



Emergency
Preparedness
Review

EPREV

**PEER APPRAISAL OF THE ARRANGEMENTS IN
THE UNITED REPUBLIC OF TANZANIA
REGARDING THE PREPAREDNESS FOR
RESPONDING TO A RADIATION EMERGENCY**



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International Atomic Energy Agency



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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 Tanzania dated 10 December 2013, the IAEA fielded an Emergency Preparedness Review (EPREV) mission to conduct, in accordance with Article III of the IAEA Statute, a peer review of Tanzania'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.

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Executive Summary

This report provides the results of the Emergency Preparedness Review (EPREV) mission to the United Republic of Tanzania from 27 July to 5 August, 2014. The mission was undertaken by the International Atomic Energy Agency (IAEA) based on a request from the Tanzania Atomic Energy Commission (TAEC). 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 EPREV team consisted of international EPR experts from IAEA Member States as well as a team coordinator from the IAEA Secretariat. This report includes recommendations for improvements based on safety requirements, suggestions for consideration based on the IAEA safety requirements and safety guides, and good practices that are considered as models for other Member States. In some cases, improvements in line with the detailed findings are already being undertaken. In other cases, the Government of Tanzania will need to adopt an action plan to implement the recommendations and suggestions.

The EPREV team considers it the highest priority for Tanzania to complete the formalization of plans and procedures for radiation emergencies, and to ensure that they are coordinated and synchronized with response arrangements for other hazards. Completing these arrangements will not only meet the international requirements, but will also improve the national capabilities to respond to high-risk emergencies such as droughts, floods, and disease outbreaks. TAEC and the Disaster Management Department (DMD) should work closely together to ensure that radiation emergencies are included in disaster management plans at all levels of government, especially at the national level. Once TAEC is familiar with the arrangement in place for disaster management, TAEC and DMD should finalize the draft National Nuclear and Radiological Emergency Response Plan (NNRERP). This document will provide much needed details to response organizations to prepare for their roles and responsibilities. Additionally, operating organizations must develop emergency response plans to ensure that capabilities are in place to protect people, the environment and infrastructure. This is especially necessary at the two Category III facilities in Tanzania.

There remains a gap in the flow of information during emergencies. This includes the lack of a continuously available contact point, undocumented information sharing arrangements and procedures between response organizations, and a lack of a clear decision making process at times when emergency actions must be undertaken. Each of these gaps increases the risk that there will be an unnecessary delay in responding to an emergency that would potentially increase its impact. One critical action is to fully establish a national emergency operations centre, as required in the 2012 Tanzania Emergency Preparedness and Response Plan (TEPRP). Having an emergency centre where response organizations can coordinate their activities will provide an immediate improvement in communication and response, not only for radiation emergencies but also for conventional (general) emergencies.

After the plans, procedures and facilities are in place, it will be necessary to increase the training, drills and exercise for all response organizations, especially for first responders and response personnel at TAEC and DMD. There exists an excellent relationship between TAEC and some first responders, including the Tanzania Police Force (TPF) border and customs officials, to conduct radiation emergency training. This cooperation should be expanded across the police force and to other government agencies to ensure that all responders are properly trained in emergency actions.

The EPREV team also noted the excellent cooperation between TAEC and the other stakeholders in coordinating the mission. TAEC management should maintain this momentum by assigning appropriate resources to emergency preparedness and response functions.

This report serves as the final record of the EPREV mission. The IAEA will continue to work with Tanzania through existing projects to continue to improve EPR arrangements. It is expected that Tanzania will develop an Action Plan to implement the recommendations and suggestions in the report, and will invite the IAEA for an EPREV Follow-Up Mission to review the implementation.

1. Introduction

1.1. Objective and Scope

The purpose of this EPREV mission was to conduct a review of the emergency preparedness and response arrangements and capabilities of the United Republic of Tanzania (URT). The EPREV scope included all hazards present in the country. The review was carried out by comparing existing arrangements in Tanzania against the IAEA safety standards.

It is expected that the EPREV mission will facilitate improvements in Tanzania's emergency preparedness and response arrangements, and those of other Member States, from the knowledge gained and experiences shared between Tanzania and the EPREV team and through the evaluation of the effectiveness of the Tanzanian arrangements, its capabilities and its good practices.

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

- Providing Tanzania with an opportunity for self-assessment of its arrangements against IAEA safety standards;
- Providing Tanzania with an objective evaluation of its emergency preparedness and response arrangements with respect to IAEA safety standards and guidelines;
- Contributing to the harmonization of emergency preparedness and response 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 staff with an opportunity to discuss their practices with reviewers who have experience with different practices in the same field;
- Providing Tanzania 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 Tanzania, a preparatory meeting for EPREV was conducted from 5 to 6 March 2014. The preparatory meeting was carried out by the initial Team Leader, Mr Karol Janko, and the IAEA EPREV Team Coordinator, Mr Mark Breitingner.

The EPREV preparatory team had discussions regarding EPR (and policy issues) with the Tanzanian Liaison Officer, Mr Leonard Kifanga, and key organizations in the host country. The discussions resulted in agreement on the scope of the EPREV mission.

Mr Kifanga made presentations on the national context, the current status of EPR in Tanzania and the self-assessment results to date. Mr. Chinyuka made presentations on the national all-hazards and disaster management capabilities in Tanzania.

IAEA staff presented the EPREV principles, process and methodology. This was followed by

a discussion on the tentative work plan for the implementation of the EPREV Mission in Tanzania in July – August 2014.

The composition of the proposed EPREV review team (experts from Member States to be involved in the review) was discussed, and the size of the team was tentatively confirmed. Logistics — including meeting and work space, counterparts and Liaison Officer identification, proposed site visits, lodging and transportation arrangements — were also addressed. All relevant aspects were included in the agreed Terms of Reference (TOR).

Prior to the mission, TAEC provided IAEA (and the review team) with limited advance reference material for the review, including the self-assessment. In preparation for the mission, the IAEA review team members conducted a review of the advance reference material and provided their initial comments to the IAEA Team Coordinator prior to the commencement of the EPREV mission.

1.3. Reference for the Review

IAEA Safety Standards GS-R-2 (Preparedness and Response for a Nuclear or Radiological Emergency) [1], 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] were used as review criteria.

The terms used in this report are consistent with those found in the IAEA safety standards referred to in the above paragraph.

2. Detailed Findings

2.1. Basic Responsibilities

The Disaster Relief Coordination Act (1990) provides for the maintenance and operation of a system for the anticipation, coordination and control of disastrous situations and the organization of relief from disaster. It established the Tanzania Disaster Relief Committee (TANDREC) under the Office of the Prime Minister, charged with overseeing and coordinating the activities of the government designed to secure the effective prevention of disasters and the preparedness and operation of affairs in the event of a disaster. The Committee guides, directs, approves and controls the activities of the Disaster Management Department (DMD), which coordinates all disaster relief operations and preparedness measures in the country. An all-hazards plan has been established, which includes references to potential radiation emergencies. The National Operational Guidelines for Disaster Management (2003) make provision for the Tanzania Atomic Energy Commission (TAEC) to be the lead agency for radiation emergencies. TAEC, as part of TANDREC through DMD, fulfil the role of the National Coordinating Authority (NCA). A National Disaster Risk Reduction Platform under the auspices of the Prime Minister's Office was established in 2005 and includes all government departments and agencies, as well as private sector and non-governmental organizations, responsible for planning and coordination of the response to specific disasters. This enables an integrated, coordinated advisory role for disaster preparations and risk reductions, information about the status of all off-site government response activities and the ability to monitor the status of the government response to all emergencies, including radiation emergencies, at a strategic level. Regional, district, ward and village disaster committees exist and have the mandate to implement disaster management arrangements including for radiation emergencies.

The Atomic Energy Act (2003) establishes TAEC and specifies its functions, which include licensing and inspection as well as responsibilities for emergency preparedness and response. The regulatory and license requirements include the submission of an emergency plan appropriate for the source and its associated risks, which must be coordinated and tested with other response organisations.

The responsibilities of operating organizations are provided for in the Atomic Energy (Protection from Ionizing Radiation) Regulations (2004).

The functions and responsibilities of all operating organizations, state authorities and response organizations to be involved in response to a radiation emergency are summarized in the draft National Nuclear and Radiological Emergency Response Plan (NNRERP) prepared by TAEC. However, a lack of coordination between DMD and TAEC has resulted in a situation where understanding of the roles and responsibilities of all stakeholders in radiation emergencies has not been communicated. Consequently, response arrangements for radiation emergencies are not well coordinated with those for conventional emergencies. In addition, the process for the resolution of differences and incompatible arrangements between the various response organizations has not been finalized.

Recommendation 1.

Observation. There is no functioning national coordinating authority or mechanism. Therefore, not all state authorities and response organizations that need to be involved

Recommendation 1.
<p>in a radiation emergency are aware of the necessary arrangements, and understand their respective functions and responsibilities, as documented in the draft National Nuclear and Radiological Emergency Response Plan.</p>
<p>Basis. GS-R-2, paragraph 3.4, states: "Legislation shall be adopted to allocate clearly the responsibilities for preparedness and response for a nuclear or radiological emergency and for meeting the requirements established in this Safety Requirements publication. This shall include establishing or identifying an existing governmental body or organization to act as a national co-ordinating authority whose function, among others, is to co-ordinate the assessment of the threats within the State ... and to co-ordinate the resolution of differences and incompatible arrangements between the various response organizations. This authority shall ensure that the functions and responsibilities of operators and response organizations as specified in these requirements are clearly assigned and are understood by all response organizations, and that arrangements are in place for achieving and enforcing compliance with the requirements."</p>
<p>Recommendation. The Tanzania Disaster Relief Committee (TANDREC), through the Disaster Management Department and the Tanzania Atomic Energy Commission, should ensure a common understanding of the respective functions and responsibilities of all operating and response organisations and coordinate the compatibility of arrangements among them.</p>

Facilities and activities where the potential exists for accidents are required by law to establish emergency preparedness and response plans, which must be approved by TAEC. The licensee has primary responsibility for emergency preparedness and response within the boundaries of its facility or during the use of radiation sources, including notification and providing advice to off-site officials. However, emergency plans have not been drafted and, consequently, have not been reviewed or approved by TAEC prior to the commencement of operation for facilities and activities. In the case of the Ocean Road Cancer Institute (ORCI), no emergency plan exists, nor are formal procedures in place, yet a license has been granted by TAEC.

Category III facilities and Category IV practices are required to assign a radiation safety officer responsible for ensuring radiation safety. The radiation safety officer and, in the case of ORCI, the medical physicist are the key contacts with TAEC during radiation emergencies.

Recommendation 2.
<p>Observation. The Tanzania Atomic Energy Commission does not consistently ensure or verify that emergency plans and preparedness arrangements are in place when issuing authorization for facilities or practices, resulting in operations being conducted without an approved emergency plan.</p>
<p>Basis. GS-R-2, paragraph 3.9, states: "In fulfilling its statutory obligations, the regulatory body ... shall establish, promote or adopt regulations and guides upon which its regulatory actions are based; ... shall provide for issuing, amending, suspending or revoking authorizations, subject to any necessary conditions, that are clear and unambiguous and which shall specify (unless elsewhere specified): ... the requirements for incident reporting; ... and emergency preparedness arrangements."</p>
<p>Recommendation. The Tanzania Atomic Energy Commission should enforce the existing regulation to review and approve licensee emergency plans prior to issuing an authorization for operation.</p>

Regional, municipal, district, ward and sub-ward authorities, with the assistance of national authorities, are responsible for determining and implementing measures to protect life, property and the environment in any area outside the facility boundaries. The provision of resources to deal with response actions are escalated as required, depending on the consequences of the hazard. The Regional Commissioner has overall responsibility for decision making regarding public protective actions at the regional level. The relevant minister, and ultimately the Prime Minister, will assume this responsibility at the national level in a severe emergency.

TAEC provides technical support and advice to the relevant disaster management committees regarding protective actions. When notified, TAEC provides the first responders and agencies with a general (radiation safety) assessment of the emergency based on the location and nature of the event, gives an initial assessment of the problem and proposes appropriate follow-up actions. TAEC has established its own emergency plan, which is still in draft form, in the event that it needs to respond to the scene of a radiation emergency. In this case, response arrangements are not formally organized to assist TAEC personnel in responding to the emergency. TAEC has not yet coordinated its response with those of the disaster management off-site responders.

2.2. Assessment of Threats

The threat (hazard) assessment has been performed by TAEC as part of the draft NNRERP. An inventory of radiation sources and practices has been completed by TAEC and considered as the basis for the threat (hazard) assessment. The inventory identified a number of missing or orphan sources, for which an ad-hoc search is still ongoing. The locations at which there is a significant probability of encountering a dangerous source that has been lost, abandoned, illicitly removed or illicitly transported — large scrap metal processing facilities, national border crossings and abandoned military or other facilities where large sources may have been used — have not been identified or considered. Moreover, no consideration has been given to the potential for security incidents, including those involving radiological dispersal devices (RDD).

Suggestion 1.
<p>Observation: The national threat (hazard) assessment, which is included in the draft National Nuclear and Radiological Emergency Response Plan, has identified threat categories but does not encompass the full range of postulated events or the locations at which there is a significant probability of encountering a dangerous source.</p>
<p>Basis. GS-R-2, paragraph 3.15, states: “The full range of postulated events shall be considered in the threat assessment. In the threat assessment, emergencies involving a combination of a nuclear or radiological emergency and a conventional emergency such as an earthquake shall be considered. Any threat associated with nuclear facilities in other States shall also be considered. In the threat assessment any populations at risk shall be identified and, to the extent practicable, the likelihood, nature and magnitude of the various radiation related threats shall be considered. The threat assessment shall be so conducted as to provide a basis for establishing detailed requirements for arrangements for preparedness and response by categorizing facilities and practices ...”</p>
<p>Suggestion. The Tanzania Atomic Energy Commission should consider finalizing the threat (hazard) assessment as part of the National Nuclear and Radiation Emergency Response Plan, including the full range of postulated events and locations at which there</p>

Suggestion 1.

is a significant probability of encountering a dangerous source.
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2.3. Establishing Emergency Management and Operations

The Disaster Relief Coordination Act (1990) establishes two main players in management of all emergencies in the URT. TANDREC is the managing, supervising and decision making body of the DMD. This organizational setting means that one organization is responsible for coordinating preparedness and response to all emergencies, including radiation emergencies. The all-hazards plan includes radiation in the list of hazards, grouped under the category of hazardous substances, but this has not been fully elaborated to include specific locations or materials, nor does it contain response arrangements.

The command and control system for the response to a radiation emergency applies the same principles as to conventional emergencies, through an “all-hazards approach”. For example, the Incident Command System (ICS) establishes that all emergencies are managed at the lowest level possible. If the emergency escalates, management and command is transferred to upper levels (e.g. district, regional and national). For all emergencies in which police, fire fighters and paramedics are involved, it is clear to all stakeholders that the Police take the lead and that TAEC provides expertise in radiation matters.

Suggestion 2.

Observation. All-hazards emergency plans at the local, district, and regional level do not address radiation emergency response.

Basis. GS-R-2, paragraph 4.9, states: “Arrangements for a nuclear or radiological emergency shall be integrated with arrangements at the national and local level for response to conventional emergencies.”

Suggestion. The Disaster Management Department through, the Tanzania Disaster Relief Committee, should consider directing authorities at all levels to include arrangements for radiation emergency response with the arrangements in their respective all-hazards plans.
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For facilities and practices involving radiation sources, the lack of an emergency plan means that there is no clear concept for establishing and organizing operations, ensuring a clear transition from normal to emergency operations, or coordinating off-site response organizations with the on-site response.

The operating organizations of Threat (Hazard) Category III facilities do not require pre-defined emergency planning zones around their facilities or urgent protective action considerations off site. Assistance from off-site organizations, at least with regard to fire fighters, paramedics and police, is foreseen, but the arrangements with these organizations are not formalized.

Both of these topics should be addressed as part of the plans to be developed as per Recommendation 2.

2.4. Identifying, Notifying and Activating

There are no notification procedures at licensees which would promptly activate responsible authorities in the event of a radiation emergency. There is a requirement in the URT’s Atomic Energy (Protection from Ionizing Radiation) Regulations, Section 9, to provide notification of

an accident to TAEC within 24 hours, which could be too long during a serious emergency. In Section 67 of the same regulations, it is stated that “licensees shall promptly notify the TAEC when an accidental situation requiring intervention has arisen.”

If an emergency were to occur outside a facility, the notification would go to the nearest responsible authority or first responders, depending on the type of accident and the location. There is no nationwide notification system in place for the public to contact emergency response organizations. TAEC can receive emergency notification from operating organizations or other response organizations only during working hours, which could cause an undue delay in the response.

Recommendation 3.
Observation. The Tanzania Atomic Energy Commission has not established a system to receive notification outside office hours, and there is no notification procedure which would ensure that an adequate response is initiated.
Basis. GS-R-2, paragraph 4.16, states: “Notification points shall be established that are responsible for receiving emergency notifications of an actual or potential nuclear or radiological emergency. The notification points shall be continuously available to receive any notification or request for assistance and to respond promptly or to initiate an off-site response.”
Recommendation. The Tanzania Atomic Energy Commission should establish a continuously available contact point, either within the Commission or another government organ, for receiving notification of radiation emergencies or requests for assistance from within the country.

Possible notification and activation procedures are outlined in the draft NNRERP. The notification procedures state that TAEC and DMD would be notified at their offices or via emergency telephone numbers provided to first responders, but they do not include any provisions for notification by operating organizations. TAEC would activate resources upon assessment of the reported situation. However, it would have to do so without the benefit of an emergency classification provided by the facility or operator. If an emergency classification had been available, it would have triggered the appropriate response by relating the emergency class reported to a set of initial response actions. Some emergency classifications and immediate actions are contained in Table 4 of the draft NNRERP; however the list does not address all possible emergencies. The Atomic Energy (Protection from Ionizing Radiation) Regulations (2004) require that operating organizations shall analyze situations leading to emergencies, but they are not related to emergency classes.

Recommendation 4.
Observation. Licensees and operating organizations have no radiation emergency classification system or procedures that would allow for a graded activation of emergency response procedures.
Basis. GS-R-2, paragraph 4.19, states: “The operator of a facility or practice in threat category I, II, III or IV shall make arrangements for the prompt identification of an actual or potential nuclear or radiological emergency and determination of the appropriate level of response. This shall include a system for classifying all potential nuclear and radiological emergencies that warrant an emergency intervention to protect workers and the public, in accordance with international standards, which covers emergencies of the following types at facilities (1–4) and other emergencies....”
Recommendation. Operating organizations of all facilities and practices should

Recommendation 4.
develop emergency classification criteria and procedures.

As part of the radiation protection training for the Tanzania Police Force (TPF) and officials at ports and national border crossings, some national arrangements for radiation detection and awareness training in the identification of radiation symbols have been established. The implementation of these arrangements has been successful thanks to a coordinated effort between TAEC, the TPF and the port and border officials. This is reflected in the number of reported events, including those which are reported to the IAEA Illicit Trafficking Database. However, the majority of first responders did not receive any information that would enable them to recognize radiation symbols and take adequate actions should they encounter an accident involving radioactive sources. Training of first responders is addressed in detail in Section 2.20 on Training, Drills, and Exercises.

Recommendation 5.
Observation. Not all first responders are aware of the indicators of a radiation emergency, nor are they aware of the notification procedures and other immediate actions that should be taken in a radiation emergency.
Basis. GS-R-2, paragraph 4.18, states: “Arrangements shall be made to ensure that first responders are aware of: the indicators of the presence of radiation or radioactive material, such as the trefoil symbol and ‘dangerous goods’ labels and placards ..., and the significance of these indicators; the symptoms that would indicate a need to conduct an assessment to determine whether there may be an emergency; and the appropriate notification and other immediate actions warranted if an emergency is suspected.”
Recommendation. The Disaster Management Department together with the Tanzania Atomic Energy Commission should consider developing a formal training programme for all first responders to teach them to recognize the indicators of a radiation emergency and the immediate actions that are to be performed if a radiation emergency is suspected.

Tanzania is party to both emergency conventions, the *Convention on Early Notification in Case of a Nuclear Accident* and the *Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency*. The contact point in Tanzania for international notifications is TAEC, who has designated the function to a single individual and does not rotate on a duty schedule. The contact point is available during working hours only, which does not meet the conventions’ provisions on communication channels for making and receiving emergency notifications to neighbouring and potentially affected states, as well as the IAEA.

Recommendation 6.
Observation. The national contact point does not meet the requirements of the GS-R-2 in terms of continuous availability.
Basis. GS-R-2, paragraph 4.29, states: “The State shall make known to the IAEA and to other States, directly or through the IAEA, its single warning point of contact responsible for receiving emergency notifications and information from other States and information from the IAEA. This warning point shall be continuously available to receive any notification, request for assistance or request for verification of information from the IAEA and to initiate promptly a response or verification. The State shall promptly inform the IAEA and, directly or through the IAEA, relevant

Recommendation 6.
States of any changes that may occur in respect of the point of contact.”
Recommendation. The Government should ensure that the single warning point for receiving emergency notifications and information from other States and international organizations is continuously available.

2.5. Taking Mitigatory Action

TAEC coordinates all radiological aspects of the response to a radiation emergency, and its roles are outlined in the draft TAEC Emergency Response Plan. TAEC coordinates the radiological monitoring and has the necessary capability to provide an assessment which includes identification of the radioactive material and the potential consequences. It also provides guidance to first responders on any immediate or urgent actions to take.

The Atomic Energy (Protection from Ionizing Radiation) Regulations (2004) provide for the establishment of measures and for a multilayer system of preventing accidents and mitigating consequences. According to the Regulations, the licensees’ emergency plans shall provide for protection and mitigation actions, and assignment of responsibilities for initiating and discharging such actions. There are currently no guidelines for Category III facilities or Category IV practices on how to mitigate the consequences of emergencies, and the training of responders includes only basic radiation protection.

For the ORCI, there is no emergency preparedness and response plan which includes potential accident scenarios and provides guidance and instructions on mitigatory actions. There is an instruction available to staff on how to deal with a Cobalt-60 source stuck in the open position, and two staff members were identified to respond to such an incident. There are no arrangements to ensure that mitigatory actions can be taken, including assessing the workload and operational conditions of the staff and responders, response under emergency conditions, availability of the necessary equipment, and receiving prompt off-site support.

Recommendation 7.
Observation. There are no formal arrangements and procedures for taking mitigatory actions for all postulated emergencies at a threat (hazard) Category III facility.
Basis. GS-R-2, paragraph 4.39, states: “For facilities in threat category I, II or III arrangements shall be made for mitigatory actions by the operator to prevent an escalation of the threat, to return the facility to a safe and stable state, to reduce the potential for releases of radioactive material or exposures and to mitigate the consequences of any actual releases or exposures. These arrangements shall take into account the following aspects of the response to mitigate the consequences of a nuclear or radiological emergency: the operational actions necessary; the operational information needs; the workload and conditions of the operational staff (such as in the control room); the responder actions necessary in the facility; the conditions in the facility in which responder actions are necessary; and the response of the personnel, instrumentation and systems of the facility under emergency conditions. Arrangements shall include emergency operating procedures and guidance for the operator on mitigatory actions for severe conditions, for the full range of postulated emergencies, including accidents beyond the design basis.”
Recommendation. The licensees should ensure that procedures are established for threat (emergency preparedness) Category III facilities and Category IV practices to take the necessary mitigatory actions in the case of a radiation emergency.

In the case of a dangerous source being lost or illicitly removed, the licensees and TAEC implement their internal arrangements for the prompt response and search. Scientific staff at TAEC who have received training in radiation safety assessment and decontamination techniques are deployed with the necessary detection equipment. Some first responders have also attended training courses on searching and securing radioactive sources and assist TAEC where necessary.

To issue warnings to the public in case of a lost source, TAEC and first responder agencies issue statements to the public through media organizations. Arrangements for coordination of public communication exist, and during past events involving illicit trafficking, the warnings and information to the public were coordinated between the TPF and TAEC.

Some first responders, such as the police, are trained on the immediate actions to take in case of a radiation emergency involving transport of radioactive material or illicit trafficking. However, there is no formal guidance and equipment available country-wide to respond to such events.

2.6. Taking Urgent Protective Action

The national intervention levels and protective actions are not included in the legislation or regulatory standards. The specific values to be used as intervention levels for taking urgent protective actions are included in Appendix 4 of the draft NNRERP. The intervention levels are not consistent with the latest IAEA safety standards, which include the development of protection strategies, establishment of reference levels and generic criteria for particular protective actions and other actions, and pre-established default triggers.

The Atomic Energy Act (2003) in 41 (3) states that every authorized person shall notify the TAEC and any relevant intervening institutions promptly when a situation requiring protective action has arisen or is expected to arise and shall keep them informed. In accordance with the Atomic Energy (Protection from Ionizing Radiation) Regulations (2004) in 65 (2), the licensee is responsible for taking such protective actions as may be required for the protection of occupationally exposed workers undertaking intervention and for protection of the public from radiation exposure.

The TPF are responsible for immediate actions, including securing and cordoning off the area, and will activate other first responders and TAEC. The relevant disaster management organisation will coordinate protective actions based on technical expertise from TAEC, but this process is not well defined. Other response organisations, such as the Tanzania People's Defence Force (TPDF) and the Ministry of Health and Social Welfare (MOHSW), will implement actions such as evacuation and decontamination if required. The provision of additional resources is coordinated at the national level. The disaster management structures have not been interfacing with the TAEC until very recently, and such cooperation is essential for coordination and response to radiation emergencies. In addition, officials have not received training in basic radiation protection, criteria for public protective actions and appropriate response to radiation emergencies.

The Atomic Energy (Protection from Ionizing Radiation) Regulations (2004) in 35, 2 (c), require that licensees provide appropriate information, instruction and training to those workers who could be affected by an emergency. There are no explicit arrangements to ensure the safety of all persons on the site in the event of a radiation emergency, for example when

the evacuation of all non-essential personnel and visitors would be required. This is address in Recommendations 2 and 4 of this report.

2.7. Providing Information and Issuing Instructions and Warnings to the Public

The Tanzanian Disaster Communication Strategy (2012) provides a basis for the communication from responsible organizations to the public during all emergencies for all hazards. According to this strategy, an Emergency Communication Center (ECC) is required to be established and located at the Emergency Operation Center (EOC) at the DMD premise in the Office of the Prime Minister. However, neither the ECC nor the EOC have been established, and the existing arrangements do not provide for adequate coordination between TAEC, the key organization in providing technical services and advice in the case of a radiation emergency, and the other response organizations.

For facilities in Category III and practices in Category IV, the first responders provide the public with information and instructions in order to identify and locate people who may have been affected by a radiation emergency. Response actions, such as decontamination, medical examination or health screening, are taken on the basis of an assessment of the situation and involve responsible entities such as TAEC, MOHSW and the TPDF. This information and the related instructions are provided to the public as appropriate. Instructions to the public are provided through loudspeakers.

Bilateral agreements have been established with five neighbouring countries to share information in case the public in those countries might be affected.

Procedures, action guides and instructions have been prepared as part of the draft NNRERP for public warnings and instructions, but have not been agreed upon with all stakeholders, are still in draft form and have not been tested. As a result, the responsible persons address the issuing of information to the public as considered appropriate by them, based on their individual experience. This is addressed in Recommendations 1 and 13 of this report.

2.8. Protecting Emergency Workers

Section 68 of the Atomic Energy (Protection Against Ionizing Radiation) Regulations (2004) addresses protection of emergency workers taking part in an intervention. All important requirements for emergency workers are contained in this section. However, the arrangements for implementation of those requirements are missing, e.g. ensuring dosimetry services and providing protective equipment to the emergency workers.

The draft NNRERP does not contain complete provisions for protecting emergency workers. Table 5.2 of the draft NNRERP contains guidance for emergency workers turn-back limits. This guidance allows workers to receive doses above the limits in case of emergencies for the purpose of saving lives, preventing major disasters and avoiding overexposure of a large number of people. There has been no training or arrangements for equipping of emergency workers to ensure that these limits are adhered to during a response. The emergency workers who may take part in an intervention are not informed in advance about the potential risks.

There is no clear description of how the individual dosimetry and dose management is performed for the emergency workers who do not belong to TAEC. Firefighters do have suitable basic protective equipment, e.g. autonomous respirators, masks and water resistant protective clothing that can also be used during radiation emergencies. Similarly, medical

staff have gloves, gowns, shoe covers, face masks, etc., which can be efficiently used for protection against contamination.

Some emergency workers, including the border police, received initial training on radiation protection, and some of them have radiation pagers. However, a comprehensive training programme, with basic training and regular refresher courses, was not established. This is discussed in more detail in Section 2.20, dealing with Training, Drills and Exercises.

Recommendation 8.
Observation. National regulations include guidance for designating and protecting emergency workers; however, this guidance has not been systematically implemented by response organizations.
Basis. GS-R-2, paragraph 4.59, states: “Those persons who may be called upon as first responders shall be informed of the risks of radiation exposure and the meanings of radiation signs and placards.”
Recommendation. Response organizations should establish and implement practical arrangements for protection of emergency workers, addressing training, dose registry and appropriate protective equipment.

2.9. Assessing the Initial Phase

Besides operating organizations, TAEC is the only organization in Tanzania which can provide the radiation measurements that are necessary to assess all phases of an accident, including the initial phase. TAEC can provide all necessary types of measurements needed to characterize the initial phase, e.g., gamma and beta radiation using portable radiation survey meters as well as contamination with alpha, beta, and gamma using portable contamination measuring equipment. For characterization of radionuclides in samples, Sodium Iodide (NaI) and High Purity Germanium (HPGe) detectors are used. This activity is performed only in laboratories.

Although the Atomic Energy Act (2003) requires that the licensees shall in their emergency response plans address “the methods and instruments for assessing the accident and its consequences on and off the site,” this requirement is not enforced.

The draft NNRERP in Table 5.2 contains the default operational intervention levels which are practical for the situations listed, but they are not exhaustive and are not consistent with the IAEA safety standards, specifically GSG-2. Examples of initial safe distances are a practical tool in case of a lack of measurements and are presented in Table 5.5 of the draft NNRERP. The safe distances relate visible assessment of the initial phase with the initial actions in case of radiation emergencies for Category IV practices.

In order to implement the protective actions related to ingestion pathway and prevention of proliferation of contaminated goods, high resolution gamma spectroscopy is needed. The only such capabilities in Tanzania exist at TAEC in Arusha. Since the laboratory of TAEC operates only one HPGe detector and the capabilities for sample preparation are under development, any breakdown or unavailability of this instrument would mean that there are no capabilities in place. Even if the instrument is operational, bottlenecks may be expected during a radiation emergency. Sampling procedures and arrangements for transporting samples to Arusha are not in place.

Suggestion 3.
<p>Observation. The operational intervention levels in the draft National Nuclear and Radiological Emergency Response Plan are not consistent with the IAEA safety guide GSG-2 in terms of their values, as well as the sets of protective actions.</p>
<p>Basis. GSG-2, paragraph 5.1, states: “Projected dose and dose that has been received are not measurable quantities and cannot be used as a basis for quick actions in an emergency. There is a need to establish — in advance — operational criteria (values of measurable default quantities or observables) as a surrogate for the generic criteria for undertaking different protective actions and other response actions. Precautionary urgent protective actions and, as applicable, urgent protective actions should be taken on the basis of precalculated default operational criteria. The majority of urgent protective actions and early protective actions are also implemented on the basis of precalculated default operational criteria. However, if the characteristics of an emergency differ from those assumed in the calculations of default operational criteria, the criteria should be recalculated. Methods for the recalculation to address prevailing conditions in an actual emergency should be established during the planning phase.”</p>
<p>Suggestion. The Tanzania Atomic Energy Commission should consider harmonizing the operational intervention levels in the draft National Nuclear and Radiological Emergency Response Plan with the IAEA safety guide GSG-2.</p>

Recommendation 9.
<p>Observation. There is only one piece of equipment in the country (a high purity Germanium spectrometer) available for environmental monitoring during an emergency, creating a single point of failure and a bottleneck limiting throughput.</p>
<p>Basis. GS-R-2, paragraph 4.67, states: “Radiation monitoring and environmental sampling and assessment shall be carried out in order to identify new hazards promptly and to refine the strategy for response.”</p>
<p>Recommendation. The Tanzania Atomic Energy Commission should ensure that there is always adequate operational equipment available to conduct environmental monitoring and assessment during the initial phase of a radiation emergency.</p>

2.10. Managing the Medical Response

The MOHSW has recently finalized a document that outlines medical procedures for all-hazards emergencies, which was in the process of being printed at the time of the EPREV mission. Separate sections address doctors, paramedics, and other medical personnel including therapists and technologists. The document does not include any information on recognizing radiation injuries, notifying authorities about them or providing for their initial treatment.

Recommendation 10.
<p>Observation. Medical practitioners are not aware of how to identify or diagnose symptoms of radiation exposure.</p>
<p>Basis. GS-R-2, paragraph 4.77, states: “Arrangements shall be made for medical personnel, both general practitioners and emergency staff, to be made aware of the medical symptoms of radiation exposure and of the appropriate notification procedures and other immediate actions warranted if a nuclear or radiological emergency is suspected.”</p>
<p>Recommendation. The Ministry of Health and Social Welfare should develop and</p>

Recommendation 10.

implement training for general practitioners on the recognition of symptoms of radiation exposure and national notification procedures.

The draft NNRERP identifies ORCI as the facility to provide initial care of any overexposed or contaminated individuals. However, this has not been coordinated with ORCI. Additionally, there are no arrangements in place for the transport of contaminated patients to ORCI after or during a radiation emergency.

Some training has been conducted by TAEC for medical practitioners on radiation protection and first response, but there is no regular training in the practical medical response to radiation emergencies. The NNRERP, when finalized, will include the necessary procedures and arrangements required for the management of the medical response. The MOHSW cooperates with the military hospitals in case of outbreaks of infections and diseases, as well as with TAEC to provide advice during radiation emergencies. Adoption of a Memorandum of Understanding (MOU) has been considered to strengthen the cooperation and coordination required for the appropriate medical response.

Recommendation 11.

Observation. There are no guidelines, procedures or arrangements for the treatment of radiation injuries resulting from accidental exposure or contamination.

Basis. GS-R-2, paragraph 4.80, states: “Arrangements shall be made at the national level to treat people who have been exposed or contaminated. These shall include: guidelines for treatment; the designation of medical practitioners trained in the early diagnosis and treatment of radiation injuries; and the selection of approved institutions to be used for the extended medical treatment or follow-up of persons subjected to radiation exposure or contamination. This shall also include arrangements for consultation on treatment following any exposure that could result in severe tissue damage or other severe deterministic health effects with medical practitioners experienced in dealing with such injuries.”

Recommendation. The Ministry of Health and Social Welfare should make the necessary arrangements at the national level to make the required capabilities and resources available for managing the medical response to radiation emergencies.

2.11. Keeping the Public Informed

An ECC has not been established as required by the Tanzanian Disaster Communication Strategy (2012). As a result, arrangements for the provision of information to the public and to the news and information media in the event of a radiation emergency are not properly coordinated among all organizations, especially between DMD and TAEC.

Procedures, action guides and instructions have been prepared for communication with the public and media. Arrangements for keeping the neighbouring countries and the international community informed of the situation, as appropriate, are included as part of the bilateral agreements with neighbouring countries.

Arrangements for ensuring the provision of useful, timely, truthful, consistent and appropriate information to the public in the event of a radiation emergency have not been formalized, nor have the procedures on how to respond to incorrect information, rumours and requests for information from the public, news and information media. The use of social media and

websites for public information and communication is not included in communication arrangements.

Recommendation 12.
Observation. There are no formal arrangements to provide appropriate information to the public in the event of a radiation emergency and to respond to requests for information from the public, news and information media.
Basis. GS-R-2, paragraph 4.83, states: “Arrangements shall be made for: providing useful, timely, truthful, consistent and appropriate information to the public in the event of a nuclear or radiological emergency; responding to incorrect information and rumours; and responding to requests for information from the public and from the news and information media.”
Recommendation. The Government should ensure that arrangements for providing appropriate information and responding to information requests from the public, news and information media during a radiation emergency are formalized and coordinated.

2.12. Taking Agriculture Countermeasures, Countermeasures against Ingestion and Longer Term Protective Actions

Section 2.9 of this report addresses monitoring and sampling equipment which can also be used for the determination of ingestion pathway protective actions, as well as for verification of the need for agriculture countermeasures in case of a nuclear accident abroad. As the report points out, the need for the introduction of the latter is highly unlikely due to the great distance of facilities of threat (hazard) Category I.

From the set of long term countermeasures and ingestion pathway countermeasures, the most likely one to be of relevance is the protection of the domestic market from the import of contaminated foodstuffs, feedstuffs and other goods and consumables in case of a nuclear accident abroad. The legal provisions are contained in the Control of Radiation Contaminated Foodstuffs Regulation of 1998 and also the Tanzania Food, Drugs and Cosmetics Act (2003). TAEC and the Tanzania Food and Drug Authority (TFDA) work closely at ports and other border entry points to control the quality and safety of imported foodstuffs. In case of a nuclear emergency abroad, the system may need to enable throughput of a larger number of samples, including the measurement of radiation in goods, vehicles, and passengers/crew, depending on the nature of the nuclear emergency abroad.

Suggestion 4.
Observation. Intervention criteria for foodstuffs are not in line with international safety standards, and there are no criteria for goods or consumables.
Basis. GS-R-2, paragraph 4.88, states: “Optimized [national] intervention levels and action levels [for agricultural countermeasures, countermeasures against ingestion and longer term protective actions shall be established that are in accordance with international standards], modified to take account of local and national conditions, such as: (a) the individual and collective [doses] to be averted by the intervention; and (b) the radiological and non-radiological health risks and the financial and social costs and benefits associated with the intervention.”
Suggestion. The Government should consider harmonizing generic criteria for foodstuffs and other goods in line with the IAEA safety guide GSG-2.

2.13. Mitigating the Non-Radiological Consequences of the Emergency and the Response

The mitigation of non-radiological consequences during an emergency is not explicitly dealt with in the regulations, and is limited to the current arrangements for responding to radiation emergencies.

Aspects related to non-radiological consequences have been included in the draft NNRERP and associate lower level documents, which are aimed at covering issues related to economic aspects and disruption of normal life, including trade, tourism, income and property losses, security concerns, fears and cultural concerns.

No arrangements are in place for consulting the affected persons, addressing public concerns, or monitoring for and responding to rumors. Procedures that would help to prevent inappropriate actions on the part of workers and the public are also missing. There are no clear responsibilities assigned for the identification of reasons for misinformation from the media or rumors and for countering them. This is addressed in Recommendations 1 and 13 of this report.

2.14. Conducting Recovery Operations

The transition from an emergency to recovery and resumption of normal operations is not addressed in any national plan or regulation. An emergency at one of the Category III facilities could potentially result in the cessation of activities.

Similarly, there is the possibility that an emergency resulting from the use of radioactive sources could lead to the need for limited decontamination, sheltering, or evacuations. It is important that there are set procedures and criteria to cancel these measures in such a way that maintains the public trust.

The necessity for these arrangements is covered under the recommendations in Section 2.18, Plans and Procedures.

2.15. Authority

A function of TAEC is to formulate and operate a national radiological emergency plan. The authority for developing, maintaining and issuing regulations concerning the preparedness for and response to a radiation emergency is addressed in paragraph 70. 1 and 2. (p) of the Atomic Energy Act, 2003. The Ministry of Communication, Science and Technology, upon the advice of TEAC and in consultation of other stakeholders, will issue the regulations. However, as discussed in Section 2.1 of this report, the other response organizations are not aware of their authorities, responsibilities, and roles during a radiation emergency, since there is no approved national radiation emergency plan. The DMD has the authority to coordinate the preparedness and response to disasters, and has a mechanism to delegate or transfer this authority to its different specialized committees, but this mechanism not yet been practiced in the field of radiation emergency. These arrangements are not specified in the draft NNRERP.

Improvements for this aspect are included in the recommendations in Section 2.18, Plans and Procedures.

2.16. Organization

The TEPRP (2012) states that all responding organizations must coordinate their actions with DMD. During any large emergency, TPF is designated as the incident commander and other organizations, such as the fire brigade, operate under its command. An exception exists for the TPDF, which would operate under a separate command structure in its response to a major emergency. There are no clear organizational relationships and interfaces between response organizations to address the unique aspects of a radiation emergency, while still being consistent with the all-hazards plan. The existing organization of the response is generic. There are plans to adjust and approve the draft NNRERP in the future during a national workshop.

Due to the limited availability of resources, the required number of qualified staff is not available at all times to ensure that appropriate positions can be promptly staffed as necessary following the declaration and notification of a radiation emergency. Although personnel would be made available based on the nature and scope of the emergency, those personnel may not have the required skills and training to fulfil their assigned tasks.

2.17. Coordination of Emergency Response

Technical criteria (e.g. turn-back values, sampling methods, etc.), procedures and equipment for a coordinated emergency response are not harmonized across response organizations, especially for major emergencies, which could lead to inconsistency and confusion between responders during an emergency. In particular, confusion could arise, if response organizations are working under separate command structures during the same response. The draft NNRERP lists some criteria for coordination, e.g. TAEC's responsibility for coordinating radiological monitoring (Ch. 4.1.3), coordination of public information between national, regional and district level (Ch. 4.1.4) and international coordination (Ch. 4.3).

An excellent example of coordination between two organizations is the Memorandum of Understanding (MOU) between TAEC and the TPF on Control of Illicit Trafficking of Radioactive Materials in Tanzania. Within the scope of this document, TAEC will provide technical advice, assistance and training to the police, while the police will bring seized sources to TAEC's storage and rely on TAEC's support during court proceedings.

Good practice 1.
<p>Observation. The Tanzania Atomic Energy Commission and the Tanzania Police Force have formalized a Memorandum of Understanding on Control of Illicit Trafficking of Radioactive Materials in Tanzania which defines cooperation between the two bodies by recognizing that the Tanzania Atomic Energy Commission's technical capacities can efficiently be used by the police and providing for better implementation and enforcement of the Atomic Energy Act (2003).</p>
<p>Basis. GS-R-2, paragraph 5.10, states: "Arrangements for the co-ordination of emergency response and protocols for operational interfaces between operators and local, regional and national governments shall be developed, as applicable. These arrangements shall include the organizations responsible for emergency services and for response to conventional emergencies. The arrangements shall be clearly documented and this documentation shall be made available to all relevant parties."</p>
<p>Good Practice. The Memorandum of Understanding between the Tanzania Atomic Energy Commission and the Tanzania Police Force on Control of Illicit Trafficking of Radioactive Materials represents a practical and efficient implementation of a</p>

Good practice 1.

coordinated arrangement between two stakeholders which resulted in identification of many cases of illicit trafficking and bringing these cases to a successful conclusion through court proceedings.

2.18. Plans and Procedures

An all-hazards plan, TEPRP (2012), integrates radiation emergencies and conventional emergencies such as fires, droughts, release of hazardous chemicals, storms or earthquakes. Part II of the plan lists the major potential hazards in Tanzania and includes radioactive material in the list. The plan shows that an accident involving hazardous material (including radioactive material) is unlikely to occur and will have a moderate public and property impact. TAEC is not explicitly included as one of the Government departments or agencies in the plan responsible for preparedness and response, but its participation will be delegated by the Ministry of Communication, Science and Technology. Emergency plans to prepare for and respond to all disasters have not been established at municipal and ward levels, although the regional plan does incorporate the response radiation emergencies.

The draft NNRERP is based on the threat (hazard) assessment of the facilities and practices in the country. The plan includes responsibilities, concept of operations and coordination between response organisations and provides a basis for the establishment of a national framework. To complement the NNRERP, TAEC has drafted procedures, Action Guides, Response Cards, Instructions and Forms for the response to different radiation emergencies, which can be used by all response organizations. These draft documents specify the duties, activities and tasks to be implemented by first responders and other responders in the case of a radiation emergency.

Good practice 2.

Observation. Comprehensive documentation, including detailed procedures and action guides, has been prepared by the Tanzania Atomic Energy Commission in order to mitigate effectively and efficiently the consequences of any nuclear or radiological accident.

Basis. GS-R-2, paragraph 5.17, states: ““The appropriate responsible authorities shall ensure that: (a) emergency plans [are] prepared and approved for any practice or source which could give rise to a need for emergency intervention; (b) [response organizations are] involved in the preparation of emergency plans, as appropriate; (c) the content, features and extent of emergency plans take into account the results of any [threat assessment] and any lessons learned from operating experience and from [emergencies] that have occurred with sources of a similar type; (d) emergency plans [are] periodically reviewed and updated.””

Good Practice. The Tanzania Atomic Energy Commission has prepared comprehensive and detailed Procedures, Action Guides, Instructions, and Response Cards for review and approval by all stakeholders.

Facilities and practices where the potential for accidents exists are required to establish emergency plans. The licensee is required to characterize the content, features and extent of the potential emergency, taking into account the results of any accident analysis and any lessons learned from operating experience and from accidents that have occurred with sources of a similar type. The approval and verification of the existence of the emergency plans and procedures prior to operations is not conducted by TAEC.

Recommendation 13.
Observation. The National Nuclear and Radiological Emergency Response Plan and associated documentation are in draft form and not agreed with all stakeholders.
Basis. GS-R-2, paragraph 5.13, states: “Plans or other arrangements shall be made for co-ordinating the national response to the range of potential nuclear and radiological emergencies. These arrangements for a co-ordinated national response shall specify the organization responsible for the development and maintenance of the arrangements; shall describe the responsibilities of the operators and other response organizations; and shall describe the co-ordination effected between these arrangements and the arrangements for response to a conventional emergency. The arrangements should include provisions that can be used to formulate in detail a response to situations such as: a serious exposure or contamination resulting from contact with a source by a member of the public; the notification of a potential transboundary release of radioactive material; the discovery of a shipment containing a dangerous source that is not under control; the notification of the potential re-entry of a satellite; public concern or rumours about a threat; and other unanticipated situations warranting a response.”
Recommendation. The Disaster Management Department and the Tanzania Atomic Energy Commission should discuss and review the National Nuclear and Radiological Emergency Response Plan and the associated documentation with all stakeholders and expedite the approval thereof.

Recommendation 14.
Observation. The regional disaster management plans do not incorporate radiation emergencies. Emergency plans for disaster management at the municipal and ward levels to prepare for and respond to disasters have not been established.
Basis. GS-R-2, paragraph 5.16, states: “The plans for response to a nuclear or radiological emergency shall be coordinated with any other plans (such as plans for physical security, law enforcement, or fire fighting) that may be implemented in an emergency in order to ensure that the simultaneous implementation of the plans would not seriously reduce their effectiveness or cause conflicts.”
Recommendation. The Disaster Management Department should ensure that radiation emergency response procedures are incorporated into current and future disaster management plans to ensure compatibility.

2.19. Logistical Support and Facilities

The TEPRP (2012) states that a national EOC is to be designated for the response to any large scale emergency. This has not yet been established as a dedicated facility or interim facility.

TAEC is provided with a minimum of relevant equipment for responding to emergencies from Category III facilities and Category IV practices, including laboratories for radionuclide analysis in Arusha. Other responding organizations do not have sufficient or adequate tools for response to radiation emergencies and rely on those available at TAEC. The relevant procedures and checklists have been drafted for review and approval and are available in draft form, ready for discussion and approval. A limited number of experts in some of the responding organizations are trained to work with the radiation and contamination measuring equipment.

TAEC staff utilizes their private mobile phones for communications during emergency response, which might not work properly and cannot be considered reliable during radiation emergencies.

Recommendation 15.
Observation. There is no national emergency operations centre to coordinate the response to a large emergency
Basis. GS-R-2, paragraph 5.29, states: “A national emergency facility or facilities shall be designated for the co-ordination of response actions and public information.”
Recommendation. The Government should establish a national emergency operations centre, including the necessary communications equipment, to allow all response organizations to coordinate their activities during an emergency.

2.20. Training, Drills and Exercises

Section 65 (1) of the Atomic Energy (Protection from Ionizing Radiation) Regulations (2004) specifies that the licensee shall establish an emergency plan and conduct drills; Section 66 (h) stipulates that the licensees’ emergency plans shall be rehearsed at suitable intervals in conjunction with designated authorities. The draft NNRRERP makes provisions for the development of an exercise programme, for the sponsoring of the exercises, for the involvement of all stakeholders and the incorporation of lessons learned in the revision and update of the emergency plans and procedures.

Currently, no drills and exercises are being conducted at facility level. Arrangements of practices in emergency preparedness Category IV are not being tested as part of a national exercise programme. In the provision of training for first and medical responders, some specific practical aspects associated with response to a nuclear or radiological emergency have been tested and drilled.

Recommendation 16.
Observation. There have been no drills or exercises conducted by facilities identified as threat (emergency preparedness) Category III, and there is no national exercise programme in place for practices identified as threat (emergency preparedness) Category IV.
Basis. GS-R-2, paragraph 5.33, states: “Exercise programmes shall be conducted to ensure that all specified functions required to be performed for emergency response and all organizational interfaces for facilities in threat category I, II or III and the national level programmes for threat category IV or V are tested at suitable intervals. These programmes shall include the participation in some exercises of as many as possible of the organizations concerned. The exercises shall be systematically evaluated and some exercises shall be evaluated by the regulatory body. The programme shall be subject to review and updating in the light of experience gained.”
Recommendation. The Government should ensure that exercise programmes are established for facilities in emergency preparedness Category III and practices in Category IV, that all response organizations are included and that the exercises are systematically evaluated.

The Atomic Energy Act (2003), in 6 (n), (r) and Schedule 3, 2 (d), provides for the formulation and implementation of programmes for the training of persons to become

qualified experts in the development and practical applications of atomic energy, nuclear technology and the use of radiation sources, radiation protection and radiation measurements.

The Atomic Energy (Protection from Ionizing Radiation) Regulations (2004), 66 (h) require that licensees' emergency plans shall, as appropriate, provide for training personnel involved in implementing emergency plans. Section 68 (3) contains information and training requirements for emergency workers and volunteers. Schedule 3, 2 (d) requires the selection, training and periodic retraining of suitably qualified personnel for medical exposures.

The draft NNRERP makes provision for the development, maintenance, and review of training programmes for each position in the radiation emergency response organisations. Responding organisations have the responsibility to develop and implement training programs to assure that all responders are aware of and understand their roles, and are competent to implement planning and response procedures.

Training of facility radiation safety officers, other facility response personnel and TAEC personnel involved in radiation emergency preparedness and response is provided and facilitated by TAEC on an ad-hoc basis. Efforts are underway to provide training on radiation detection and protection of workers and managers in the scrap metal processing facilities.

National, regional and local authorities disaster management officials have not been trained on information sharing and decision making related to a radiation emergency, e.g., sheltering, evacuation.

Some first responders for radiation emergencies have been provided with training and refresher training. This training is provided by TAEC. To date, it has focused on border personnel, customs officers and police officers in major cities (e.g. Dar es Salaam, Arusha). It has included lessons on radiation hazards and radiation protection, as well as practical training on the use of radiation detection equipment. This also included the recognition and identification of packages and devices used to store or transport radioactive materials. About ten training courses have been conducted so far by TAEC in radiation protection and identification of radiation sources. There are no training programmes that would cover nationwide first responders who must respond to any radiation emergency involving a practice in threat (hazard) Category IV.

No arrangements are in place to ensure that general medical practitioners nationwide are aware of the medical symptoms of radiation exposure; however, two medical doctors at the ORCI have been trained to identify medical symptoms of radiation exposure and to treat radiation injured persons.

There are no training requirements, knowledge, skills and abilities established for each position and teams within the facilities' response organization with regards to radiation emergency preparedness.

Recommendation 17.
Observation. Training programmes for first responders to a radiation emergency are not formalised, and training is not systematically implemented to ensure organisations at all levels are able to perform preparedness and response functions.
Basis. GS-R-2, paragraph 5.31, states that "... the response organizations shall identify the knowledge, skills and abilities necessary to be able to perform the functions specified in Section 4. ... the response organizations shall make

Recommendation 17.
arrangements for the selection of personnel and for training to ensure that the personnel have the requisite knowledge, skills, abilities, equipment, and procedures and other arrangements to perform their assigned response functions. The arrangements shall include ongoing refresher training on an appropriate schedule and arrangements for ensuring that personnel assigned to positions with responsibilities for emergency response undergo the specified training.”
Recommendation. All response organisations should ensure that a training programme for each position is established for all relevant facility responders, first responders and other off-site personnel involved in radiation emergencies at all levels. The training programme should be based on the roles and responsibilities in the National Nuclear and Radiological Emergency Response Plan.

2.21. Quality Assurance Programme

The national all-hazards emergency plan of the DMD specifies that the plan will be reviewed annually; however, due to the lack of resources this task is carried out approximately every three years. It has been planned for 2014, but there are no records available for the review.

Recommendation 18.
Observation. There is no quality assurance programme to assure the preparedness and response capability at the national, regional or operator level.
Basis. GS-R-2, paragraph 5.37, states: “The operator of a facility, practice or source in threat category I, II, III or IV and the off-site response organizations shall establish a quality assurance programme, in accordance with international standards, to ensure a high degree of availability and reliability of all the supplies, equipment, communication systems and facilities necessary to perform the functions specified in Section 4 in an emergency This programme shall include arrangements for inventories, resupply, tests and calibrations, made to ensure that these items and facilities are continuously available and functional for use in an emergency. Arrangements shall be made to maintain, review and update emergency plans, procedures and other arrangements and to incorporate lessons learned from research, operating experience (such as the response to emergencies) and emergency drills and exercises”
Recommendation. The Government and operating organizations should establish quality assurance programmes to maintain their emergency response capabilities.

Although TAEC, the TPF, and MOHSW have responded to different types of emergencies (stolen sources, illicit trafficking, abandoned/found sources), this has not been reflected in the assessment of threats. Furthermore, there are no reviews carried out to evaluate these previous responses in order to improve the preparedness and response arrangements.

Recommendation 19.
Observation. Past emergencies and responses are not considered as resources for improving the preparedness for and response to future radiation emergencies.
Basis. GS-R-2, paragraph 5.39, states: “The operator of a facility, practice or source in threat category I, II, III or IV and the off-site response organizations shall make arrangements to review and evaluate responses in emergencies and in drills and exercises, to record the areas in which improvements are necessary and to ensure that the necessary improvements are made.”

Recommendation 19.

Recommendation. Response organizations should review past responses and identify lessons learned to improve the preparedness for future emergencies.

Appendix I: Mission Team Composition

No.	Name and LAST NAME	Position	Organization
1.	Mr Igor GRASICAREV	EPREV Team Leader	Slovenian Nuclear Safety Administration, Slovenia
2.	Mr Mark BREITINGER	EPREV Team Coordinator	IAEA, Incident and Emergency Centre
3.	Mr Alan Muller	EPREV Team Member	National Nuclear Regulator, South Africa
4.	Mr Mohammad HAMADALNEEL	EPREV Team Member	Sudanese Nuclear and Radiological Regulatory Authority, Sudan
5.	Mr Peter VAN BEEK	EPREV Team Member	Centre for Regional Nuclear Preparedness, The Netherlands

Appendix II: Mission Schedule

Date	Subject
27 July	Preparatory work for the EPREV team, Presentation of initial findings
28 July	Plenary Meeting with all stakeholder organizations Presentations by DMD and TAEC Counterpart Interview: DMD Counterpart Interview: TAEC
29 July	Counterpart Interview: TPF Counterpart Interview: MOHSW
30 July	Counterpart Interview: Kinondoni Municipal Council Counterpart Interview: Dar es Salaam Regional Council
31 July	Site Visit: DMD Site Visit: ORCI
1 August	Counterpart Interview: TPDF Counterpart Interview: Fire and Rescue Forces
2 August	Site Visit: Fire and Rescue Forces Finalization of Draft EPREV Report
3 August	Counterpart Review of Draft EPREV Report
4 August	Counterpart Presentation and Discussion of Detailed Findings Finalization of Technical Draft by EPREV Team
5 August	Exit Meeting and Finalization of Technical Draft EPREV Report

Appendix III: List of Attendees to EPREV Mission Meetings

No.	Name	Position	Organization
1.	Leonard KIFANGA	Consultant	TAEC
2.	Peter PANTALEO	Radiation Specialist	TAEC
3.	Ewald BONIFACE	Disaster Risk Reduction Expert	DMD
4.	Harrison CHINYUKA	Coordinator	DMD
5.	Agatha Mary KATUA	Nuclear Medical Physicist	TPDF
6.	Edward Victor MASALLA	Director, Research & Development	TPDF
7.	James BOYI	Head, Radiology & Imaging Services	MOHSW
8.	Rogasian KIMARYO	Regional Disaster Focal Point	Regional Commissioner's Office, Dar es Salaam
9.	Hezron S. GYIMBI	Chief, Monitoring & Evaluation	TPF
10.	J.E. MABEYO	Scenes of Crime Officer	TPF
11.	Yokebeth VUHAHULA	Manager, Radiology & Imaging Section	ORCI
12.	Diwani MSEMO	Director of Medical Services	ORCI
13.	Anna Namara MUSHUMBUSI	Radiation Protection Officer	ORCI
14.	Adelaida KAGARUKI	Municipal Disaster Focal Point	Kinondoni Municipal Council
15.	Lawrence Daniel KEBISI	Inspector	Ministry of Home Affairs, Fire and Rescue Force

References

- [1] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR ORGANIZATION, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, UNITED NATIONS OFFICE FOR THE CO-ORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, Preparedness and Response for a Nuclear or Radiological Emergency, Safety Standards Series No. GS-R-2, IAEA, Vienna (2002).
- [2] INTERNATIONAL ATOMIC ENERGY AGENCY, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency, Safety Standards Series No. GSG-2, IAEA, Vienna (2011).
- [3] INTERNATIONAL ATOMIC ENERGY AGENCY, Arrangements for Preparedness for a Nuclear or Radiological Emergency, Safety Standards Series No. GS-G-2.1, IAEA, Vienna (2007).

Acronyms

Name	Position
DMD	Disaster Management Department
ECC	Emergency Control Centre
EOC	Emergency Operations Centre
EPREV	Emergency Preparedness Review
HPGe	High Purity Germanium detector
IAEA	International Atomic Energy Agency
ICS	Incident Command System
MOHSW	Ministry of Health and Social Welfare
MOU	Memorandum of Understanding
NaI	Sodium Iodide detector
NCA	National Coordinating Authority
NNRERP	National Nuclear and Radiation Emergency Response Plan
ORCI	Ocean Road Cancer Institute
RDD	Radiation Dispersal Device
TAEC	Tanzania Atomic Energy Commission
TANDREC	Tanzania Disaster Relief Committee
TEPRP	Tanzania Emergency Preparedness and Response Plan
TFDA	Tanzania Food and Drug Authority
TOR	Terms of Reference
TPDF	Tanzania People's Defence Force

Name	Position
TPF	Tanzania Police Force
URT	United Republic of Tanzania