the event of a nuclear or radiological emergency.
Basis for recommendation: GSR Part 7, paragraph 5.67, states: "Arrangements shall be made to ensure that information provided to the public by response organizations, operating organizations, the regulatory body and others (e.g. international organizations) in a nuclear or radiological emergency is coordinated and consistent, with due recognition of the evolutionary nature of the emergency."
Recommendation: NEMA, in coordination with relevant stakeholders, should make arrangements to ensure that information provided to the public by all stakeholders in response to a nuclear or radiological emergency is coordinated and consistent.

The NNREP lists the key objectives of disseminating harmonized information and stipulates when and what in form information is to be disseminated. However, it does not address the necessity to carry out communication with the public in a nuclear or radiological emergency on the basis of a strategy developed at the preparedness stage as part of the protection strategy, nor does it contain arrangements to adjust this strategy in the emergency response on the basis of prevailing conditions.

3.9. Taking early protective actions

The NNREP does not provide specific provisions in regard to early protective actions as defined in GSR Part 7. It states that the National Agency for Food and Drug Administration and Control (NAFDAC) has the responsibility under the plan for providing advice about the food products in any areas that may have been contaminated by the accident and for obtaining samples of food products for radioactivity measurements. NAFDAC is also responsible for organizing the efficient control of food and other products at the Nigerian border crossings in co-operation with the Nigeria Customs and Nigerian Immigration Service.

The NNREP provides for national action levels based on GS-R-2 for agricultural countermeasures against ingestion and longer term protective actions. There is no strategy for decontaminating people, commodities and the environment, and no arrangements or criteria are in place for lifting restrictions on protective actions.

Recommendation 13.
Observation: There are no arrangements in place for monitoring the contamination of people, vehicles and goods moving out of areas with contamination, nor for lifting restrictions on protective actions.
Basis for recommendation: GSR Part 7, paragraph 5.75, states: "Within the emergency planning zones and inner cordoned off area, arrangements shall be made for monitoring the contamination levels of people, vehicles and goods moving out of areas with contamination, in order to control the spread of contamination and, as applicable, for the purposes of decontamination in accordance with the protection strategy. These arrangements shall include the use of pre-established operational criteria in accordance with the protection strategy and shall take into consideration that some vehicles and items potentially with contamination as well as members of the public and emergency workers may have left these areas before the establishment of contamination control points and boundaries."
Recommendation: NNRA should ensure that arrangements are established for monitoring the contamination of people, vehicles and goods moving out of areas with contamination; arrangements or criteria to lift restrictions on protective actions and a strategy for decontaminating people, commodities and the environment should be put in place.

3.10. Managing radioactive waste in an emergency

NNRA has developed Radioactive Waste Management Regulations which set up the basic technical and organizational requirements that waste generators and operators of waste management facilities should follow. The regulations stipulate requirements for collection, segregation, characterization, treatment, conditioning, storage and preparation for transport of radioactive waste arising from medical, industrial and research facilities.

The national policy on radioactive waste and spent nuclear fuel management of December 2013 sets forth a regulatory framework for safe and sustainable radioactive waste management, defines the responsibilities of key stakeholders and specifies the manner of radioactive waste management funding. The policy stipulates that radioactive waste will be classified in accordance with international standards.

The Strategy/National Plan for the Safe and Sustainable Management of Radioactive Waste and Spent Nuclear Fuel in Nigeria assigns responsibilities for the implementation of the plan, provides a waste classification scheme, and includes provisions for radioactive waste processing and waste management end points.

The Nigerian Nuclear and Radiological Emergency Preparedness and Response Regulations of 2014, currently in draft stage, stipulate that the operating organization is responsible for ensuring the safe and effective management of radioactive waste during a nuclear or radiological emergency. The national policy and strategy for radioactive waste management shall apply to radioactive waste generated in a nuclear or radiological emergency (see Suggestion 3).

Currently, there is a radioactive waste storage facility in Nigeria, located at the Centre for Energy Research and Training (CERT) in Zaria.

3.11. Mitigating non-radiological consequences

The Civil Defence Corps has established arrangements for psychological counselling to both victims of a disaster and emergency workers. A number of trained paramedics, counsellors and social workers can provide immediate medical and psychological counselling. Further assistance can be provided by clinical psychologists in state owned hospitals or from other national institutions such as the Psychologists Board.

The NNREP does not provide any specific provisions on mitigating non-radiological consequences. Protection strategies for facilities in emergency preparedness category III do not contain provisions on mitigating non-radiological consequences either.

Recommendation 14.
Observation: There are no formal arrangements in place for mitigating non-radiological consequences of a nuclear or radiological emergency.
Basis for recommendation: GSR Part 7, paragraph 5.87, states: "Arrangements shall be made for mitigating the non-radiological consequences of an emergency and an emergency response and for responding to concerns of the public in a nuclear or radiological emergency. These arrangements shall include providing the public with: (a) information on any associated health hazards and clear instructions on the actions to be taken …; (b) medical and psychological counselling; and (c) adequate social support, as appropriate."
Recommendation: NEMA, in coordination with NNRA and other response organizations, should make arrangements for mitigating the non-radiological consequences of an emergency and an emergency response, as well as for responding to concerns of the public in a nuclear or radiological emergency.

3.12. Requesting, providing and receiving international assistance

Nigeria is party to the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency and a member of the West Africa disaster forum (Regional Committee for Disaster Management in West Africa), which has multilateral management agreements to provide resources in case of disasters; however, nuclear and radiological elements of disasters are not considered.

NNRA is in charge of assessing whether the national capabilities to cope with an emergency have been exceeded so that international assistance is needed; it is also responsible for requesting this international assistance.

Nigeria is member of the IAEA Response and Assistance Network (RANET). It registered its national assistance capabilities that could be made available to assist another State in five areas (source search and recovery, radiation survey, environmental sampling and analysis, radiological assessment and advice and dose assessment). Capabilities to provide assistance may yet be enhanced.

NNRA is designated as the National Warning Point (NWP), National Competent Authority for Emergencies Abroad (NCA-A) and National Competent Authority for Domestic Emergencies (NCA-D), as defined in the IAEA Incident and Emergency Communication Manual, and it participates in Convention Exercises (ConvEx) conducted by the IAEA.

3.13. Terminating an emergency

The NDRP contains the Recovery Function Section, which describes the policies, planning considerations and concept of operations that guide the provision of assistance to help disaster victims and affected communities return to normal life. There are also provisions for the "stand down" of response teams and organizations after an emergency.

The NNREP contains some provisions for recovery and termination of an emergency, including the allocation of responsibility for directing recovery operations and for declaring the termination of the state of emergency. It is envisaged that the emergency will be terminated when all victims have been rescued and been given emergency medical aid, the hazardous materials involved have been identified, further spread of contamination has been stopped, and affected emergency workers as well as areas have been decontaminated.

These arrangements should be amended with specific aspects of terminating a nuclear or radiological emergency as defined in GSR Part 7.

Recommendation 15.
Observation: Existing arrangements for terminating a nuclear or radiological emergency do not cover specific aspects of terminating an emergency as defined in GSR Part 7.
Basis for recommendation: GSR Part 7, paragraph 5.96, states: "The transition from an emergency exposure situation to an existing exposure situation and the return to a planned exposure situation shall be made in a coordinated and orderly manner, by making any necessary transfer of responsibilities and with an increasing involvement of relevant authorities and interested parties."
Basis for recommendation: GSR Part 7, paragraph 5.97, states: "The government shall ensure, as part of its emergency preparedness, that arrangements are in place for the termination of a nuclear or radiological emergency. The arrangements shall take into account that the decision on the termination of the emergency might be taken at different times in different geographical areas. The planning process shall include as appropriate: (a) the roles and functions of organizations; (b) methods of transferring information; (c) means for assessing radiological consequences and non-radiological consequences; (d) conditions, criteria and objectives to be met for enabling the termination …; (e) review of the hazard assessment and of the emergency arrangements; (f) establishment of national guidelines for termination of an emergency; (g) arrangements for continuing communication with the public, and for monitoring of public opinion and the response of the news media; (h) arrangements for consultation with interested parties."
Recommendation: NNRA, in coordination with NEMA, should ensure that arrangements for terminating an emergency are in place as defined in GSR Part 7.

3.14. Analysing the emergency and emergency response

The Nigerian Nuclear and Radiological Emergency Preparedness and Response Regulations of 2014, currently in draft stage, stipulate that, for all facilities and activities, the operating organization shall evaluate the causes and its own response to a nuclear or radiological emergency, in order to identify actions to be taken to prevent future occurrences of similar emergencies and to improve emergency arrangements.

Nigeria does not have experience with nuclear and radiological emergencies but has extensive experience with conventional emergencies, so some arrangements to analyse emergency response and incorporate lessons learned are in place. Lessons are also learned by the thorough evaluation of regular exercises and drills that are executed by operating organizations and some responding organizations to a nuclear or radiological emergency, such as the Civil Defence Corps and the Federal Fire Service.

4. DETAILED FINDINGS ON REQUIREMENTS FOR INFRASTRUCTURE

4.1. Authorities for emergency preparedness and response

NEMA is the prime authority responsible for making arrangements for preparedness and response to all disasters at national level. NEMA has also been assigned the authority for coordinating the entire response and for resolving of any conflicts among different organizations, as stated in the NNREP. The legislation empowers NNRA to establish plans and procedures, in cooperation with other national authorities, for coping with radiation emergency and abnormal occurrences involving nuclear materials and radiation sources.

The authority and responsibility to make decisions concerning actions on the site are assigned to operating organizations; however, the authority and responsibility to make decisions with regard to actions off the site are not clearly defined. The Federal Lead Agency (FLA) for decision making during the national response to nuclear or radiological emergencies is not identified. Similarly, the authority for communication with the public is also not clearly assigned for the different phases of the emergency response.

Recommendation 16.
Observation: The Federal Lead Agency (FLA) which is authorized and responsible to make decisions concerning off-site response actions and to communicate with the public is not clearly defined.
Basis for recommendation: GSR Part 7, paragraph 6.4, states "The authority and responsibility for making decisions on response actions to be taken on the site and off the site … and for communication with the public shall be clearly assigned for each phase of the response".
Recommendation: NEMA, in coordination with other stakeholders, should identify the responsible authority for making decisions on response actions to be taken in the off-site area (e.g. by including it in the NNREP) and for communication with the public for each phase (early, intermediate, recovery) of the response.

For notifications, taking immediate actions and directing on-site response, authority and responsibility are assigned in the emergency plans of the operators, which are approved by NNRA. The arrangements for delegation and/or transfer of authority are also addressed in the emergency plans of the operators.

4.2. Organization and staffing for emergency preparedness and response

At the national level, the overall relationship and interface among different response organizations for emergency preparedness and response are defined in the NNREP. However, this relationship and interface has not yet been tested. A generic organizational structure for response to a nuclear or radiological emergency is also included in the NNREP. Information about assigning the positions to specific individuals responsible for performing response functions in case of a nuclear or radiological emergency could not be found in the organizational plans of the response organizations.

Recommendation 17.
Observation: The off-site response organizations have not assigned the positions responsible for the performance of different response actions in case of a nuclear or radiological emergency.

Recommendation 17.
Basis for recommendation: GSR Part 7, paragraph 6.8, states: ”The positions responsible within each operating organization and response organization for performance of the response functions specified in Section 5 shall be assigned in the emergency plans and procedures. The positions responsible within each operating organization, each response organization and the regulatory body for the performance of activities at the preparedness stage, in accordance with these requirements, shall be assigned as part of the routine organizational structures and shall be addressed, as appropriate, in the emergency plans and procedures.”
Recommendation: NEMA and NNRA should ensure that off-site response organizations develop nuclear and radiological emergency plans. The positions of those responsible for performing different response functions should be clearly defined and incorporated in the organizations’ emergency plans, in line with their mandates.

For the operating organizations, the organizational relationships and interfaces are defined in the emergency plans of the operators, which are approved by NNRA. These interfaces are tested in emergency exercises conducted by the operators in the light of regulatory requirements. The positions responsible for initiating and performing different response actions have been assigned properly in the emergency plans. The Nuclear Technology Centre (NTC), CERT and NIRPR informed the EPREV team that the responsible personnel assigned to these positions to perform emergency response functions are qualified and fit for their intended duty.

It was highlighted in the self-assessment report and during the discussions with relevant stakeholders of NNREP that sufficient numbers of suitably qualified personnel for response to a radiological emergency are not available, and efforts are being made to improve the situation. The responders are qualified and trained for handling conventional emergencies, but only a limited number of staff at a few organizations — such as the Chemical, Biological, Radiological and Nuclear (CBRN) units of the Nigeria Armed Forces, the Nigeria Security and Civil Defence Corps and the Explosive Ordinance Division (EOD) — have the basic knowledge for responding to nuclear or radiological emergencies.

Recommendation 18.
Observation: The off-site response organizations do not have the sufficient number of qualified and trained staff to respond to a nuclear or radiological emergency.
Basis for recommendation: GSR Part 7, paragraph 6.9, states: “Personnel who are assigned to positions in all operating organizations and response organizations to perform the functions necessary to meet the requirements established in Section 5 shall be qualified and fit for their intended duty.”
Basis for recommendation: GSR Part 7, paragraph 6.10, states: “Appropriate numbers of suitably qualified personnel shall be available at all times (including during 24 hour a day operations) so that appropriate positions can be promptly staffed as necessary following the declaration and notification of a nuclear or radiological emergency. Appropriate numbers of suitably qualified personnel shall be available in the long term to staff the various positions necessary to take mitigatory actions, protective actions and other response actions.”

Recommendation 18.
Recommendation: NEMA, in coordination with NNRA, should ensure that off-site response organizations have the appropriate number of suitably qualified and trained staff responsible for performing the response functions in case of nuclear or radiological emergency.

4.3. Coordination of emergency preparedness and response

In their emergency plans, the operating organizations have defined the mechanism for the coordination with response organizations and the regulatory body. A coordination mechanism for emergency preparedness and response to nuclear or radiological emergencies has also been addressed in the NNREP. NEMA has the main responsibility to ensure the effective coordination among all the organizations at the national, state and local levels. For further improving the coordination and maintaining preparedness, a national level committee will be formed, consisting of representatives from NEMA, NNRA, NAEC and the Office of the National Security Adviser.

Different centres and institutes, such as CERT, CERD, NTC and NIRPR, are assigned the responsibility of radiological assessment in case of a radiological emergency. However, information about coordination among these departments to avoid any confusion and ensure consistency of the assessments of the situation could not be found.

Recommendation 19.
Observation: There is no coordination mechanism among different organizations and their support centres responsible for radiological assessment in case of a nuclear or radiological emergency.
Basis for recommendation: GSR Part 7, paragraph 6.13, states: ”When several different organizations of the State or of other States are expected to have or to develop tools, procedures or criteria for use in the response to the same emergency, arrangements for coordination shall be put in place to improve consistency of the assessments of the situation, including assessments of contamination, doses and radiation induced health effects and any other relevant assessments made in a nuclear or radiological emergency, so as not to give rise to confusion.”
Recommendation: NAEC and NNRA should establish coordination mechanisms and develop a procedure for use during joint response to emergency situations.

Arrangements for coordination with other States in case of a transnational emergency are not in place to satisfy those States that protective actions taken for their citizens are according to international recommendations.

Suggestion 5.
Observation: There are no arrangements in place to coordinate with other States for providing information during the response to transnational emergencies.
Basis for suggestion: GSR Part 7, paragraph 6.14, states: ”Arrangements shall be made to coordinate with other States in the event of a transnational emergency any protective actions and other response actions that are recommended to their citizens and to embassies in order either to ensure that they are consistent with those recommended in these States, or to provide an opportunity for them to explain to the public the basis for the differences.”

Suggestion 5.
Suggestion: The Government should consider making necessary arrangements for coordination with its embassies and embassies from other States in case of a transnational emergency.

4.4. Plans and procedures for emergency response

The NNREP has been prepared by NNRA in coordination with NEMA and with the involvement of all relevant organizations. The development of the NNREP started in 2005, and the roles of all the stakeholders have been agreed upon in a meeting held few months back. Now the validated plan has been re-distributed to all the stakeholders for their final comments, and subsequently it will be submitted to Federal Executive Council for approval. Arrangements are not available for coordination and integration of the NNREP with other plans and procedures, which are to be implemented simultaneously in a nuclear or radiological emergency. The coordination of the NNREP with the other plans and procedures like security, firefighting, nuclear forensics, investigations, etc. is necessary to ensure its effective implementation and to avoid conflicts.

Recommendation 20.
Observation: The NNREP has been prepared and validated through meetings of all the relevant stakeholders; however, it has not been approved yet. Furthermore, information about the coordination and integration of the NNREP with other plans and procedures like security, firefighting, nuclear forensics, investigations and others is not available.
Basis for recommendation: GSR Part 7, paragraph 6.17, states: "... A national emergency response plan shall be developed that integrates all relevant plans for emergency response in a coordinated manner and consistently with an all-hazards approach. Emergency plans shall specify how responsibilities for managing emergency response operations are to be discharged on the site, off the site and across national borders, as appropriate. The plans for emergency response shall be coordinated with any other plans and procedures that may be implemented in a nuclear or radiological emergency, in order to ensure that the simultaneous implementation of the plans would not reduce their effectiveness or cause conflicts. Such other plans and procedures include emergency plans for facilities in category I and for areas in category V; security plans and contingency plans; procedures for the investigation of a nuclear security event, including identification, collection, packaging and transport of evidence contaminated with radionuclides; nuclear forensics and related activities; evacuation plans; and plans for firefighting."
Recommendation: NEMA should expedite the approval of the NNREP. Furthermore, arrangements should be implemented to ensure coordination and integration of the NNREP with other plans and procedures that may be implemented in a nuclear or radiological emergency.

Some of the organizations, like NNRA and the Explosive Ordinance Division, have prepared their organizational response plans for performing their assigned response functions in the NNREP; however, most of the response organizations have not developed their organizational plans yet.

The operating organizations of facilities or activities in category III and IV prepare their emergency plans and procedures for coping with nuclear or radiological emergency and submit them to NNRA for review and approval as part of the licensing process.

Recommendation 21.
Observation: There are response organizations that have not developed their organizational plans to perform their assigned functions in the NNREP.
Basis for recommendation: GSR Part 7, paragraph 6.17, states: "Each response organization shall prepare a general emergency plan or plans for coordinating and performing their assigned functions as specified in Section 5 and in accordance with the hazard assessment and the protection strategy."
Recommendation: All response organizations listed in the NNREP should develop their organizational plans and procedures to coordinate and effectively perform their assigned response functions.

4.5. Logistical support and facilities

NEMA has the overall responsibility to coordinate the provision of all necessary logistical support and resources for execution of the NNREP at the national level. The NNREP requires each operating and response organization to maintain tools, instruments, supplies, equipment, communication systems, facilities and documentation to perform its assigned functions. The response organizations, especially the first responders, are lacking the equipment and tools required for response to a nuclear or radiological emergency (see Recommendation 8 in Section 3.6).

NNRA has established a radiation emergency preparedness and response unit to perform emergency response functions assigned to the regulatory body, and it is equipped with communications tools, some radiation monitoring equipment and a mobile laboratory.

CERT, CERD and NIRPR are assigned the responsibility of performing radiological assessments in case of a nuclear or radiological emergency. These centres are equipped with the necessary equipment/tools to perform their assigned functions. NIRPR is responsible for making arrangements for the analysis of environmental and biological samples.

4.6. Training, drills and exercises

NNRA has established requirements for training of the staff of the operating organizations in performing their respective duties, and this training is addressed in the emergency plans of the operators. At the national level, each organization identified in the NNREP is responsible to ensure the training of its relevant personnel in performing the assigned tasks in case of a nuclear or radiological emergency. NNRA has been assigned the responsibility to develop a training programme for each position identified in the NNREP for the organization of emergency response; however, currently the programme for initial and regular training for response organizations is not in place.

Recommendation 22.
Observation: The training programme for emergency response personnel at different levels has not been developed.
Basis for recommendation: GSR Part 7, paragraph 6.28, states: "The operating organization and response organizations shall identify the knowledge, skills and

Recommendation 22.
abilities necessary to perform the functions specified in Section 5. The operating organization and response organizations shall make arrangements for the selection of personnel and for training to ensure that the personnel selected have the requisite knowledge, skills and abilities to perform their assigned response functions. The arrangements shall include arrangements for continuing refresher training on an appropriate schedule and arrangements for ensuring that personnel assigned to positions with responsibilities in emergency response undergo the specified training."
Recommendation: All the organizations identified in NNREP should develop and implement a training programme for continuous training at an appropriate schedule and ensure that all relevant personnel undergo the specified training.

NNRA is in the process of arranging training for the first responders and decision makers with the assistance of the IAEA under a Technical Cooperation programme. NNRA conducts awareness of media personnel on yearly basis. The training of NNRA professional personnel to extend their knowledge and skills in radiation protection and emergency management has been identified by NNRA management as a high priority issue for the near future.

The operators conduct emergency drills/exercises to test their emergency plans at defined intervals, as per the regulatory requirements, and submit the exercise evaluation report to NNRA as a part of the license renewal application. NNRA also participates in the evaluation of some of the exercises.

NNRA conducts some drills and exercises to test its own response plan and also participates in Convention Exercises (ConvEx) conducted by the IAEA. However, there is no defined exercise programme available.

Recommendation 23.
Observation: A programme for conducting and evaluating the exercises to test response functions specified in the NNREP has not been developed.
Basis for recommendation: GSR Part 7, paragraph 6.30, states: "Exercise programmes shall be developed and implemented to ensure that all specified functions required to be performed for emergency response, all organizational interfaces for facilities in category I, II or III and the national level programmes for category IV or V are tested at suitable intervals. These programmes shall include the participation in some exercises of, as appropriate and feasible, all the organizations concerned, people who are potentially affected and representatives of news media. The exercises shall be systematically evaluated and some exercises shall be evaluated by the regulatory body. Programmes shall be subject to review and revision in the light of experience gained."
Basis for recommendation: GSR Part 7, paragraph 6.31, states: "The personnel responsible for critical response functions shall participate in drills and exercises on a regular basis so as to ensure their ability to take their actions effectively."
Basis for recommendation: GSR Part 7, paragraph 6.33, states: "The conduct of exercises shall be evaluated against pre-established objectives of emergency response to demonstrate that identification, notification, activation and response actions can be performed effectively to achieve the goals of emergency response."

Recommendation 23.
Recommendation: NEMA, in coordination with NNRA, should develop and implement an exercise programme to ensure that all specified response functions in the NNREP are tested regularly. All the personnel responsible for critical response functions and decision making should participate in the exercises. Furthermore, a process for systematic evaluation of exercises should also be developed.

4.7. Quality management

A quality management programme for emergency preparedness and response has not been established by the response organizations.

Recommendation 24.
Observation: A quality management programme for emergency preparedness and response is not in place.
Basis for recommendation: GSR Part 7, paragraph 6.34, states: "The operating organization, as part of its management system and response organizations, as part of their emergency management system, shall establish a programme to ensure the availability and reliability of all supplies, equipment, communication systems and facilities, plans, procedures and other arrangements necessary to perform functions in a nuclear or radiological emergency as specified in Section 5. The programme shall include arrangements for inventories, resupply, tests and calibrations, to ensure that these are continuously available and functional for use in a nuclear or radiological emergency."
Basis for recommendation: GSR Part 7, paragraph 6.36, states: "Arrangements shall be made to maintain, review and update emergency plans, procedures and other arrangements and to incorporate lessons from research, operating experience (such as in the response to emergencies) and emergency exercises."
Basis for recommendation: GSR Part 7, paragraph 6.37, states: "The operating organization and response organizations shall establish and maintain adequate records in relation to both emergency arrangements and the response to a nuclear or radiological emergency, to include dose assessments, results of monitoring and inventory of radioactive waste managed, in order to allow for their review and evaluation. These records shall also provide for the identification of those persons requiring longer term medical actions, as necessary, and shall provide for the long term management of radioactive waste."
Recommendation: NNRA, NEMA and other response organizations should establish a quality management programme to ensure the availability and reliability of all supplies, equipment, communication systems and facilities, plans, procedures and other arrangements necessary for the effective response in a nuclear or radiological emergency.

Appendix I: Mission Team Composition

No.	Name and LAST NAME	Position	Organization
1.	Pablo Jerez	EPREV Team Leader	National Centre of Nuclear Security (CNSN) Ministry of Science, Technology and Environment Cuba
2.	Geza Macsuga	EPREV Deputy Team Leader	Department for Technical Support Hungarian Atomic Energy Authority (HAEA) Hungary
3.	Genaro Rodrigo Salinas Mariaca	EPREV Team Coordinator	Incident and Emergency Centre Department of Nuclear Safety and Security IAEA
4.	Nera Belamaric	EPREV Team Member	Consultant on Emergency Preparedness and Response Croatia
5.	Muhammed Nadeem Hussain	EPREV Team Member	Pakistan Nuclear Regulatory Authority (PNRA) Pakistan

Appendix II: Mission Schedule

IAEA Emergency Preparedness Review EPREV

Federal Republic of Nigeria

INTERNATIONAL ATOMIC ENERGY AGENCY EMERGENCY PREPAREDNESS AND RESPONSE REVIEW SERVICE (EPREV) MISSION TO NIGERIA

15TH - 23RD JUNE 2015

PROGRAMME

DAY 1: MONDAY, 15TH JUNE 2015		
Time	**Activity**	**Venue**
09:00-09:30	General Introductions of Stakeholders and IAEA Experts	Reiz Continental Hotels, Abuja
09:30 -10:15	Presentation by NEMA on overall national framework for EPR	Reiz Continental Hotels, Abuja
10:15 -11:00	Presentation by Nigeria on Self-Assessment	Reiz Continental Hotels, Abuja
11:00-11:15	Tea Break	Reiz Continental Hotels, Abuja
11:15-12:00	Presentation by IAEA on EPREV objectives and process	Reiz Continental Hotels, Abuja
12:00-13:00	Lunch Break	Reiz Continental Hotels, Abuja
14:00-15:30	Meeting with National Counterparts on National Nuclear and Radiological Emergency Plan (NEMA, NNRA, NAEC, NSCDC, POLICE EOD, FIRE SERVICE, CERT, NAFDAC, ABUTH, SHETSCO, SGS, SCHLUMBERGER)	Reiz Continental Hotels, Abuja
15:30-15:45	Tea Break	Reiz Continental Hotels, Abuja
15:45-17:00	**BREAKOUT SESSION**	Reiz Continental Hotels, Abuja
17:00- 18:00	EPREV team daily meeting	Reiz Continental Hotels, Abuja
18:00	Report writing	Reiz Continental Hotels, Abuja
DAY 2: TUESDAY, 16TH JUNE 2015		
09:00-10:00	Meeting with NEMA	NEMA HQ, Abuja
10:00-10:30	Tea Break	Abuja
10:30-12:30	Meeting with NNRA	NNRA Board Room
12:30-14:00	Lunch Break	Abuja
14:00-15:30	Meeting with organizations involved in the nuclear embarking intentions: National Environmental Standards and Regulations Enforcement Agency (NESREA); Nigeria Metrological Agency (NIMET), National Agency for Food Drug Administration and Control (NAFDAC); Nigeria Atomic Energy Commission (NAEC); Consumer Protection Council of Nigeria (CPC)	NNRA Board Room

15:30-15:45	Tea Break	Abuja
15:45-17:00	Group A will fly to Lagos; Group B will travel to Zaria EPREV team daily meeting/report writing	
DAY 3: WEDNESDAY, 17TH JUNE 2015		
	Group A - Lagos	**Group B - Zaria**
09:00-09:45	Meeting with Federal Airport Authority, Lagos	
09:45-10:15	Tea Break	
10:15-11:00	Meeting with Nigeria Civil Aviation Authority, Lagos	Meeting with CERT & Waste Management Facility, Zaria
11:00-11:45	Meeting with Nigeria Maritime Safety Authority, Lagos	
11:45-12:30	Meeting with Representatives of Scrap metal companies, Lagos	
12:30-14:00	Lunch Break	Lunch Break
14:00-14:45	Meeting with Ordinance Depots (Army, Navy & Air Force), Lagos	Meeting with ABUTH, Zaria
14:45-15:30	Meeting with Nigeria Police Force, Explosive & Ordnance (EOD), Lagos	
15:30-15:45	Tea Break	Tea Break
15:45-16:30	State Security Office, Lagos	Report writing
16:30-17:00	Fly to Port Harcourt	
	EPREV team daily meeting/report writing	
DAY 4: THURSDAY, 18TH JUNE 2015		
	Group A – Port Harcourt	**Group B - Abuja**
07:30- 11:30		Group B travels back to Abuja
09:00-10:30	Meeting with Schlumberger Nigeria Limited, Port Harcourt	
10:30-11:00	Tea Break	Tea Break
11:30- 13:00	Meeting with SGS Inspection Services	Meeting with National Hospital Abuja
13:00-14:00	Lunch Break	Lunch Break
15:00-16:30	Fly back to Abuja	Group B Meeting with Nuclear Technology Centre, Sheda Abuja

16:30-17:00	Report writing	Tea Break/ Report writing
17:00- 18:00	EPREV team daily meeting	Reiz Continental Hotels, Abuja
18:00	Report writing	Reiz Continental Hotels, Abuja
DAY 5: FRIDAY, 19TH JUNE 2015		
09:00-10:30	Meeting with Nigeria Security & Civil Defence Corps, Abuja	Abuja
10:30-11:00	Tea Break	Abuja
11:30-12:30	Meeting with Nigeria Fire Services, Abuja	Abuja
12:30-13:45	Lunch Break	Abuja
14:00-15:15	Meeting with Federal Road Safety Corps, Abuja	Abuja
15:15-16:15	EPREV team daily meeting	Reiz Continental Hotels, Abuja
16:15	Report writing	
DAY 6: SATURDAY, 20TH JUNE 2015		
09:00-10:30	Report writing by EPREV team	Reiz Continental Hotels, Abuja
10:30-11:00	Tea Break	Abuja
11:00-12:30	Report writing by EPREV team	Reiz Continental Hotels, Abuja
12:30-14:15	Lunch	Abuja
14:15-15:15	Report writing by EPREV team	Reiz Continental Hotels, Abuja
15:15-15:30	Tea Break	Abuja
15:30-17:45	Report writing by EPREV team	Reiz Continental Hotels, Abuja
DAY 7: SUNDAY, 21ST JUNE 2015		
Morning	Report writing	Reiz Continental Hotels, Abuja
Afternoon	Free	
Evening	Preliminary draft report submitted to counterparts by EPREV team	Reiz Continental Hotels, Abuja

DAY 8: MONDAY, 22ND JUNE 2015		
	EPREV Team	**Nigeria Team**
09:15-10:45	Draft the executive summary, Reiz Continental Hotels, Abuja	Review and revise the first draft, Reiz Continental Hotels, Abuja
10:45-11:15	Time off for the team/Social activity	Tea Break
11:15-12:15		Review and revise the first draft, Reiz Continental Hotels, Abuja
12:15-14:00		Lunch Break
14:00-15:30		Comments sent by Liaison Officer in track changes mode to EPREV Coordinator, Abuja
15:30-15:45	Tea Break	Tea Break
15:45- 17:00	EPREV team reviews the comments,	Reiz Continental Hotels, Abuja
17:00	Report writing	Reiz Continental Hotels, Abuja
DAY 9: TUESDAY, 23RD JUNE 2015		
09:15-10:30	EPREV team reviews the comments	Reiz Continental Hotels, Abuja
10:30-11:00	Team Break	
11:00-12:30	Meeting to clarify issues, if any	Reiz Continental Hotels, Abuja
12:30-14:00	Lunch Break	
14:00-15:15	Report finalization	Reiz Continental Hotels, Abuja
15:15	Agreed draft report delivered	Reiz Continental Hotels, Abuja
15:15- 16:30	Exit meeting	Reiz Continental Hotels, Abuja
16:30-16:45	Tea Break	
DAY 10: WEDNESDAY, 24TH JUNE 2015		
09:15-17:30	EPREV Team leaves Nigeria	

References

[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards No. GSR Part 7, IAEA, Vienna (forthcoming).

[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards No. GSG-2, IAEA, Vienna (2011).

[3] INTERNATIONAL ATOMIC ENERGY AGENCY, Arrangements for Preparedness for a Nuclear or Radiological Emergency, IAEA Safety Standards No. GS-G-2.1, IAEA, Vienna (2007).

[4] INTERNATIONAL ATOMIC ENERGY AGENCY, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards No. GS-R-2, IAEA, Vienna (2002).

Acronyms
(Alphabetic order)

Acronym	Description
CERD	Centre for Energy Research and Development
CERT	Centre for Energy Research and Training
ConvEx	Convention Exercises
EPR	Emergency Preparedness and Response
EPREV	IAEA Emergency Preparedness Review
FLA	Federal Lead Agency
IAEA	International Atomic Energy Agency
JIC	Joint Information Centre
JICS	Joint Information Co-ordination System
NAEC	Nigeria Atomic Energy Commission
NAFDAC	National Food, Drug Administration and Control
NCA-A	National Competent Authority for Emergencies Abroad
NCA-D	National Competent Authority for Domestic Emergencies
NDMF	National Disaster Management Framework
NDRP	National Disaster Response Plan
NEMA	National Emergency Management Agency
NIRPR	National Institute of Radiation Protection and Research
NNRA	Nigerian Nuclear Regulatory Authority
NNREP	National Nuclear and Radiological Emergency Plan

Acronym	Description
NTC	Nuclear Technology Centre
NWP	National Warning Point