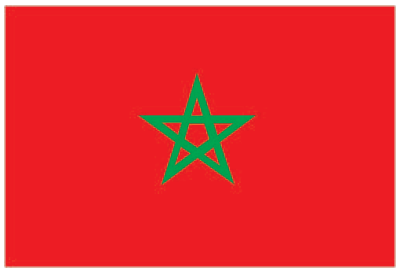
IAEA

Emergency Preparedness Review

EPREV

# PEER APPRAISAL OF THE ARRANGEMENTS IN THE KINGDOM OF MOROCCO REGARDING THE PREPAREDNESS FOR RESPONDING TO A RADIATION EMERGENCY



2022-10-24 to 2022-11-02

International Atomic Energy Agency

## 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 Kingdom of Morocco, the IAEA fielded an Emergency Preparedness Review (EPREV) mission to conduct, in accordance with Article III of the IAEA Statute, a peer review of the Kingdom of Morocco'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

This report provides the results of the Emergency Preparedness Review (EPREV) mission to Morocco from 24 October to 02 November 2022. The mission was undertaken by the International Atomic Energy Agency (IAEA) in response to a request from the Kingdom of Morocco. 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 mission focused on emergency preparedness category III and IV, as defined in IAEA Safety Standards Series No. GSR Part 7, Preparedness and Response for a Nuclear or Radiological Emergency [1], which includes emergencies involving nuclear and radiation facilities and activities which could occur anywhere in the country.

The Review Team for the EPREV mission consisted of international EPR experts from IAEA Member States, as well as a Team Coordinator from the IAEA Secretariat. The EPREV mission took place in Rabat, as well as in Kénitra and Tangier where the National Centre for Energy, Nuclear Sciences and Technology (CNESTEN) and the National Institute for Agricultural Research (INRA) were visited, respectively. The EPREV consisted of a review, prior to the actual mission, of extensive reference materials provided by Morocco and, during the mission, of site visits and interviews. The Review Team interacted during the mission with the Moroccan Agency for Nuclear and Radiological Safety and Security (AMSSNuR), the Ministry of Interior (MI), the Ministry of Energy Transition and Sustainable Development (MTEDD), the Ministry of Health and Social Protection (MSPS), the General Directorate of Civil Protection (DGPC), the General Directorate of National Security (DGSN), CNESTEN and INRA.

This report includes recommendations and suggestions for improvements by Morocco, based on the principles, requirements and recommendations of the IAEA Safety Standards; the report also mentions good practices that were observed and that are considered models for other Member States. In some cases, improvements in line with the detailed findings are already being undertaken. In other cases, the Kingdom of Morocco should adopt an action plan to implement the recommendations and suggestions.

The Government of Morocco is to be commended for having a solid basis for their EPR arrangements for nuclear and radiological emergencies.

The Review Team noted some areas where improvements could be made such as:

- Finalizing and approving the draft documents laying out their emergency management system;
- Updating the National Hazard Assessment to include an analysis specific to the nuclear and radiation facilities and sources in Morocco;
- Revising the protection strategy in line with the latest IAEA Safety Standards;
- Establishing an emergency classification system to allow for prompt identification, notification and activation of the response;
- Developing a radiation monitoring strategy for supporting protective action decisions.

The Review Team also noted a number of specific commendable practices. These good practices refer to aspects that go beyond the expectations set in the IAEA Safety Standards. Among these, the Review Team identified:

- Maintaining a high level of capability throughout the country for field radiological emergency operations;

- Engagement of funding organizations throughout the national planning process to improve identification and planning of resourcing requirements;
- Implementation of a Geographical Information System application that displays all relevant information on radioactive sources to help identify potential hazards stemming from those sources;
- Hosting and participating in exercises, training, outreach and capacity building, intercomparison studies and peer reviews to strengthen national and international EPR.

This report serves as the final record of the EPREV mission. The IAEA will continue to work with Morocco to enhance its national EPR arrangements. Morocco has committed to developing an Action Plan to implement the recommendations and suggestions in this report and to inviting the IAEA for an EPREV follow-up mission to review their implementation.

# 1. INTRODUCTION

## 1.1. Objective and Scope

The purpose of this Emergency Preparedness Review (EPREV) mission was to conduct a review of Morocco's emergency preparedness and response (EPR) arrangements and capabilities for a nuclear or radiological emergency. The EPREV mission focused on the arrangements for nuclear or radiological emergencies in emergency preparedness category (EPC) III and IV, as defined in International Atomic Energy Agency (IAEA) Safety Standards Series No. GSR Part 7, Preparedness and Response for a Nuclear or Radiological Emergency (hereafter: GSR Part 7) [1].The review was carried out by comparison of existing arrangements against the IAEA Safety Standards for EPR.

It is expected that the EPREV mission will facilitate improvements in Morocco's EPR arrangements, and those of other Member States, from the knowledge gained and experiences shared between Morocco and the Review Team and through the evaluation of the effectiveness of Morocco's arrangements, capabilities and good practices.

The key objectives of this mission were to enhance preparedness and response for nuclear or radiological emergencies, including:

- Providing Morocco with an opportunity for self-assessment of its activities against IAEA Safety Standards;
- Providing Morocco with a review of its EPR arrangements;
- Providing Morocco 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 secretariat with opportunities to broaden their experience and knowledge of EPR;
- Providing key staff with an opportunity to discuss their practices with reviewers who have experience with different practices in the same field;
- Providing Morocco with recommendations and suggestions for improvement;
- Providing other Member 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 Kingdom of Morocco, a preparatory meeting for the EPREV mission was conducted on 29 April 2021. The preparatory meeting was carried out virtually, due to travel restrictions imposed by the COVID-19 pandemic situation, by the appointed Team Leader, Mr Brian AHIER, Team Coordinator (at the time)[1], Ms Muzna ASSI, Deputy Team Coordinator (at the time)[2], Ms Stacey HORVITZ, and counterparts from Morocco.

[1] The Team Coordinator that conducted the EPREV mission was Mr Gurdal GOKERI.
[2] There was not a Deputy Team Coordinator for the conduct of the EPREV mission.

The preparatory meeting attendees discussed matters concerning EPR (and policy issues) with the National Coordinator, Mr Abdelkader BENIDER from the Moroccan Agency for Nuclear and Radiological Safety and Security (AMSSNuR), Mr Bouchaib FIKRI from Ministry of Interior (MI) and key organisations in the host country. The discussions resulted in agreement of the scope of the EPREV mission.

The IAEA EPREV Team Coordinator and Team Leader delivered presentations on the goals of the preparatory meeting and different aspects regarding EPREV methodology and scope. The National Coordinator delivered a presentation on Morocco's EPR framework and arrangements at the regional and local levels. This was followed by an exchange on the tentative work plan for the implementation of the EPREV Mission in Morocco in 2022.

The proposed composition of the Review Team (experts from Member States to be involved in the review) was discussed and the size of the Review Team was tentatively confirmed. Logistics regarding meeting and work spaces, the identification of counterparts and liaison officers, proposed site visits, and lodging and transportation arrangements were also addressed. All relevant aspects were included in the agreed *Terms of Reference*.

### 1.3 Reference for the Review

The primary reference for the review is GSR Part 7 [1]. In addition, IAEA Safety Guides GSG-2, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency [2], GS-G-2.1, Arrangements for Preparedness for a Nuclear or Radiological Emergency [3], GSG-11, Arrangements for the Termination of a Nuclear or Radiological Emergency [4], GSG-14, Arrangements for Public Communication in Preparedness and Response for a Nuclear or Radiological Emergency [5], and SSG-65, Preparedness and Response for a Nuclear or Radiological Emergency Involving the Transport of Radioactive Material [6] 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 ON GENERAL REQUIREMENTS

### 2.1. Emergency management system

The lead role for emergency management resides with the MI. The MI has developed a national all-hazards framework for emergency management, which includes provisions for hazard-specific plans. The system allows for the activation and coordination of multiple plans as required for the emergency. Arrangements for nuclear or radiological emergencies are contained within this framework.

The national legal and regulatory infrastructure for nuclear safety, security and safeguards is based on Law No. 142-12 on *Nuclear and Radiological Safety and Security and the Creation of the Moroccan Agency for Nuclear and Radiological Safety and Security (AMSSNuR)*. The Law applies to all facilities and activities that could give rise to ionizing radiation risks, including nuclear installations, the use of radiation and radioactive sources, the transport of radioactive material and the management of radioactive waste.

A draft *Decree on the Preparation and Conduct of Interventions in a Nuclear or Radiological Emergency (PCI-SUNR)*, intended to implement the provisions of Law No. 142-12, has been developed in cooperation with all relevant ministerial departments. The draft *Decree on PCI-SUNR* indicates that an emergency management system shall be established by joint order of the Ministers concerned after consultation with the AMSSNuR, describes the elements of the system, and requires that it be commensurate with the National Hazard Assessment.

It was noted that the arrangements described in the draft *Decree on PCI-SUNR* are generally in place, but on an ad-hoc or informal basis. Update and approval of the draft *Decree on PCI-SUNR* and plan is required to formalize these arrangements defined in the law. Morocco has indicated that the documents will be finalized based on outcomes of the EPREV mission and following any necessary revisions, including addressing any inconsistencies in the current documents as observed by the Review Team.

Morocco is a signatory to, and participates in, international emergency preparedness activities under the Convention on Nuclear Safety, the Convention on Early Notification of a Nuclear Emergency, and the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency. National contact points for the Early Notification and Assistance Conventions have been identified.

### 2.2. Roles and responsibilities

*General*

Law No. 142-12 provides the legal basis for nuclear and radiological safety and security, including emergency plans.

The MI is the lead authority for EPR, including the development of the National Nuclear and Radiological Emergency Plan (NREP) required by Law No. 142-12, and in this capacity ensures coordination across ministerial departments and organizations involved in radiation emergency management. At the local level, the MI exercises its authority through the Walis and Governors, whose powers are described in the Constitution.

Law No. 142-12 requires the State to establish an NREP that includes two coordinated levels of preparedness and response: a national level plan under the authority of the MI; and local level plans under the authority of the Walis or Governors, who are local representatives of the MI. The Law also requires operating organizations to prepare an internal (on-site) emergency plan that must be coordinated with the local plan. It was noted that in an emergency, coordination between the two plans would be enabled by the competent territorial authority.

The draft *Decree on PCI-SUNR*, and the draft NREP (which has been approved by all stakeholders but not yet formally published into law) describe the roles and responsibilities for on-site and off-site EPR, including governmental ministries and organizations, territorial authorities, coordination committees and the operator. The Review Team noted some inconsistencies between these two documents, but the MI has a plan to address these prior to their publication.

A draft *National Framework for Emergency Preparedness and Response* provides the overarching roles of governmental ministries, and requires each ministry department to review its responsibilities and functions in emergency management through the planning process for prevention/mitigation, preparedness, response and recovery.

In case of serious emergencies, the Royal Armed Forces (FAR) provide logistical support and participate in the various operations of crisis management, in accordance with the provisions of Royal Instruction: IP No. 5631/CS dated 22 November 2016 and Circular No. 34/IPC dated 25 January 1983 on the rescue organization in case of disaster.

As the government department in charge of nuclear issues in Morocco, the Ministry of Energy Transition and Sustainable Development (MTEDD) participates and contributes to decision-making through the analysis of technical assessment reports within a technical expertise cell. It contributes to the implementation of regulations relating to the protection and control of nuclear and radioactive materials and their impact on the environment. It also participates in environmental monitoring with the departments concerned.

It was reported that the Ministry of Finance participated in the drafting process for the national plan as part of the ad-hoc committee for drafting the NREP, and that each organization involved in the plan has identified the financial resources it needs to fulfil its identified role. The MI stated that publication of the NREP as a legal document will confirm the availability of these resources.

According to the draft *Decree on PCI-SUNR*, the operator makes the necessary measures to provide compensation to victims for damage due to a nuclear or radiological emergency in accordance with the applicable national liability regime and provisions. While the operator is liable for the damages caused by an emergency situation, compensation is assured by the State. The process for compensation is defined in Law No. 12-02 on civil responsibility for nuclear damage. Morocco is also a signatory to the Convention on Supplementary Compensation for Nuclear Damage.

| **Recommendation 1** |
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| **Observation:** There is a draft decree, framework and national plan in place for nuclear and radiological emergency preparedness and response, but these are not yet finalised and approved. |
| **Basis for the 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 |

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| 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 (see para. 1.12)" |
| **Recommendation:** The Government should complete in a timely manner the approval of the draft documents for emergency preparedness and response in order to formalize the arrangements addressing the emergency management system, roles and responsibilities. |

| **Good practice 1** |
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| **Observation:** The Ministry of Finance was involved in the ad-hoc committee for drafting the National Radiation Emergency Plan in order to understand the resource requirements to fulfil the identified roles for each national ministry in the Plan. It was noted that this has enabled the planned allocation of resources once the Plan is formally published. |
| **Basis for Good Practice**: GSR Part 7 paragraph 4.8 states: "The government shall ensure that response organizations, operating organizations and the regulatory body have the necessary human, financial and other resources, in view of their expected roles and responsibilities and the assessed hazards, to prepare for and to deal with both radiological and non-radiological consequences of a nuclear or radiological emergency, whether the emergency occurs within or beyond national borders". |
| **Good Practice**: Engaging funding organizations throughout the national planning process to improve identification and planning of resourcing requirements. |

*Coordination mechanism*

The draft *Decree on PCI-SUNR* provides for the creation of an Interdepartmental Committee for radiological and nuclear emergencies (referred to as the Inter-ministerial Committee for Emergency Management in the draft NREP). When established, the Committee will be responsible for coordination at the national and local levels for the preparation for and management of nuclear or radiological emergencies, in particular between the various parties responsible for carrying out the response functions provided for in the emergency plans. The Committee membership, roles, and operations are set by order of the Minister of the Interior and the secretariat is provided by ASSMNuR. The draft *Decree on PCI-SUNR* lists the responsibilities of the Inter-Ministerial Committee for both emergency preparedness and response, however the Review Team noted that little detail is provided on the specific mandate and activities for emergency preparedness.

In 2018, the MI, in coordination with AMSSNuR, created an ad-hoc committee for drafting the NREP, as well as other relevant emergency procedures. The ad-hoc committee includes representation from the relevant government ministries involved in EPR, as well as those involved in security. Representatives from Morocco indicated that this ad-hoc committee currently functions as the National Coordination Mechanism, but that this role will be formally transferred to the Inter-ministerial Committee for Emergency Management once the draft *Decree on PCI-SUNR* is approved into law. A National Committee on Nuclear Security has been created by the MI under a draft *Decree on Physical Protection*. The Review Team observed that the participation of AMSSNuR as the secretariat for both committees would enable the coordination of emergency management and nuclear security arrangements.

The draft *National Framework on Emergency Preparedness and Response* outlines the expectations related to emergency preparedness at the national level. The framework provides for the review and updating of its provisions, and reporting to the Head of Government, every

5 years after it comes into effect, including the review of the national hazard mapping associated with facilities and activities.

According to the draft NREP, the Inter-Ministerial Committee also has a role in emergency response at the political level, with a mandate to direct the actions of the ministerial departments and organizations involved in emergency management, and provide general and strategic guidance on the implementation of the NREP. However, according to the draft *Decree on PCI-SUNR*, the Committee has a role, inter alia, in collecting and analysing information necessary to assess the extent of impacts on the population and environment, and to recommend appropriate measures and means of intervention to be implemented, in the event of a nuclear or radiological emergency. The Review Team noted that such activities may not be consistent with the mandate as described in the draft NREP, and should be verified before the documents are finalized.

| **Suggestion 1** |
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| **Observation:** While the current arrangement for the National Coordinating Mechanism will be replaced by an Inter-Ministerial Committee on Emergency Management upon publication of the draft *Decree on the Preparation and Conduct of Interventions in a Nuclear or Radiological Emergency*, its designation as the National Coordination Mechanism and its specific functions in that capacity are not clearly described. |
| **Basis for the Suggestion:** GSR Part 7 paragraph 4.10 states: "The government shall establish a national coordinating mechanism5 to be functional at the preparedness stage, consistent with its emergency management system, with the following functions: …" |
| **Suggestion:** The Government should consider clearly designating the relevant committee as the National Coordinating Mechanism and documenting its mandate and activities. |

*Regulatory body*

As per Law No. 142-12, regulation of nuclear facilities is the responsibility of the AMSSNuR, an independent regulatory body that reports directly to the Head of Government (Prime Minister). AMSSNuR's functions as stipulated in the Law include, *inter alia*: to regulate, authorize and control facilities and activities in the nuclear and radiation areas; to assist the administration (government) in setting up the NREP; and to contribute to the management of emergency situations at the local and national level.

The Law requires the operators to have internal (on-site) emergency plans that are coordinated with the local (off-site) plan. AMSSNuR, as the regulatory body, has developed a draft *Decree on Establishing the Content of the Internal Emergency Plan* for each EPC. In its regulatory capacity, AMSSNuR is also responsible for approving the internal emergency plan as part of licensing conditions for "Category II"[3] activities as defined in Law No. 142-12. However, responsibility for approving the internal emergency plan for "Category I" remains with the Administration. As the *Decree on Establishing the Content of the Internal Emergency Plan* is still draft, AMSSNuR noted that it provides periodic guidance to operators on the expectations of the plan as part of its inspection program. The timeline for compliance with the draft will be included in the Decree once published.

Law No. 142-12 as well as the draft *Decree on PCI-SUNR* provide for the operating organization to promptly take the necessary protective actions on the site in response to a nuclear or radiological emergency that could result in off-site consequences. The internal plan

[3] As defined in Article 4 of Law No. 142-12 Category I and Category II refer to classes of sources and facilities.

should specify the emergency response organization that will enable the operator to implement appropriate arrangements throughout the emergency, and to ensure coordination with off-site authorities.

As per the draft NREP, AMSSNuR is responsible for verifying the measures taken by the operator to ensure the protection of the population, responders and the environment in the event of a radiological incident or accident and to mitigate the consequences of the accident.

*Operating organizations*

Law No. 142-12 assigns operators all responsibility for all aspects of safety and security including on-site emergency response. This includes establishing and maintaining on-site arrangements for preparedness and response for the facilities or activities under its responsibility, and promptly taking the necessary mitigatory and protective actions at the site. The Review Team observed that such arrangements are described in the internal emergency plans for National Centre for Energy, Nuclear Sciences and Technology (CNESTEN) and National Institute for Agricultural Research (INRA).

In the event of an incident or accident, the operator is responsible for triggering the facility's Internal Emergency Plan and alerting the competent territorial authority and the AMSSNuR. AMSSNuR indicated that evaluation of the operator's compliance with EPR arrangements is done as part of the regulatory inspection process.

### 2.3. Hazard assessment

Morocco's National Hazard Assessment, established by AMSSNuR, is explained in a report titled *Hazard mapping associated with facilities and activities involving ionizing radiation sources,* issued in 2019. This report was developed to address hazards stemming from all activities associated with nuclear facilities and radiation sources, either in fixed or unforeseen locations (EPC III, IV). Nevertheless, some information and considerations applicable to EPC I, II and V are also included.

The categorization is based on the generic hazard assessment for radiation sources contained in the IAEA publication *Method for Developing Arrangements for Response to a Nuclear or Radiological Emergency* (EPR-Method 2003). The Review Team observed that there is no specific evaluation of the hazards related to the activities associated with the nuclear facilities and radiation sources in the country. AMSSNuR indicated that they will revise this document in the future based on the *Protection Strategy*, currently in draft version.

Morocco's self-assessment report for this EPREV states that AMSSNuR lacks adequate analytical tools to conduct the specific assessment that would be needed to determine the potential consequences in the different scenarios that could be postulated in the national hazard assessment for nuclear and radioactive facilities and activities. Plans for addressing this gap are pending further development.

As part of the authorization process, operators are required to submit to AMSSNuR their internal emergency plan which includes a description of the characteristics of the emergencies identified in the assessment of the potential hazards associated with the facility. The Review Team observed that the internal emergency plans for CNESTEN and INRA contained information on the assessment for emergency situations.

Regarding the inclusion of the outcome of the threat assessment of nuclear security events in the national hazard assessment, MI indicated that there is a National Committee on Nuclear Security, chaired by MI, where this aspect will be addressed. As per the draft *Decree on Physical Protection*, the mandate of the Committee includes the evaluation of the threat related to malevolent activities involving nuclear and radioactive materials, therefore the inclusion of the impact of threat assessment in the national hazard assessment can be addressed. amssnur holds the secretariat of this committee.

AMSSNuR has developed an application (SIG), based on geographic information system (GIS) technology, that provides relevant information (location, facility, activity, isotope and date, manufacturer, etc.) on all radioactive sources. This information is periodically updated and may serve as a useful tool to support EPR.

Regarding consideration of combined emergencies (natural events or other emergencies triggered or otherwise influencing the response to a radiological emergency), the Moroccan all-hazards framework includes a detailed consideration and assessment of natural and man-made hazards. If an event stemming from those hazards triggers a nuclear or radiological emergency in one or more facilities, the resulting emergency would be managed under the existing all hazards arrangements, facilitating coordination of the combined emergency's management.

MI and AMSSNuR indicated that the national hazard assessment will be reviewed every 5 years or when relevant changes in the existing hazards make advisable a review.

| **Recommendation 2** |
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| **Observation:** The National Hazard Assessment does not consider the specific characteristics of the hazards stemming from all activities associated with nuclear facilities and radiation sources. |
| **Basis for the Recommendation**: GSR Part 7 paragraph 4.18 states: "Hazards shall be identified and potential consequences of an emergency shall be assessed to provide a basis for establishing arrangements for preparedness and response for a nuclear or radiological emergency. These arrangements shall be commensurate with the hazards identified and the potential consequences of an emergency". |
| **Recommendation**: The Government should ensure that the National Hazard Assessment is revised to include specific information and analysis of the existing hazards in the country stemming from all activities associated with nuclear facilities and radiation sources. |

| **Recommendation 3** |
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| **Observation:** The regulatory body of Morocco lacks adequate analytical tools to effectively evaluate the existing hazards stemming from all activities associated with nuclear facilities and radiation sources. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 4.20 states: "The government shall ensure that for facilities and activities, a hazard assessment on the basis of a graded approach is performed. The hazard assessment shall include consideration of: (a) Events that could affect the facility or activity, including events of very low probability and events not considered in the design; (b) Events involving a combination of a nuclear or radiological emergency with a conventional emergency such as an emergency following an earthquake, a volcanic eruption, a tropical cyclone, severe weather, a tsunami, an aircraft crash or civil disturbances that could affect wide areas and/or could impair capabilities to provide support in the emergency response; (c) Events that could affect several facilities and activities |

| Recommendation 3 |
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| concurrently, as well as consideration of the interactions between the facilities and activities affected; (d) Events at facilities in other States or events involving activities in other States". |
| **Recommendation**: The Government should ensure that the regulatory body of Morocco has adequate analytical tools needed to effectively evaluate the existing hazards stemming from all activities associated with nuclear facilities and radiation sources. |

| Good practice 2 |
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| **Observation:** AMSSNuR has put in place a GIS based information system (SIG) that displays the location of all relevant radioactive sources and the most relevant features of the sources for emergency preparedness and response purposes. The information existing in this application is periodically updated. |
| **Basis for the Good Practice:** GSR Part 7 paragraph 4.18 states: "Hazards shall be identified, and potential consequences of an emergency shall be assessed to provide a basis for establishing arrangements for preparedness and response for a nuclear or radiological emergency". |
| **Good Practice**: Having a GIS application that displays all relevant information on radioactive sources provides useful information to identify potential hazards stemming from radioactive sources and improve the preparedness and response to emergencies related to those radioactive sources. |

### 2.4. Protection strategy for an emergency

The draft *Protection Strategy* is included in the documented titled "Protection Strategy in a Nuclear or Radiological Emergency" (March 2022) which is pending approval. The *Protection Strategy* includes different protective actions and other response actions based on IAEA guidance. Definitions of Reference Levels for urgent response, early response and transition phases of emergencies are included as well. There are different protective actions and other response actions that are defined for different scenarios, based on the use of Generic Criteria, Operational Intervention Levels and other observables on the scene. In general, with some exemptions indicated below, the document provides a sound basis for the definition and understanding of the strategy to protect the public and emergency workers in case of a nuclear or radiological emergency.

The use of the Generic Criteria and Operational Intervention Levels in the *Protection Strategy* have some aspects that depart from GSR Part 7 requirements, and a justification related to national circumstances has not been provided. This affects Table 4, 5 and 6, in which the dose concepts (dose received or projected) are not indicated and the actions to be taken, if the Generic Criteria are exceeded, are missing. Generic Criteria for food and commodities restrictions at the local level for international trade of those products and commodities are also missing. For dose restrictions for emergency workers, the 20 mSv annual limit for planned exposure situations is used instead of the general dose restriction of 50 mSv for the duration of the emergency exposure, as indicated in GSR Part 7.

No process for justification nor optimization, in the national context, for the protective actions or the strategy itself has been implemented and this aspect is pending further actions that need to be defined.

The Review Team observed that the draft NREP is not consistent with the *Protection Strategy* when it comes to General Criteria for taking protective actions, which are based on superseded

Safety Standards (GS-R-2, 2002). It is expected that this will be reviewed before approval of the NREP to ensure consistency between these two key documents.

To date, the process to develop the draft *Protection Strategy* by AMSSNuR included involvement of all relevant ministerial departments and organizations. The process to be undertaken for broader consultation with all interested parties will be defined in future stages of the document by the National Committee on the Upgrade of Regulatory Activities. In addition, prior to approval, the final text will be published for public comments for one month.

| **Recommendation 4** |
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| **Observation:** The draft *Protection Strategy* does not include justification and optimization of the individual protective actions nor the whole protection strategy at the preparedness stage, nor a process for optimization during the response. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 4.27 states: "The government shall ensure that, on the basis of the hazards identified and the potential consequences of a nuclear or radiological emergency, protection strategies are developed, justified and optimized at the preparedness stage for taking protective actions and other response actions effectively in a nuclear or radiological emergency to achieve the goals of emergency response". |
| **Recommendation**: The Government should revise the draft *Protection Strategy* to ensure that adequate provisions are in place for justification and optimization of the individual protective actions and the strategy itself. |

| **Recommendation 5** |
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| **Observation:** The draft *Protection Strategy* does not include arrangements to revise operational criteria in the course of a nuclear or radiological emergency, with account taken of the prevailing conditions as they evolve. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 4.28 states: "Development of a protection strategy shall include, but shall not be limited to, the following … (4) Once the protection strategy has been justified and optimized and a set of national generic criteria has been developed, pre-established operational criteria (conditions on the site, emergency action levels (EALs) and operational intervention levels (OILs)) for initiating the different parts of an emergency plan and for taking protective actions and other response actions shall be derived from the generic criteria13. Arrangements shall be established in advance to revise these operational criteria, as appropriate, in the course of a nuclear or radiological emergency, with account taken of the prevailing conditions as they evolve. |
| **Recommendation**: The Government should ensure that there is a process to revise operational criteria, as appropriate, in the course of a nuclear or radiological emergency, with account taken of the prevailing conditions as they evolve. |

| **Recommendation 6** |
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| **Observation:** There are some discrepancies between the draft *Protection Strategy* and GSR Part 7 with respect to the Generic Criteria for (i) taking protective actions to avoid or to minimize deterministic effects, (ii) reducing the risk of stochastic effects and (iii) restricting exposure of emergency workers. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 4.31.a states: "The government shall ensure that the protection strategy is implemented safely and effectively in an emergency response through the implementation of emergency arrangements, including but not limited to: (a) Promptly taking urgent protective actions and other response actions with account |

| Recommendation 6 |
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| taken of Appendix II to avoid or to minimize severe deterministic effects, if possible, on the basis of observed conditions and before any exposure occurs; (b) Taking early protective actions and other response actions to reduce the risk of stochastic effects with account taken of Appendix II; (c) Providing for registration, health screening and longer term medical follow-up, as appropriate, with account taken of Appendix II; (d) Taking actions to protect emergency workers, with account taken of guidance values provided in Appendix I |
| **Recommendation**: The Government should revise the draft *Protection Strategy* to ensure that generic criteria and dose restrictions for emergency workers are aligned with the provisions set forth in GSR Part 7. |

# 3. DETAILED FINDINGS ON FUNCTIONAL REQUIREMENTS

## 3.1. Managing emergency response operations

The national arrangements for managing emergency response operations in a nuclear or radiological emergency are described in the draft NREP.

The MI has the overall responsibility at the national and local level for managing the response and making decisions. The setup of emergency operations centres at national and local levels under the command of the MI provides for a unified command and control response and takes into account all hazards. At the local level this overarching control is delegated to the Wali or Governor who directly represents the MI.

For EPC III facilities, the authorizations that are issued to operators place responsibilities on the operator to have emergency response plans to manage the on-site emergency. The authorization requires the facility to ensure all the relevant local response organizations are consulted in the development of the plan. It is a requirement of the operator to immediately notify AMSSNuR and the local authorities if a radiological incident with actual or potential radiological consequences occurs.

In the event of a radiological emergency requiring a national response, the MI coordinates and convenes an Inter-Ministerial Committee on Emergency Management to ensure all the relevant organizations, capabilities and equipment are deployed. This includes expert advice from the key radiological protection expert organizations including AMSSNuR that can provide technical assessment of the information received on radiological conditions that can assist with decision making.

Field response operations including radiological monitoring and assessment are established and coordinated depending on the location and nature of the event according to the draft NREP.

During the mission, the Review Team visited the emergency operation centre for MI (Monitoring and Coordination Centre (CVC)) and the Operational and Monitoring structures of the General Directorate of Civil Protection (DGPC) and observed the organization of the facilities and how they are set up and managed.

## 3.2. Identifying, notifying and activating

From the discussions and visits to MI and DGPC emergency operation centres, it was understood that notification points, operable on a 24/7 basis, were established in those centres. These centres also maintain continuous vigilance of media, meteorological data and other intelligence situations that may require emergency intervention. For example, at DGPC it was observed that multiple forest fires in a remote part of the country were being monitored in real time.

The operator is responsible for identifying and notifying radiological incidents and emergencies for EPC III facilities as required in the authorization (licence). This requires the operator to immediately notify AMSSNuR. This also applies to EPC IV incidents involving transport carriers as they must be licensed by AMSSNuR.

The Review Team noted that the authorizations issued to operators place a very general requirement to notify AMSSNuR immediately of any incident with a potential ‘radiation safety

significance'. However, as there are no criteria established for what is meant by a "radiation safety significant incident", it is not clear how an operator identifies an event that must be notified.

Additionally, there is no emergency classification system in place, based on facility conditions and other observables (Emergency Action Levels) on the scene or off-site for EPC III or IV postulated scenarios. Such a system is needed to allow prompt identification, notification and activation of a response that is commensurate with the potential risk.

For reporting and receiving notifications of transnational emergencies, and for requesting, receiving and providing international assistance, Morocco has established arrangements in accordance with the provisions of the IAEA Early Notification and Assistance Conventions. AMSSNuR acts as the IAEA's National Warning Point and Competent Authority for a Domestic Emergency and maintains 24/7 operations. The Competent Authority for an Emergency Abroad is delegated to The Ministry of Foreign Affairs, African Cooperation and Moroccan Expatriates (MAECAMRE).

There is a programme scheduled for 2023 to develop and publish technical guides to assist operators in preparing their radiation emergency plans.

| **Recommendation 7** |
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| **Observation:** For EPC III and IV, there are no criteria related to radiological safety significance or an emergency classification system based on facility conditions and other observables on the scene or off-site to allow prompt identification, notification and activation of the response. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 5.14 states: "The operating organization of a facility or activity in category I, II, III or IV shall make arrangements for promptly classifying, on the basis of the hazard assessment, a nuclear or radiological emergency warranting protective actions and other response actions to protect workers, emergency workers, members of the public and, as relevant, patients and helpers in an emergency, in accordance with the protection strategy (see Requirement 5). This shall include a system for classifying all types of nuclear or radiological emergency...."<br><br>and<br><br>GSR Part 7 paragraph 5.16 states: "The emergency classification system for facilities and activities in categories I, II, III and IV shall take into account all postulated emergencies, including those arising from events of very low probability. The operational criteria for classification shall include emergency action levels and other observable conditions (i.e. 'observables') and indicators of the conditions at the facility and/or on the site or off the site. …" |
| **Recommendation**: The Government should ensure that criteria are established for (i) identifying events of radiological safety significance and (ii) an emergency classification system with Emergency Action Levels and other observable conditions and indicators of the conditions at the facility on and/or off site, to allow for prompt identification, notification and activation of the response commensurate with the risk. |

### 3.3. Taking mitigatory actions

Law No. 142-12 established the mitigatory action requirements that are to be implemented by facility operators, radioactive material licence holders or by an authorized organization during a radiological emergency. To determine what actions are needed to effectively mitigate the consequences of a radiological emergency, a hazard assessment is performed to analyse the hazards of radiological activities (including waste management), at a facility, or of radiation sources.

The responsibility and arrangements for the implementation of mitigatory actions, both radiological and non-radiological, are found in Article 8 in the draft *Decree on PCI-SUNR*. Specifically, Article 8 identifies that the operator is responsible for promptly taking the necessary mitigatory and protective actions at the site against a nuclear or radiological emergency.

The draft NREP describes the response actions associated with mitigation. These response actions are taken to mitigate the impact of an emergency on life and health of persons, property or the environment.

Law No. 142-12 clearly identifies how the mitigatory actions are to be determined and establishes the responsibilities for implementing the mitigatory actions. Additionally, Law No. 142-12 recognizes that if assistance to mitigate the consequences of the radiological emergency is needed by a response organization, it can be provided by Moroccan governmental agencies at the local and national level and, through various agreements, from international organizations. Nevertheless, the recognition that assistance may be needed from non-governmental agencies (e.g., universities, commercial technical entities, radiological consultants, etc.) is not pre-planned.

| **Suggestion 2** |
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| **Observation:** There are no pre-planned arrangements or processes to obtain non-governmental assistance during a radiological emergency. |
| **Basis for the Suggestion:** GSR Part 7 paragraph 5.29 states: "Arrangements shall be made to provide expertise and services in radiation protection promptly to local officials, first responders in an emergency at an unforeseen location and specialized services (e.g. law enforcement agencies) responding to emergencies involving activities and acts in category IV, and to those personnel at locations where there is a significant likelihood of encountering a dangerous source that is not under control (see para. 4.21). This shall include arrangements for on-call advice or other appropriate mechanisms and arrangements to dispatch to the site an emergency team capable of assessing radiation hazards, mitigating radiological consequences and managing the exposure of emergency workers. In addition, arrangements shall be made to determine whether and when additional assistance is necessary and to determine how to obtain such assistance (see paras 5.24 and 5.94)."<br><br>GS-G-2.1 para. 3.6 states: "The off-site level consists of organizations that will perform the response actions carried out off the site, and should include:<br>– National and regional officials. These are the governmental agencies responsible for planning and response at the national (or regional) level and also non-governmental organizations (NGOs). These agencies should be responsible for providing technical assistance to local responders and for implementing protective actions and other |

| Suggestion 2 |
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| actions that do not need to be implemented urgently to be effective. At the national level, preparations should be made to respond to radiological emergencies that can occur anywhere unexpectedly. These preparations should be designed to support local officials in dealing with these emergencies.” |
| **Suggestion**: The Government should consider the development of a process for obtaining assistance from non-governmental agencies, which provides for prior arrangements for their response, during a radiological emergency. |

### 3.4. Taking urgent protective actions and other response actions

Urgent protective actions and other response actions are defined in different draft documents at different stages of approval, namely:

- Draft Protection Strategy in a Nuclear or Radiological Emergency
- Draft NREP
- Draft Concept of Operations in Response to a Radiological Emergency

In the case of facilities in EPC III, protective actions and other response actions are implemented by the operator with the support as necessary at the local level, with escalation to national level, if needed, as per the draft NREP. Any actions that might be needed for confirmation of the radiological situation off-site would be implemented in coordination between the operator (if it has resources for that) and the authorities. However, currently there is no emergency classification system in place, based on facility conditions and other observables (Emergency Action Levels, see Section 3.2 Identifying, Notifying and Activating, Recommendation 7). This gap might delay understanding by the operating organization and the authorities of the scope of the protective actions and the kind of support that is needed to be provided by the authorities.

Regarding malevolent acts or terrorist attacks that may trigger a radiological emergency in EPC III facilities, the MI would provide the response to counter and prosecute the perpetrators in the framework of the draft NREP. To make this response more efficient, the MI has promoted the establishment of cooperation agreements with these EPC III facilities to establish direct contact with the nearest police stations so that an adequate response can be provided expeditiously. For some large EPC III facilities (CNESTEN, INRA), security services are rapidly deployed on site.

EPC IV activities and relevant locations in which there is likelihood of encountering radioactive materials out of regulatory control (such as scrap metal yards, foundries and port customs) have installed portal monitors for detection of radioactive materials. They are required to notify the competent authorities (MI and AMSSNuR) about the detection of any radioactive material and to have in place an emergency plan to take any actions required to control risks stemming from the radioactive material detected. These actions are deployed based on the facility’s emergency plans that, when activated, would operate in the framework of the NREP. The Ministry of Industry, Trade, Investment and Digital Economy has issued provisions for scrap metal yards and foundries that require the installation of detection portals and development of emergency plans.

Regarding terrorist attacks involving the use of radioactive materials (such as radiation exposure or radiological dispersal devices), MI is responsible through the General Directorate of National Security (DGSN) to provide the response to the perpetrators and coordinate protective actions for the public and responders as set forth in the draft NREP. Urgent protective

actions in this case are based on observables on the scene and radiation monitoring measurements. These actions are tested regularly in different emergency exercises.

| Good practice 3 |
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| **Observation:** DGSN has established practical arrangements for EPC III facilities to provide them direct communication with the nearest police station. |
| **Basis for the Good Practice:** GSR Part 7 paragraph 5.43 states: "The operating organization of a facility in EPC I, II or III shall ensure that suitable, reliable and diverse means of communication are available at all times, under the full range of emergency conditions, for use in taking protective actions and other response actions on the site and for communication with off-site officials responsible for taking protective actions and other response actions off the site or within any emergency planning zones or emergency planning distances.". |
| **Good Practice**: Direct communication between the operator and police station allows for more rapid, effective and better coordinated response. |

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

The Law No. 142-12, Article 121, establishes that emergency plans are required to identify how the public is to receive information during a radiological or nuclear emergency event. The draft NREP, section 1.3, "Objectives," states that one of its objectives is to provide a process for rapid and effective response that includes public information and communication.

The draft NREP, Section 1.2.3, describes the CVC, which is under the authority of the MI. The CVC continuously monitors operations, and during an emergency, coordinates, collects, analyses, and shares information between various response organizations.

During a radiological emergency, the CVC's Communication and Information Unit is tasked with the dissemination of public information. The Communication and Information Unit is composed of representatives from MI, MAECAMRE, the Ministry of Health and Social Protection (MSPS) and AMSSNuR and performs the following tasks:

- Preparation of press releases for the public and the media;
- The analysis of all relevant information related to the emergency;
- Maintaining ongoing and diverse communication during all phases of the emergency;
- Daily drafting of the operations monitoring report and a summary for communication purposes.

As mentioned previously, the Law No. 142-12 and the draft NREP clearly define the organizations and the responsibilities for the dissemination of public information during all phases of a radiological emergency. Indeed, the draft NREP, definitively states that the MI has the "exclusive" authority to provide official public communications.

It is acknowledged that the MI has the capability to provide public information as evidenced by previous national events. As there are unique aspects associated with public communication during a radiological emergency, especially during a rapidly evolving event, it is necessary that a well-structured public communication process includes, at a minimum, elements of timeliness goals, prescripted messaging, plain language, and a methodology for the rapid development of public information through pre-arranged media that address the unique aspects of a radiological emergency.

AMSSNuR and the MI have drafted a communication plan for radiological emergency response.

| Suggestion 3 |
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| **Observation:** The existing public communication process does not currently consider all of the unique elements of nuclear and radiological emergencies relevant to providing public information and instructions for prompt protective action. |
| **Basis for the Suggestion:** GSR Part 7 paragraph 5.47 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. |
| **Suggestion:** The Government should consider developing a communication process specific to the unique nature of radiological emergencies with the capability to promptly provide the public with plain language information in an effective and efficient manner within pre-established timeliness goals. |

### 3.6. Protecting emergency workers and helpers in an emergency

Chapter 3 Section 2 of the draft *Decree on PCI-SUNR* is dedicated to the protection of emergency response team members. Article 35 of Section 2 clearly defines emergency workers as the individuals involved in nuclear or radiological emergencies. Article 39 requires the operator to ensure that emergency workers receive comprehensive information on protective measures. Article 41 requires compliance with the occupational exposure in planned exposure situations during the recovery phase of an emergency. In addition, Article 42 requires each response organization to meet the regulatory measures regarding protection of emergency workers in their emergency plan. In Article 43, dose records of all emergency workers for the purpose of medical follow-up are needed.

During nuclear or radiological emergencies, three technical organizations are designated to provide advice regarding the protection of emergency workers. These organizations are AMSSNuR, CNESTEN and National Radiation Protection Centre (CNRP) part of MSPS. Individual protective equipment and contamination monitors have been acquired through Government budget and technical cooperation with the European Union (EU) and the IAEA. DGPC and DGSN are properly equipped with appropriate personal protective equipment (PPE) for the protection of emergency workers. PPE is checked by technical organizations (CNESTEN and CNRP) before use. The equipment available in mobile units is located around the country. A certified calibration facility for radiation protection equipment is available in CNESTEN. CNRP also maintains a secondary standards dosimetry laboratory (SSDL) for dosimetry and calibration services which participates in the IAEA/WHO Network of SSDLs.

First responders are aware of the hazards and receive regular training on radiation protection. The draft NREP established the national guidance values of the exposure of emergency workers. However, the draft *Decree on PCI-SUNR* should be finalized as stated in Recommendation 1.

The Review Team noted that the legal framework does not account for helpers as a resource during nuclear or radiological emergencies. Further, the draft *Decree on PCI-SUNR* does not include provisions for helpers and does not mention the designation of emergency workers for the different tasks in the response to a nuclear or radiological emergency.

| **Recommendation 8** |
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| **Observation:** The legal framework does not account for helpers as a resource during nuclear or radiological emergencies. Further, the draft *Decree on PCI-SUNR* does not include provisions for helpers and does not mention the designation of emergency workers for different tasks in the response to a nuclear or radiological emergency. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 5.50, states: "Arrangements shall be made to register and to integrate into operations in an emergency response 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 protection of emergency workers and protection of helpers in an emergency". |
| **Recommendation**: The government should make arrangements for integrating and protecting helpers in an emergency and designating emergency workers for different tasks in the response to a nuclear or radiological emergency. |

### 3.7. Medical response

The MSPS is responsible for medical management of casualties in a nuclear or radiological emergency with active participation of DGPC. In addition, MSPS is responsible for implementing health measures related to water consumption and contributing to the analyses of the health impacts of the emergency. DGPC provides first aid and transfer of contaminated patients requiring medical attention.

The Review Team observed that key stakeholders have a good understanding of the need to prioritize life-saving actions over the radiological hazards (i.e., contamination). DGPC performs triage of casualties including radiological triage and decontamination of patients if their medical conditions allow it.

There is some capability for initial medical treatment of overexposed and/or contaminated individuals but arrangements for predesignated medical facilities have not been established yet. MSPS provides its technical expertise and contributes to the organization and pre-distribution and renewal of stable iodine tablets. There is some capability at CNESTEN and CNRP to perform internal dose assessment following the suspected intake of radioactive material notably whole body counting. Arrangements are in place for the distribution of iodine thyroid blocking agents to reduce the uptake of radioactive iodine in certain postulated scenarios. No other medical countermeasures (for example, use of chelating agents) have been considered to minimize doses from the intake of other radionuclides for any radiological emergencies in the country.
Advanced Medical Posts dedicated to dealing with all hazards are distributed at the local level with the capability to deal with radiological emergencies.

Under the Assistance Convention, Morocco could request assistance for advanced medical treatment of individual patients involved in nuclear and radiological emergencies.

| **Suggestion 4** |
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| **Observation:** There is some capability for initial medical treatment of overexposed and/or contaminated individuals but arrangements for predesignated medical facilities have not been established yet. |
| **Basis for the Suggestion:** GSR Part 7 paragraph 5.65 states: "For facilities in categories I, II and III, arrangements shall be made to manage an adequate number of any individuals with contamination or of any individuals who have been overexposed to radiation, including arrangements for first aid, the estimation of doses, medical transport and initial medical treatment in predesignated medical facilities". |
| **Suggestion**: The Government should consider establishing arrangements for predesignated medical facilities for initial medical treatment of overexposed and/or contaminated individuals. |

| **Suggestion 5** |
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| **Observation:** The medical response to nuclear or radiological emergencies does not currently consider urinalysis and decorporation response actions for internally contaminated patients. |
| **Basis for the Suggestion:** GSR Part 7 paragraph 5.67 states: Arrangements shall be made to identify individuals with possible contamination and individuals who have possibly been sufficiently exposed for radiation induced health effects to result, and to provide them with appropriate medical attention, including longer term medical follow-up. These arrangements shall include:<br>...(c) Designation of institutions for evaluating radiation exposure (external and internal), for providing specialized medical treatment and for longer term medical actions. |
| **Suggestion**: The Government should consider developing capability for internal dosimetry assessments including urinalysis and for decorporation response actions for internally contaminated patients. |

The Review Team noted that the arrangements for the identification of individuals who are in population groups that are at risk of sustaining increases in the incidence of cancers as a result of radiation exposure and for taking longer term medical actions to detect radiation induced health effects, are not yet in place.

| **Recommendation 9** |
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| **Observation:** Arrangements for the identification of individuals who are in population groups that are at risk of sustaining increases in the incidence of cancers as a result of radiation exposure and for taking longer term medical actions to detect radiation induced health effects, are not yet in place. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 5.68 states: "Arrangements shall be made for the identification of individuals who are in those population groups that are at risk of sustaining increases in the incidence of cancers as a result of radiation exposure in a nuclear or radiological emergency. Arrangements shall be made to take longer term medical actions to detect radiation induced health effects among such population groups in time to allow for their effective treatment. These arrangements shall include the use of pre-established operational criteria in accordance with the protection strategy"<br>. |
| **Recommendation**: The Government should establish arrangements for the identification of individuals who are in those population groups that are at risk of sustaining increases in the |

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| incidence of cancers as a result of radiation exposure, and for taking longer term medical actions to detect radiation induced health effects. |

### 3.8. Communicating with the public throughout an emergency

Article 121 in the Law No. 142-12, establishes that local and national level emergency plans provide a capability to inform the public during a nuclear or radiological emergency that includes direction on public protective actions. Section 3.5 previously identified that a process does not currently exist for a continual flow of public information during all phases of a radiological event. Currently, per the draft NREP, the mission of official communication with the public is exclusive to the MI.

Various other governmental agencies, including MAECAMRE, MSPS and AMSSNuR will provide information and technical input, but have no role in direct communications with the public during a radiological event. The MI intends to develop a communication plan that will include AMSSNuR as an organization that can provide input on the technical aspects of the ongoing radiological event; however, there is no intention to identify in the communication plan that AMSSNuR can disseminate public information, even in a supporting role.

In the context of ensuring accuracy and promoting public confidence, AMSSNuR is currently not authorized to disseminate technical information to the public when appropriate. Additionally, the draft NREP does not recognize the capability of the operator to provide public information when appropriate.

| **Recommendation 10** |
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| **Observation:** The draft NREP does not provide for the regulatory body (AMSSNuR), nor the operator to have the capability to develop or the authority to disseminate public information on technical issues during a radiological emergency. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 5.70 states: "Arrangements shall be made to ensure that information provided to the public by response organizations, operating organizations, the regulatory body, international organizations and others in a nuclear or radiological emergency is coordinated and consistent, with due recognition of the evolutionary nature of an emergency". |
| **Recommendation**: The Government should identify in the NREP that AMSSNuR and radiological facility operators have the capability to develop and authority to disseminate public information during a radiological event when deemed appropriate by the MI. Further, this information should be coordinated by the MI to ensure consistency and accuracy in messaging. |

### 3.9. Taking early protective actions

The draft *Decree on PCI-SUNR*, Article 1, defines the types of protective actions that are conducted during a nuclear or radiological emergency. Included are urgent and early protective actions. Article 11 of the draft *Decree on PCI-SUNR* states that protective strategies are to be developed to ensure that effective response actions are implemented on a graded approach based on a set of criteria established in consultation with AMSSNuR.

Urgent protective actions are those that would be taken within a few hours to a day, while early protective actions would be taken within days to a few weeks. Urgent protective actions would be taken prior, or immediately after a release of radioactive material and include short-term

sheltering, evacuation and iodine thyroid blocking, and actions to reduce ingestion of contaminated food products. Early protective actions are subsequent to the release and include relocation of impacted population and restrictions on contaminated food.

Throughout the draft NREP, the responsibilities for assessing and implementing the protective action strategies are assigned to the various national and local response agencies. To support these various agencies in the conduct of their mission, the AMSSNuR document "Protection Strategy in a Nuclear or Radiological Emergency" provides a process for implementing and removing protective actions. This document includes processes and extensive criteria outlined in numerous figures and tables to assess radiological data and inform the decision-making on whether protective actions are warranted and to what degree.

The Review Team noted that there are clearly defined responsibilities and criteria to ensure that early and effective protective actions would be implemented in a radiological emergency to provide for public safety. However, a monitoring strategy for supporting protective action decisions has not yet been developed.

| **Recommendation 11** |
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| **Observation:** A monitoring strategy for supporting protective action decisions has not yet been developed. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 5.82 states: "Monitoring in response to a nuclear or radiological emergency shall be carried out on the basis of a strategy to be developed at the preparedness stage as part of the protection strategy. Arrangements shall be made to adjust the monitoring in the emergency response on the basis of prevailing conditions". |
| **Recommendation**: The Government should develop a monitoring strategy for supporting protective action decisions in a nuclear or radiological emergency. |

### 3.10. Managing radioactive waste in an emergency

Radioactive waste is defined in Article 1 of Law No. 142-12. The national policy and strategy for radioactive waste management is described in draft documents:

- National Policy on Radioactive Waste and Spent Fuel Management (v1 Aug 2017)
- National Radioactive Waste and Spent Fuel Management Strategy (v1 Aug 2017)

However, the Review Team noted that the national policy and strategy documents do not describe the arrangements for management of radioactive wastes arising from a radiological emergency.

At an operational level there are capabilities and arrangements in place to deal with radioactive waste arising during emergency response operations. These were observed and discussed during visits to DGPC, CNESTEN and MSPS.

DGPC field response operations provide for the collection of liquid waste arising from decontamination of personnel and the public. The arrangements also ensure the containment of solid waste arising from those operations.

At the national level, CNESTEN has radioactive waste storage facilities for interim storage of solid and liquid radioactive wastes. They also manage and store spent sealed sources and are

the designated facility for taking safe possession of orphan sources or other radioactive materials that are out of regulatory control on behalf of the government.

For a major event where large volumes of low-level contaminated waste are generated, response would be initiated to take control of the management of such radioactive waste by the designated organization.

There is currently no documented procedure for dealing with radioactive contaminated human remains resulting from a radiological emergency.

| **Recommendation 12** |
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| **Observation:** Although at an operational level there are arrangements and capabilities in place to manage radioactive wastes arising from a radiological emergency, the draft documents that describe the national policy and strategy do not address the arrangements. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 5.84 states: "the national policy and strategy for radioactive waste management shall apply for radioactive waste generated in a nuclear or radiological emergency, with account taken of paras 5.85 to 5.88". |
| **Recommendation**: The government should review and revise the draft National Policy on Radioactive Waste and Spent Fuel Management and the draft National Radioactive Waste and Spent Fuel Management Strategy to include the arrangements for the safe management of radioactive waste, including radioactive waste and contaminated human remains resulting from a radiological emergency. |

### 3.11. Mitigating non-radiological consequences

The draft NREP states that one of the goals of the response to be provided in case of a nuclear or radiological emergency is the mitigation of the social and economic consequences of the emergency. Response is implemented under the overall coordination by the MI. Also, in the framework of the draft NREP, the MSPS is responsible for monitoring the health situation and providing for the analysis of the health impact of the emergency and its long term and epidemiological follow up. In the context of the continuity of economic activities in the affected area, organizations need to consider psychological impacts in their business continuity plans.

For discharging this responsibility, the MSPS deploys social support teams in each hospital, which provides for psychological support and counselling, among other duties, for casualties and their families. They may also provide this support to health practitioners working under stressful conditions in an emergency. This support was provided during the COVID-19 pandemic. All these actions are implemented at the hospital level. There is a follow up of the overall situation by the Directorate General of Epidemiology (DELM).

MSPS also provides for an analysis of the health hazards caused by the emergency, including psychological effects. They support communication to the public under the lead of MI to provide factual and understandable evaluations of the health hazards stemming from radiation exposure to reassure the population. MSPS does not have outreach materials (leaflets, brochures, audio-visuals) prepared in advance for this purpose, but it was indicated that they could be prepared rapidly should the need arise.

Mitigation of the economic impact caused by the emergency in international trade is addressed through the general provisions included in the draft NREP about continuity of public services. However, there is no specific provision on how to deal with this matter.

The monitoring and prevention of unjustified protective actions taken by the public during the emergency is done in the framework of media monitoring, including social media, which is implemented by MI in the frame of the draft NREP.

| **Suggestion 6** |
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| **Observation:** There are no specific arrangements to ensure that information on controls and restrictions that may affect exports from Morocco of food and commodities potentially affected by the emergency is disseminated among interested parties. |
| **Basis for the Suggestion:** GSR Part 7 paragraph 5.91 states: "Arrangements shall be made to mitigate the impacts on international trade of a nuclear or radiological emergency and associated protective actions and other response actions, with account taken of the generic criteria in Appendix II. These arrangements shall provide for issuing information to the public and interested parties (such as importing States) on controls put in place in relation to traded commodities, including food, and on vehicles and cargoes being shipped, and on any revisions of the relevant national criteria". |
| **Suggestion:** The Government should consider putting in place arrangements to ensure that appropriate information on restrictions and controls on food and commodities, as result of the emergency, is disseminated and shared with relevant stakeholders involved in the international trade of those products. |

### 3.12. Requesting, providing and receiving international assistance

The Kingdom of Morocco has ratified the Convention on Assistance in the Case of a Nuclear accident or a Radiological Emergency. The provisions of article 25 of the draft Decree on PCI-SUNR is set to establish an Inter-Ministerial Committee on Emergency Management. The Committee will be responsible for activating international assistance procedures. The request is to be initiated by MI in consultation with AMSSNuR. MAECAMRE, assisted by AMSSNuR, is the contact point for requesting IAEA assistance. The Review Team considers that the oversight of the committee would enhance the ability to facilitate and streamline receiving and integrating international assistance within the national emergency response organization.

The Review Team was informed by MI that there are staging areas (warehouses) close to the airports and highways for the receipt and the storage of national resources for affected population and which could be used to facilitate the receipt of international resources.

There is an ongoing effort by AMSSNuR to register national capabilities to the IAEA Response and Assistance Network (RANET), and an internal procedure to respond to requests for assistance has been developed. These arrangements are pending the issuance of draft *Decree on PCI-SUNR*.

### 3.13. Terminating an emergency

The draft NREP indicates that "the Minister of the Interior is solely responsible for activating and lifting the National Response Plan," and is the National Coordinator of recovery operations. The MI has indicated that decisions on termination will be based on a technical assessment of the situation, and taken in consultation with the Inter-Ministerial Committee on Emergency Management, as provided for in the draft *Decree on PCI-SUNR*.

The draft NREP indicates that the transition phase and lifting of the emergency occurs when the situation is fully controlled and the risks of a new release and contamination are eliminated.

The draft NREP includes a section on Operations to Restore Normality, and identifies, at a high level, issues such as zoning for decontamination, contamination management and continuity of public services (for which a separate guide on developing continuity plans has been developed). The draft *Protection Strategy* contains additional elements and descriptions of considerations for termination and transition to recovery.

The Review Team noted that the available documentation contains elements as described in GSR Part 7 in various levels of detail, and that they do not include all requirements such as the conditions or criteria for enabling termination, the roles and functions of organizations or the arrangements for consultation of interested parties. There is no specific strategy for communicating changes in protective measures in the context of transitioning to termination or post-event recovery. More detailed guides on how these functions would be implemented in practice, or in the longer-term have not yet been developed.

| **Recommendation 13** |
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| **Observation:** The planning documents do not include all the relevant arrangements indicated in GSR Part 7 for the termination of an emergency and should be developed in further detail as part of preparedness to ensure their effective and timely implementation in an emergency. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 5.100 states: "The government shall ensure that, as part of its emergency preparedness, arrangements are in place for the termination of a nuclear or radiological emergency. The arrangements shall take into account that the termination of an emergency might be at different times in different geographical areas…" |
| **Recommendation:** The Government should ensure that all the relevant arrangements are in place for the termination of radiological emergencies |

### 3.14. Analysing the emergency and emergency response

A serious radiological accident was known to occur in Mohammedia in the Kingdom of Morocco in 1984. Other minor emergencies were traffic accidents during transport of radioactive sources. There are reports made by each department, but no evidence of the analysis of any of the emergencies and the response made. It has been noted that there have been no nuclear or radiological emergencies since the establishment of AMSSNuR.

A workshop about reporting and analysis of emergencies was jointly organized with Spain.

AMSSNuR noted that they will lead the assessment process with the involved response organizations, however there are no formal arrangements, and the required tools to support this process are lacking. Specifically, there are no arrangements in place or provisions included in the draft Decree on PCI-SUNR nor in the draft NREP to document, protect, and preserve in an emergency response, data and information important for an analysis of the nuclear or radiological emergency and the emergency response.

| **Recommendation 14** |
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| **Observation:** There are no arrangements in place to document, protect and preserve, in an emergency response, data and information important for an analysis of the nuclear or radiological emergency and the emergency response. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 5.102 states: Arrangements shall be made to document, protect and preserve, in an emergency response, to the extent practicable, |

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| data and information important for an analysis of the nuclear or radiological emergency and the emergency response. Arrangements shall be made to undertake a timely and comprehensive analysis of the nuclear or radiological emergency and the emergency response with the involvement of interested parties. |
| **Recommendation**: The government should establish arrangements to document, protect and preserve, in an emergency response data and information important for an analysis, and arrangements to analyse nuclear or radiological emergencies and the emergency response, including identification of lessons learned. |

# 4. DETAILED FINDINGS ON REQUIREMENTS FOR INFRASTRUCTURE

## 4.1. Authorities for emergency preparedness and response

The authorities for developing, maintaining and regulating arrangements for preparedness and response for a nuclear or radiological emergency have been clearly established in the law, and further defined in regulations and draft decrees.

The lead role for emergency management resides with the MI. The Ministry has developed a national framework for emergency management, which includes provisions for hazard-specific plans. Arrangements for nuclear or radiological emergencies are contained within this framework. Law No. 142-12 provides the legislative authority and general provisions related to preparedness for and response to a nuclear or radiological emergency, including roles and responsibilities of the regulatory body, operating organization and response organizations at local and national levels.

To implement this Law, a draft *Decree on PCI-SUNR* was developed which specifies the arrangements for developing, maintaining and regulating arrangements both on-site and off-site. The draft *Decree on PCI-SUNR* provides for the creation of an Inter-ministerial Committee for Emergency Management. The Minister of the Interior as National Coordinator chairs the Committee and is responsible for activating the national emergency procedures and taking the necessary response actions. The *Decree on PCI-SUNR* is currently undergoing review prior to approval.

As per the Law, a national plan for the preparation and response to radiological and nuclear emergencies has been developed. The draft NREP, which is the responsibility of the MI, has been developed in consultation with and approved by all parties and is pending formal publication. The draft NREP includes roles and responsibilities for communication with the public.

At the regional and provincial levels, the Walis and Governors are the competent territorial authorities and are constitutionally endowed with the power of inter-ministerial coordination in their capacity as representatives of the State. The competent territorial authority of the relevant region or province triggers and implements the emergency plan at the local level and decides on the implementation of all or part of the protective actions. The Minister of the Interior may trigger the national plan when the magnitude of the radiological or nuclear emergency exceeds the response capacity of the affected region.

The Law No. 142-12, draft NREP, and the draft decrees clearly assign responsibilities and document their roles and responsibilities. Law No. 142-12 assigns specific responsibilities for safety and security to the operator, including developing an internal emergency plan coordinated with the off-site plan. According to the draft *Decree on PCI-SUNR*, the operator is responsible for triggering the facility's internal emergency plan, and for implementing measures to alert the competent territorial authority of the region and AMSSNuR.

## 4.2. Organization and staffing for emergency preparedness and response

The organization for preparedness and response to a radiological emergency is well developed with a high-level of capability in terms of sufficiently trained and equipped personnel in the key stakeholder emergency response organizations able to respond effectively to credible postulated radiological emergencies throughout the country.

There is a coordinated emergency management system that can operate at local and national levels. In all cases the MI has overall responsibilities for decision making and is supported by key agencies for expert advice and response actions.

Expert radiological protection advice and services are available 24/7 from AMSSNuR, CNRP and CNESTEN. Operational organizations including DGPC, Gendarmerie, DGSN and the Royal Armed Forces are integrated into the response as mentioned in the draft NREP.

During the mission, the Review Team observed MI and DGPC facilities that included the emergency operational facilities and a deployable mobile emergency control post. The MI and DGPC emergency operation centres are well established for dealing with multi hazard events, including natural disasters and technological emergencies. The emergency operation centres have direct access to a national inventory database of radiation monitoring instruments and equipment, resources, PPE, respiratory protective equipment (RPE) and support personnel to ensure deployment of resources wherever they may be needed.

There was also a practical demonstration of the field operations capability. This includes a deployable response capability with skilled personnel trained to use specialized vehicles and equipment including multiple health physics instruments such as radiation and contamination survey meters, electronic personal dosimeters, tele-probes, portable gamma spectrometry and large volume scintillation backpack detection systems. The capability includes PPE, RPE and deployable decontamination units for emergency response workers and larger units for decontamination of the public, for which the teams are fully staffed and trained. This full capability is replicated around the country with a total of twelve field operations systems with nearly similar staffing and capability. In a major protracted event, field response teams and equipment could be deployed from other regions to support and allow shift change overs.

In addition, discussions with the security services identified specialist capabilities including qualified response personnel and radiation detection capability for security surveillance and for performing search activities in the event of a lost or stolen dangerous source.

| **Good practice 4** |
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| **Observation:** There is high level of capability to provide expert advice, services and operations to support a nuclear or radiological emergency occurring anywhere in the country. Staffing and organization provide for 24/7 capability and allows rapid deployment anywhere in the country. |
| **Basis for the Observation:** GSR Part 7 paragraph 5.29 states: "arrangements shall be made to provide expertise and services in radiation protection promptly to local officials, first responders in an emergency at an unforeseen location…" |
| **Good Practice:** Maintaining a high level of capability in terms of well trained and equipped personnel for field radiological emergency operations throughout the country enables a rapid and effective response. |

The draft *Decree on Establishing the Content of the Internal Emergency Plan* specifies that the internal emergency plan must describe the emergency response organization that will enable it to implement appropriate arrangements throughout the emergency. However, The Review Team noted that a documented process for determining this organization does not exist.

| **Suggestion 7** |
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| **Observation:** There is no documented process for determining the staffing levels of the emergency response organization that will enable response organizations to implement appropriate arrangements throughout the emergency. |
| **Basis for the Suggestion:** 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 for the long term to staff the various positions necessary to take mitigatory actions, protective actions and other response actions." |
| **Suggestion:** The Government should consider documenting the process for determining appropriate staffing levels necessary to take mitigatory actions, protective actions and other response actions. |

### 4.3. Coordination of emergency preparedness and response

Overall coordination of emergency preparedness arrangements and response activities is provided by MI in the framework of the draft NREP. This coordination involves a number of different ministries and governmental bodies and agencies, local authorities (at both province and prefecture level) and the operator of the facility or activity involved in the emergency. MI efforts to ensure coordination across all organizations and levels are outstanding.

The draft NREP refers to coordination of emergency plans of the authorities (the draft NREP and local plans) with internal emergency plans (drafted and implemented by the operators). The Review Team noted that the operators' involvement in the development of the draft NREP appeared limited. Also, the operator's knowledge of the content of the draft NREP appeared limited.

Regarding transnational emergencies, MAECAMRE is responsible for coordination with affected countries and for providing recommendations for protection of Moroccan national and Diplomatic Representations in the affected country. MAECAMRE participates in the Inter-ministerial Committee on Emergency Management according the draft NREP. They have internal arrangements to liaise with the affected country and provide for the coordination with this country regarding measures to protect Moroccan citizens present in that country. This aspect is exercised periodically in different international exercises, particularly ConvEx-3.

Currently, Morocco doesn't have any areas in EPC V.

| **Suggestion 8** |
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| **Observation:** Even though cooperation with operators is referred to in the draft NREP, their engagement with and knowledge of the draft NREP appears limited. |
| **Basis for the Suggestion:** GSR Part 7 paragraph 6.12 states that: "Arrangements shall be developed, as appropriate, for the coordination of emergency preparedness and response and of protocols for operational interfaces between operating organizations and authorities at the local, regional and national levels, including those organizations and authorities responsible for the response to conventional emergencies and to nuclear security events (see paras 4.3, 4.10, 6.3 and Requirement 6). The arrangements shall be clearly documented and the documentation shall be made available to all relevant parties. Arrangements shall be put in place to ensure effective working relationships among these organizations, both at the preparedness stage and in an emergency". |

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| **Suggestion:** The Government should consider taking action to improve engagement of operators in the development, implementation and maintenance of the NREP. |

### 4.4. Plans and procedures for emergency response

To upgrade the regulatory framework including regulatory requirements on EPR, a National Committee on Upgrading the Regulatory Framework (CCR) was established in 2017. This committee includes 34 members of the national EPR stakeholders. In an effort to advance the work led by CCR, an ad-hoc committee was established for drafting the NREP and relevant emergency procedures in the year 2018. The NREP is part of the national emergency plans in an all-hazards approach and will be coordinated by the Inter-Ministerial emergency management committee under MI. The draft NREP includes clear responsibilities of response organizations and the operator. AMSSNuR has drafted an emergency plan to support their role in the draft NREP. However, other response organizations have not yet established their own plans and procedures to support their roles in the draft NREP.

Operators and licensees are obliged to prepare an emergency plan during licence application. AMSSNuR approves this plan before granting an authorization. A decree has been drafted on the contents of the internal emergency plans and the required coordination with local authorities at the provincial level.

| **Recommendation 15** |
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| **Observation:** Government organizations have participated in the preparation of the draft NREP, however, organization-specific plans and procedures in support of their roles and responsibilities as described in the draft NREP have not yet been developed for all organizations. |
| **Basis for the Recommendation:** GSR Part 7 paragraph 6.17 states: "Each response organization shall prepare an 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. An emergency plan shall be developed at the national level 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 operations in an emergency response are to be discharged on the site, off the site and across national borders, as appropriate. The emergency plans shall be coordinated with other plans and procedures that may be implemented in a nuclear or radiological emergency, to ensure that the simultaneous implementation of the plans would not reduce their effectiveness or cause conflicts …" |
| **Recommendation**: The government should ensure that each response organization has established its own emergency plan and procedures required for effective response to a nuclear or radiological emergency. |

### 4.5. Logistical support and facilities

The draft NREP provides for the establishment of an inventory of all human resources, materials and equipment available to the various departments involved in response operations at the provincial or regional level. The draft *Decree on the Content of the Internal Emergency Plan* requires the operator to define in its internal emergency plan all the equipment necessary for emergency response. The plans also contain contact and notification points. In general, it was observed that response organizations and operators have the procedures, checklists, contact lists and 'reflex sheets' related to their functions. Equipment inventories are based on the hazard

assessment, and are routinely verified. Calibration and quality control of radiation detection instruments are assigned to and undertaken by CNRP and CNESTEN according to a defined quality assurance process.

It was noted that the MI maintains an inventory of all equipment, resources and experts involved in emergency response, and that this information is made available to the Governors. The DGPC also maintains a national inventory of all necessary equipment for emergency response. This is contained in both paper format and an electronic national database available in all regions listing the type, quantity and location of equipment. Emergency response facilities are designated to support emergency response operations in all postulated hazardous conditions. There is evidence of backup and business continuity arrangements.

Law No. 142-12 specifies that only organizations approved by the AMSSNuR can provide services related to, amongst other functions, dosimetry monitoring of workers, radioactivity measurements specified by AMSSNuR, calibration of instruments used for the detection of ionizing radiation, and quality control of instruments for medical applications. This supporting role has been assigned to CNRP and CNESTEN. Both CNESTEN and CNRP indicated that they are in the process of obtaining ISO17025 accreditation for dosimetry and calibration services.

The Review Team observed that CNESTEN has a permanent on-site presence of the DGPC and Royal Gendarmerie to provide support in an emergency. As per constitutional powers, the Governor has authority to call on any necessary support and resources to assist in an emergency response, including from the private sector.

The Review Team viewed a practical demonstration of the DGPC field operations capability as described in Section 4.2. The maintenance and availability of this capability is facilitated through an established quality management program.

It was also noted that some international arrangements are in place to support the establishment and maintenance of equipment in some facilities (e.g., an agreement between CNESTEN and U.S. Department of Energy on risk assessment / monitoring and assessment capabilities).

### 4.6. Training, drills and exercises

The draft *Decree on PCI-SUNR*, Articles 50 and 51 state the requirements for the responsibilities for training and their exercise programs. Article 50 identifies that the operator and response organizations are responsible for emergency response training through initial and continuous training that includes training specific to their organization. Article 51 states that exercise programs are periodically conducted, and evaluated, to ensure that the knowledge and skills of the response organizations and individuals are maintained.

The draft *Decree on Establishing the Content of the Internal Emergency Plan* states that the internal emergency plan is to include a training and exercise program that is aligned with the knowledge and skills of the response organization's personnel utilizing a systematic approach to training.

The draft NREP, Section 4.11, Training and Exercises, describes five levels of training and three types of exercises. The five levels of training include: Basic Training Program; Advanced Training Program I; Advanced Training Program II; Special Training Program; and Continuing

Training Program. The three types of exercises are: Tabletop Exercise; Partial or Full Emergency Exercise; and Field Exercise.

The draft NREP further describes the expected content and duration for each of the training levels and that exercises are performed at specified intervals with pre-defined objectives. AMSSNuR has developed numerous procedures on how to develop each of the five levels of training. These procedures provide detailed discussions on the expected course objectives, content and duration.

The DGPC is to be commended for instituting an impressive Centre of Excellence for training of emergency response personnel that implements a comprehensive and well-organized program. This program ensures that all Civil Protection response personnel, and those that attend the training, receive high quality training that is re-enforced on a regular basis, which supports the good practice in Section 4.2.

The "Strategy for the Design and Conduct of Nuclear or Radiological Emergency Response Exercises" provides a clear process and description on how to develop a multi-year exercise program on the three types of exercises. This includes how to develop, conduct, and evaluate the exercises. A key to effective emergency response is maintenance of key knowledges and abilities. Those personnel that perform a critical response function or decision-making need to exercise on a regular basis. Nevertheless, the exercise program does not identify that individual emergency response personnel, in particular, those that perform critical functions or decisions, need to exercise on a prescribed frequency. Additionally, it has been identified that the communications personnel and organizations do not regularly participate in exercises.

| **Recommendation 16** |
| --- |
| **Observation:** Emergency response personnel that perform critical response functions or decisions are not required to exercise regularly. |
| **Basis for the 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".<br><br>GSR Part 7 paragraph 6.32 states: "Officials off the site who are responsible for making decisions on protective actions and other response actions shall be trained and shall regularly participate in exercises. Officials off the site who are responsible for communication with the public in a nuclear or radiological emergency shall regularly participate in exercises". |
| **Recommendation**: The Government should include in the exercise requirements that individuals who perform critical functions and decisions exercise on regular intervals. This includes those personnel that have public communication functions. |

### 4.7. Quality management

Quality management for the draft NREP plan is currently under the auspices of the ad-hoc committee for drafting the NREP, established by MI in coordination with AMSSNuR. It was explained that once the plan is approved and implemented this role will be the responsibility of an inter-ministerial committee convened by MI.

The Review Team noted that quality systems are established in key stakeholder organizations. DGPC and DGSN radiation instruments, PPE, RPE and other specialist radiation emergency equipment are registered in a national inventory database of MI.

It was also observed that CNESTEN has implemented a quality management system for the control of their radiation protection equipment in accordance with ISO 17020. The equipment is inspected, tested, maintained and calibrated in accordance with maintenance and inspection schedules.

The CNRP and CNESTEN are in the process of gaining ISO 17025 accreditation for dosimetry and calibration services. Intercomparisons are also conducted with international partners.

Training records for some key stakeholders were observed.

Morocco has a comprehensive involvement in activities at international level. They have hosted multiple activities including peer reviews and exercises involving international partners.

| **Good practice 5** |
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| **Observation:** Morocco has a comprehensive involvement in activities at the international level. They have hosted multiple activities including peer reviews, national and international exercises and training, and conducted intercomparisons with international partners. |
| **Basis for the Good Practice:** GSR Part 7 paragraph 6.35 states: "The programme shall also include periodic and independent appraisals against functions as specified in Section 5, including participation in international appraisals." |
| **Good Practice:** Actively hosting and participating in exercises, training, outreach and capacity building, intercomparison studies, and peer reviews strengthens national and international emergency preparedness and response capabilities. |

## 5. POLICY ISSUE: IMPLICATIONS OF THE PANDEMIC AND ASSOCIATED CHALLENGES ON ALL LEVELS OF EMERGENCY PREPAREDNESS AND RESPONSE

A policy discussion was held between the international experts in the Review Team and the representatives of competent authorities on the measures taken to maintain the delivery of EPR functions and conduct of EPR activities during the COVID-19 pandemic to contribute to the exchange of experiences and lessons learned. The discussions focussed on prioritizing resources and fulfilling safety requirements during a pandemic.

The participants shared their experiences by providing the following information:

- Some international experts and the representatives of AMSSNuR highlighted that the regulatory inspection activities relevant to EPR were affected because of the restrictions implemented during the pandemic. They also stated that the inspections were carried out virtually.
- An international expert stated that they revised the existing guidelines to cover non-radiological hazards that could be present during the implementation of the protective actions and other response actions.
- The conduct of training and exercises was another challenge for some of the international experts and the representatives of the competent authorities.
  - Morocco developed a new system for training and tabletop exercises. They attended two ConvEx exercises and conducted one tabletop exercise and one field exercise for which all arrangements were discussed virtually.
  - Morocco had to cancel some of the activities that would be implemented at the Capacity Building Centre, in collaboration with the IAEA. However, they made use of a hybrid training method to conduct two regional workshops.
- AMSSNuR started using a web platform, Front Office, used for the reduction of physical contact during regulatory activities such as authorization, and inspection, and also for communication with customs. This platform was demonstrated during the meeting.

## APPENDIX I: EPREV TEAM COMPOSITION

| No. | Name and LAST NAME | Position | Organization |
|---|---|---|---|
| **1.** | Mr. Brian AHIER | Team Leader | Canada |
| **2.** | Mr. Cris ARDOUIN | Deputy Team Leader | New Zealand |
| **3.** | Mr. Gurdal GOKERI | Team Coordinator | IAEA |
| **4.** | Mr. Ramon DE LA VEGA | Reviewer | Spain |
| **5.** | Mr. Robert KAHLER | Reviewer | USA |
| **6.** | Mr. Mohammad HAMADALNEEL | Reviewer | Sudan |

## APPENDIX II: MISSION SCHEDULE

## IAEA EPREV MISSION TO THE KINGDOM OF MOROCCO
## PROGRAMME

| **Agenda**<br><br>**EPREV Mission to Morocco**<br><br>**Version 20221004** | | | | **Morocco only activity**<br>**IAEA only activity**<br>**IAEA and Morocco activity** |
|---|---|---|---|---|
| **Day** | **Time** | **Activity** | **Location** | **Participants** |
| Sunday<br><br>23 October<br><br>(Day 0) | 10:00 - 10:15 | • Welcome & Opening Remarks and Introductions (Team Leader) | • NJ Hotel Rabat Meeting Room | • IAEA team |
| | 10:15 – 10:30 | • EPREV Overview and Discussion (Team Coordinator) | | |
| | 10:30 – 11:00 | • Coffee Break | | |
| | 11:00 – 12:45 | • Review of ARM and First Impression Reports (aim is to review preliminary observations and assign priorities) (Team Leader) | | |
| | 12:50 – 13:00 | • Review of mission schedule and logistics (Team Leader)<br>• Review of writing assignments (Deputy Team Leader) | | |
| | 13:00 – 14:00 | Lunch | | |
| | 14:00 – 14:15 | • Host Welcome Remarks (Morocco Coordinator) | • NJ Hotel Rabat Meeting Room | • IAEA team<br>• Morocco Coordinator |
| | 14:15 – 15:15 | • Host Country Update and Overview (Morocco Coordinator) | | |
| | 15:15: – 15:45 | • Coffee Break | | |
| | 15:45 – 16:00 | • EPREV Logistics (Morocco Coordinator) | | |
| | 16:00 – 16:30 | • Q/A & Discussion (All) | | |
| | 16:30 – 16:45 | • Final review of daily process, initial writing steps, and how | | |

# Agenda

# EPREV Mission to Morocco

**Version 20221004**

**Morocco only activity**

**IAEA only activity**

**IAEA and Morocco activity**

| Day | Time | Activity | Location | Participants |
|---|---|---|---|---|
| | | the report will come together (Team Coordinator) | | |
| | 16:45 – 16:55 | • Final tips on interactions with counterparts and any sensitivities (Team Leader / Team Coordinator) | | |
| | 16:55 – 17:00 | • Closing (Morocco Coordinator) | | |
| Monday<br>24 October<br>(Day 1) | 8:30 – 8:50 | Transport from NJ HOTEL to IBIS HOTEL | | |
| | **09:00 - 12:00** | **Entrance meeting:** | • IBIS Hotel Rabat Meeting Room | • IAEA team<br>• Morocco representatives (senior management and focal points) |
| | 09:00 - 09:20 | • Opening remarks and introductions (AMSSNuR DG) | | |
| | 09:20 - 09:30 | • Opening remarks (Team Leader) | | |
| | 09:30 - 10:30 | • Presentation on EPREV objectives and process (IAEA Coordinator) | | |
| | 10:30 - 11:00 | • Coffee Break | | |
| | 11:00 - 11:30 | • Presentation on overall EPR national framework, Ministry of Interior | | |
| | 11:30 - 12:00 | • Morocco's national framework for EPR (Morocco Coordinator) | | |
| | 12:00 - 12:20 | • Final review of arrangements for the mission (Morocco Coordinator) | | |
| | 12:20- 12:30 | • Group photo with all participants | | |
| | 12:30 - 13:30 | Lunch | | |
| | 13:30 - 15:00 | • Meetings with National Counterparts: AMSSNuR[4] | • IBIS Hotel Rabat | • IAEA team |

[4] Interviews are expected to finish with clear statements from IAEA reviewer(s) about their perception about the status of the relevant recommendations/suggestions. This is for transparency purposes and due to time limitations.

# Agenda

# EPREV Mission to Morocco

**Version 20221004**

**Morocco only activity**

**IAEA only activity**

**IAEA and Morocco activity**

| Day | Time | Activity | Location | Participants |
|---|---|---|---|---|
| | 15:00 – 15:30 | • Coffee Break | Meeting Room | • AMSSNuR representatives |
| | 15:30 – 17:00 | • Meetings with National Counterparts: AMSSNuR | | |
| | 17:00 – 18:00 | • IAEA team meeting with Morocco Coordinator to discuss open items[5] | | • IAEA team<br>• Morocco Coordinator |
| | 18:00 – 18:20 | Transport from IBIS HOTEL to NJ HOTEL | | |
| | 18:20 onwards | • IAEA team meeting | • NJ Hotel Rabat Meeting Room | • IAEA team |
| Tuesday<br>25 October<br>(Day 2) | 8:30 – 8:50 | Transport from NJ HOTEL to Ministry of Interior (MI) | | |
| | 09:00 – 12:30 | • Meeting with Ministry of Interior (MI) (Interviews) | • MI (Rabat) | • IAEA team<br>• Morocco Coordinator MI representatives |
| | 12:30 – 13:30 | Lunch | | |
| | 13:30 – 13:50 | Transport to MTEDD and DGPC | | |
| | 14:00 – 17:00 | • Meeting with MTEDD | • MTEDD (Rabat) | • Team A<br>• MTEDD representatives |
| | | • Meeting with DGPC | • DGPC (Rabat) | • Team B<br>• DGPC representatives |
| | 17:00 – 17:20 | Transport from MTEDD and DGPC to NJ HOTEL | | |
| | 18:00 – 19:00 | • IAEA team meeting with Morocco Coordinator to discuss open items | • NJ Hotel Rabat Meeting Room | • IAEA team<br>• Morocco Coordinator |
| | 20:00 onwards | • IAEA team meeting | • NJ Hotel Rabat Meeting Room | • IAEA team |

[5] At the end of each day IAEA and Morocco coordinators will discuss details of next day activities, as needed.

# Agenda

# EPREV Mission to Morocco

**Version 20221004**

**Morocco only activity**

**IAEA only activity**

**IAEA and Morocco activity**

| Day | Time | Activity | Location | Participants |
|---|---|---|---|---|
| | 8:00 – 8:50 | Transport from NJ HOTEL to CNESTEN – Kénitra | | |
| Wednesday 26 October (Day 3) | 09:00 – 12:30 | • Meeting with CNESTEN | • CNESTEN (Kénitra) | • Team A<br>• CNESTEN representatives |
| | 12:30 – 13:30 | • Transport from CNESTEN – NJ Hotel | | |
| | 8:00 – 11:15 | Transport from NJ HOTEL to INRA - Tanger | | |
| | 11:30 – 14:30 | • Meeting with INRA | • INRA (Tanger) | • Team B<br>• INRA representatives |
| | 13:30 – 14:30 | Lunch | | • Team A |
| | 14:30 – 15:30 | | | • Team B |
| | 15:30 – 18:30 | Transport from INRA- Tanger to NJ HOTEL | | |
| | 14:30 – 14:45 | • Transport NJ hotel - AMSSNuR | | • Team A |
| | 15:00 – 16:00 | • Meeting with AMSSNuR. | • AMSSNuR Meeting Room | • Team A<br>• AMSSNuR Representatives |
| | 19:00 – 19:15 | Transport from to NJ HOTEL to AMSSNuR (Team B) | | |
| | 19:15 – 20:15 | • Meeting with AMSSNuR. | • AMSSNuR<br>• Meeting Room | • Team B<br>• AMSSNuR Representatives |
| | 16:00 – 16:20<br>20:15 – 20:30 | • Transport from AMSSNuR to the NJ Hotel | | • Team A<br>• Team B |
| | 20:00 – 21:00 | • IAEA team meeting with Morocco Coordinator to discuss open items | • NJ Hotel Rabat Meeting Room | • IAEA team<br>• Morocco Coordinator |
| | | | | |
| | 21:00 onwards | • IAEA team meeting | • NJ Hotel Rabat Meeting Room | • IAEA team |
| Thursday 27 October | 08:30 – 08:50 | Transport from NJ HOTEL to MSPS | | |
| | 09:00 – 12:30 | • MSPS | • MSPS (Rabat) | • IAEA team |

# Agenda

# EPREV Mission to Morocco

**Version 20221004**

**Morocco only activity**

**IAEA only activity**

**IAEA and Morocco activity**

| Day | Time | Activity | Location | Participants |
|---|---|---|---|---|
| (Day 4) | | | | • Morocco Coordinator<br>• MSPS representatives |
| | 12:30 – 13:00 | Transport from MSPS to IBIS HOTEL | | |
| | 13:00 – 14:00 | Lunch | | |
| | 14:00 – 17:00 | • Meeting with: AMSSNuR and all counterparts | • IBIS Hotel Rabat | • IAEA team<br>• Morocco Coordinator and Morocco representatives |
| | 17:00 – 17:20 | Transport from IBIS HOTEL to NJ HOTEL | | |
| | 17:00 onwards | • IAEA team report writing | • NJ Hotel Rabat Meeting Room | • IAEA team |
| Friday 28 October (Day 5) | 09:00 - 13:00 | • IAEA team report writing | • NJ Hotel Rabat Meeting Room | • IAEA team |
| | 13:00 – 14:00 | Lunch | | |
| | 14:00 onwards | • IAEA team report writing | NJ Hotel Rabat Meeting Room | • IAEA team |
| Saturday 29 October (Day 6) | 09:00 - 12:30 | • Meeting to discuss outstanding issues | • AMSSNuR Meeting Room | • IAEA team<br>• Morocco Coordinator |
| | 12:30 – 13:30 | Lunch | | |
| | 13:30 – 17:30 | • IAEA team finalize first draft of the report | • NJ Hotel Rabat Meeting Room | • IAEA team |
| | 17:30 | • EPREV Review Team Leader sends the first draft to Morocco coordinator | • NJ Hotel Rabat Meeting Room | • Team Leader |

# Agenda

# EPREV Mission to Morocco

**Version 20221004**

**Morocco only activity**

**IAEA only activity**

**IAEA and Morocco activity**

| Day | Time | Activity | Location | Participants |
|---|---|---|---|---|
| Sunday 30 October (Day 7) | 09:00 – 12:30 | • Moroccan coordinator and organizations review and comment on the Draft Report and sends it back to Morocco coordinator | • IBIS Hotel Rabat Meeting Room | • Morocco Coordinator and organizations |
| | 12:30 | • Morocco Coordinator sends the commented Draft Report to EPREV Review Team Leader | • IBIS Hotel Rabat<br>• Meeting Room | • Morocco Coordinator |
| | 12:30 – 13:30 | Lunch | | |
| | 13:30 onwards | Time Off for the team / Further comment time for Morocco organizations as needed[6] | | |
| Monday 31 October (Day 8) | 09:00 – 12:30 | • Team discusses comments, addresses them, and sends back to Morocco coordinator | NJ Hotel Rabat Meeting Room | • IAEA team |
| | 12:30 | • Morocco coordinator sends the Draft Report with consolidated comments to Moroccan organizations | | • Morocco Coordinator and organizations |
| | 12:30 – 13:30 | Lunch | | |
| | 13:30 – 17:30 | • Moroccan organizations review and approve the Draft Report with consolidated comments | • AMSSNuR Meeting Room | • Morocco Coordinator and organizations |
| | 17:30 | • Morocco Coordinator sends the Approved commented Draft Report to EPREV Review Team Leader | | • Morocco Coordinator |
| Tuesday 01 November | 8:30 – 8:50 | Transport from NJ HOTEL to AMSSNuR | | |
| | 09:00 - 12:30 | • Discuss and finalize the report | • AMSSNuR Meeting Room | • IAEA team |

[6] If further time is required to review and comment on the draft report, the Moroccan coordinator and organizations can use this afternoon for additional time. If this option is taken, the Moroccan Coordinator must notify the EPREV Review Team Leader **no later than 12:00PM on Sunday 30 October** and submit the comments **before 08:00AM on Monday 31 October**

# Agenda

# EPREV Mission to Morocco

**Version 20221004**

**Morocco only activity**

**IAEA only activity**

**IAEA and Morocco activity**

| Day | Time | Activity | Location | Participants |
|---|---|---|---|---|
| (Day 9) | | | | • Morocco Coordinator and representatives |
| | 12:30 – 13:30 | Lunch | | |
| | 13:30 – 18:00 | • Finalize executive summary and press release based on agreed-upon report | • AMSSNuR Meeting Room | • IAEA team<br>• Morocco Coordinator |
| | 18:00 | Transport from AMSSNuR to the restaurant | | |
| | 18:00 - 21:00 | Dinner | | |
| | 21:00 – 21:20 | Transport from the restaurant to NJ HOTEL | | |
| | 19:00 onwards | • Finalize Exit Meeting Presentation | • NJ Hotel Rabat Meeting Room | • IAEA team |

# Agenda

# EPREV Mission to Morocco

**Version 20221004**

**Morocco only activity**

**IAEA only activity**

**IAEA and Morocco activity**

| Day | Time | Activity | Location | Participants |
|---|---|---|---|---|
| Wednesday<br><br>02 November<br><br>(Day 10) | 8:30 – 8:50 | Transport from NJ HOTEL to AMSSNuR | | |
| | 09:00 – 12:30 | **Exit Meeting and Press Conference:** | • HOTEL FARAH, Rabat Meeting Room | • IAEA team<br>• Morocco representatives |
| | 09:00 – 09:20 | • Introduction (Morocco Coordinator) | | |
| | 09:20 – 10:15 | • Mission's main observations (presentation, Team Leader) | | |
| | 10:15-10:30 | • Next steps (IAEA Coordinator) | | |
| | 10:30 – 11:00 | Coffee break | | |
| | 11:00 – 11:30 | • Closing remarks (AMSSNuR DG) | | |
| | 11:30 – 12:00 | • Closing remarks (IAEA Incident and Emergency Centre Director) | | |
| | 12:00 | END OF MISSION | | |
| | 12:30 – 13:30 | Lunch | | |

## APPENDIX III: LIST OF ATTENDEES TO EPREV MISSION MEETINGS

| No. | Name | Position | Organization |
|---|---|---|---|
| **1.** | Bouchaib FIKRI | In charge of CBRN Risk Management & Emergencies Preparedness and Response | MI/Security and Documentation Department (DGAI) |
| **2.** | Adil FELLAH | Head of Service | MI/DGAI |
| **3.** | Hafid MESSAOUDI | Head of Prevention and Pacification Division | MI/DGPC |
| **4.** | Rokia GHCHIME | Doctor, senior commissioner police, head of CBRN management risk's service | MI/DGSN |
| **5.** | Mounji ZNIBER | Director | AMSSNuR |
| **6.** | Abdelkader BENIDER | Division Head of Radiation Safety Inspection & Responsible for Emergencies | AMSSNuR |
| **7.** | Mohamed ZOUITEN | Engineer / Nuclear and Radiological Emergency Service | AMSSNuR |
| **8.** | Wiam CHAFI | Engineer / Department of Radiation Safety and Protection of Environment | AMSSNuR |
| **9.** | Mohamed Khalil EL GARNI | Officer / Nuclear and Radiological Emergency Service | AMSSNuR |
| **10.** | Abderraouf BENABOU | Director of the Directorate of Electricity | MTEDD |
| **11.** | Karim EL-ASSEFRY | Head of Division of Nuclear Applications and Safety | MTEDD |
| **12.** | Lalla Meryem EL KIRAM | Head of Nuclear Safety Service | MTEDD |
| **13.** | Houria EL KHOLFI | Head of Nuclear Applications Service | MTEDD |
| **14.** | Hamid MARAH | Director | CNESTEN |
| **15.** | Hamid GHAZLANE | Director of Safety and Security Directorate | CNESTEN |
| **16.** | Meriam INJIRAHI | In charge of the Internal Emergency Plan | CNESTEN |
| **17.** | Rachid MELLOUKI | Head of Physical Protection Unit | CNESTEN |
| **18.** | Mouad MERABET | Coordinator of the National Center for Public Health Emergency Operations (CNOUSP) | Directorate of Epidemiology and Disease Control (DELM)/MSPS |

| No. | Name | Position | Organization |
|---|---|---|---|
| **19.** | Mohammed ISMAILI ALAOUI | Epidemiologist at the National Center for Public Health Emergency Operations (CNOUSP) | DELM/MSPS |
| **20.** | Mohamed TAZI | Director | CNRP/MSPS |
| **21.** | Ilham BACHISSE | Head of the Emergency and Rescue Division | Hospitals and Ambulatory Care Department (DHSA)/MSPS |
| **22.** | Noureddine Ratbi | Head of the Emergency Department | DHSA/MSPS |
| **23.** | Mustapha El HOUSNI | Head of the Hospital Action Planning Department | DHSA/MSPS |
| **24.** | Moncef ZIANI | Responsible for the Central Unit of Sanitary Border Control | DELM/MSPS |
| **25.** | Ghita CHERKAOUI | Cadre à l'UCCSF | DELM/MSPS |
| **26.** | Mohamed KHALLAF | Head of the Environmental Health Department (SSE) | DELM/MSPS |
| **27.** | Amal DAHRI | Officer / Environmental Health Department | DELM/MSPS |
| **28.** | Mohammed MOUHIB | Irradiation facility manager | INRA |
| **29.** | Mouad CHENTOUF | Head of Regional Research Center of Tangier | INRA |

## REFERENCES


[1] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL CIVIL AVIATION ORGANIZATION, INTERNATIONAL LABOUR ORGANIZATION, INTERNATIONAL MARITIME ORGANIZATION, INTERPOL, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, UNITED NATIONS OFFICE FOR THE CO¬ORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, WORLD METEOROLOGICAL ORGANIZATION, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015).

[2] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR OFFICE, PAN AMERICAN HEALTH ORGANIZATION, WORLD HEALTH ORGANIZATION, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG-2, IAEA, Vienna (2011).

[3] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR OFFICE, PAN AMERICAN HEALTH ORGANIZATION, UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, Arrangements for Preparedness for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GS-G-2.1, IAEA, Vienna (2007).

[4] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL CIVIL AVIATION ORGANIZATION, INTERNATIONAL LABOUR OFFICE, INTERNATIONAL MARITIME PORGANIZATION, INTERPOL, OECD NUCLEAR ENERGY AGENCY, UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, WORLD METEOROLOGICAL ORGANIZATION, Arrangements for the Termination of a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG-11, IAEA, Vienna (2018).

[5] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL CIVIL AVIATION ORGANIZATION, INTERPOL, PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION AND UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, Arrangements for Public Communication in Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG-14, IAEA, Vienna (2020)

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Preparedness and Response for a Nuclear or Radiological Emergency Involving the Transport of Radioactive Material, IAEA Safety Standards Series No. SSG-65, IAEA, Vienna (2022)

**ACRONYMS**
(Alphabetic order)

| | |
|---|---|
| AMSSNuR | Moroccan Agency for Nuclear and Radiological Safety and Security |
| CCR | National Committee on Upgrading the Regulatory Framework |
| CNESTEN | National Centre for Energy, Nuclear Sciences and Technology |
| CNRP | National Radiation Protection Centre |
| CVC | Monitoring and Coordination Centre |
| DELM | Directorate of Epidemiology and Disease Control |
| DGAI | Security and Documentation Department |
| DGPC | General Directorate of Civil Protection |
| DGSN | General Directorate of National Security |
| DHSA | Hospitals and Ambulatory Care Department |
| EPR | Emergency Preparedness and Response |
| EPREV | Emergency Preparedness Review |
| FAR | Royal Armed Forces |
| GIS | Geographic Information System |
| IAEA | International Atomic Energy Agency |
| INRA | National Institute for Agricultural Research |
| MAECAMRE | Ministry of Foreign Affairs, African Cooperation and Moroccan Expatriates |
| MI | Ministry of Interior |
| NREP | National Nuclear and Radiological Emergency Plan |
| MSPS | Ministry of Health and Social Protection |
| MTEDD | Ministry of Energy Transition and Sustainable Development |
| PCI-SUNR | Preparation and Conduct of Interventions in a Nuclear or Radiological Emergency |
| PPE | Personal Protective Equipment |
| RANET | Response and Assistance Network (IAEA) |
| RPE | Respiratory Protective Equipment |
| SIG | GIS-based software that provides relevant information (location, facility, activity, isotope and date, manufacturer, etc.) on radioactive sources. |
| SSDL | Secondary Standards Dosimetry Laboratory |