

## **Establishing a nuclear security inspection programme in Morocco**

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### **Abstract**

The Kingdom of Morocco has enacted, in 2014, a new legal framework addressing nuclear and radiological safety and security, and nuclear safeguards; and the creation of a unique and independent regulatory body reporting to the Prime Minister: the Moroccan Agency for Nuclear and Radiological Safety and security (AMSSNuR). A dedicated regulations (decree) on security of cat 1, 2&3 radioactive sources during use, storage and transport have been, since then, prepared and submitted to the Government approval and other regulations on physical protection of nuclear material and facilities have been also drafted and reviewed by IAEA experts and are being submitted to the Government for approval. A variety of guides dedicated to operators, to help them implementing provisions of the legal and regulatory framework, have been or are being drafted. In order to strengthen nuclear security at the national level, there are two main components: the licensing process and the regulatory inspection and enforcement process.

As most countries establishing or considering establishing a regulatory inspection programme for nuclear security for the first time, there is a need to learn from other states or International organizations that have years of experience in the field. This could be done through workshops and/or experts' missions. However, to train inspectors, the best way would be their participation through internships or technical visits in field inspections in these countries as observers. For obvious reasons, in most cases it is not doable.

The paper presents and analyses the actions undertaken and the challenges faced by the regulatory body AMSSNuR in establishing a regulatory inspection programme taking into account the preparation of inspection and enforcement procedures as part of AMSSNuR's Integrated Managements System, guidance for inspectors and checklists as well as ensuring training and qualification of future nuclear security inspectors. This programme considers, in addition, the interface between safety and safeguards

### **1. INTRODUCTION**

The Kingdom of Morocco established its first legislative framework in 1971 by promulgating Law 005-71. This law laid the groundwork for a system of regulatory control of activities involving sources of ionizing radiation. The effective implementation of this system began in 1979-1980 with the creation of two regulatory authorities in two ministerial departments, dealing Health and Energy.

Law 005-71 established the principle of authorization and inspection of activities involving sources of ionizing radiation. It has also provided for sanctions in the case of infringements of the provisions of the said law and the regulations adopted for its application. These regulations have been enacted in order to protect workers, the public and the environment against the effects of ionizing radiation. Considering that at that time, the use of radioactive material for malicious purposes was not really a credible threat and that the Kingdom of Morocco had not yet established a safeguards agreement with the IAEA as stipulated in the Non-Proliferation Treaty. The law as well as the regulations adopted for its application dealt only with aspects of nuclear and radiological safety as well as radiation protection.

After the events of September 11 and the terrorist attacks in Casablanca in 2003, it became clear that a new dimension needed to be seriously considered: nuclear security because safety measures that provided a certain level of security were no longer sufficient, especially for nuclear and other radioactive material and associated facilities considered to be hazardous.

## 2. ADOPTION OF A NEW LEGISLATIVE FRAMEWORK

In the early 2000s, a reflection was conducted at the national level encouraged by international bodies including the IAEA, for the establishment of a new legislative and regulatory framework adequate with the international legal commitments of the Kingdom of Morocco and based on the international standards and recommendations.

This reflection led to the promulgation in 2014 of a new law (n ° 142-12) framing activities involving sources of ionizing radiation. In addition to the provisions on nuclear and radiological safety which have been strengthened and updated in accordance with international standards and recommendation , the establishment of provisions on nuclear security and the implementation of the agreement between the Kingdom of Morocco and the IAEA for the implementation of the Treaty on the Non-Proliferation of Nuclear Weapons and the creation of the Moroccan Agency for Nuclear and Radiological Safety and Security (AMSSNuR) as a sole and independent regulatory authority, constitute real changes from the old legislative framework.

## 3. ESTABLISHMENT OF THE REGULATORY AUTHORITY

On October 26, 2016, assignments from the former regulatory authorities were transferred to AMSSNuR. The first challenge faced by this newly created authority was the continuity of the service provided to the various operators of activities involving sources of ionizing radiation. To this end and for a short period of time, the contribution of the former authorities was assured, while constituting a core composed by qualified personnel and new freshly graduated staff.

### 3.1. Strategic Objectives 2021<sup>1</sup>

In its 2021 vision, AMSSNuR aims to become an independent, effective, credible and transparent regulatory body. To this end, it has established the following strategic objectives:

- Upgrade the existing regulatory framework in accordance with the provisions of Law 142-12, international treaties and conventions, standards and guidance on nuclear safety, security and safeguards;
- Strengthen the level of nuclear and radiological safety and security of all activities and installations involving ionizing radiation sources;
- Develop, in coordination and in collaboration with the relevant national departments and agencies, the establishment of the national nuclear security system and the national response plan in the event of a radiological emergency;
- Establish a transparent and reliable communication policy;
- Develop and maintain the human and organizational capacities necessary for the implementation of its strategic objectives ;
- Ensure, on the regional and international level, developments and cooperation in the fields of nuclear and radiological safety and security.

To achieve these strategic objectives, AMSSNuR has drawn up multi-year action plans focusing, inter alia, on two important components: the upgrading of the regulatory framework pursuant to Law 142-12 and the development of human skills. While the aspects of radiation safety were mastered by the existence of regulations and qualified human resources, much if not all, remained to be done in the fields of nuclear security and safeguards. This paper will only deal with the nuclear security aspect.

### 3.2. Organization of AMSSNuR<sup>2</sup>

The development of the organizational chart was part of the process of establishing the strategic vision of AMSSNuR and its 2017 action plan, adopted by its Board of Directors at its first session in September 2016.

The adopted organizational logic considers that the organization constitutes the support that should allow for :

- Carrying out the mission and the vision of AMSSNuR;
- Declining the strategic objectives at the level of the different structures of the organization;
- Clarifying the roles and responsibilities of the actors in the organization; and
- Implementing the action plans.

The coherence between the structures, is ensured by a process approach: Management Processes, Core Processes and Support Processes.

### 3.2.1. Organizational Flowchart

The Management Processes are led by the Director General, assisted by a Secretary General. Specific entities are directly attached to this level;

Core Processes are supported by three Departments, covering three intervention areas:

- Department of Radiation Safety and Protection of the Environment;
- Department of Nuclear Security and Safeguards;
- Department of Nuclear Safety and Radioactive Waste.

Support Processes, including management of human, financial and general resources, are provided by:

- Department of Administration and Finance.

### 3.2.2. Department mission profiles

In terms of generic mission, Core Departments must discharge, in addition to the managerial support (as a member of the General Direction Committee), the following responsibilities:

- The implementation, as part of the AMSSNuR strategic orientations, of the action plan to upgrade the regulatory framework, in terms of nuclear and radiological safety and security, and safeguards in their respective fields of activity;
  - Promoting nuclear safety and security cultures within and outside AMSSNuR;
  - The integrated and optimal coordination of the structures attached to them (Divisions and Services), material resources, staff and budgets allocated to their specific plans.

Divisions, declined from these departments, have a programmatic, organizational and supervisory role for the structure of Sections attached to them.

Sections and operating units, within the Divisions, are expected to carry out, in full compliance with and by adopting the integrated management system, the main activities related to the regulatory control functions: review and assessment, authorization, inspection and enforcement.

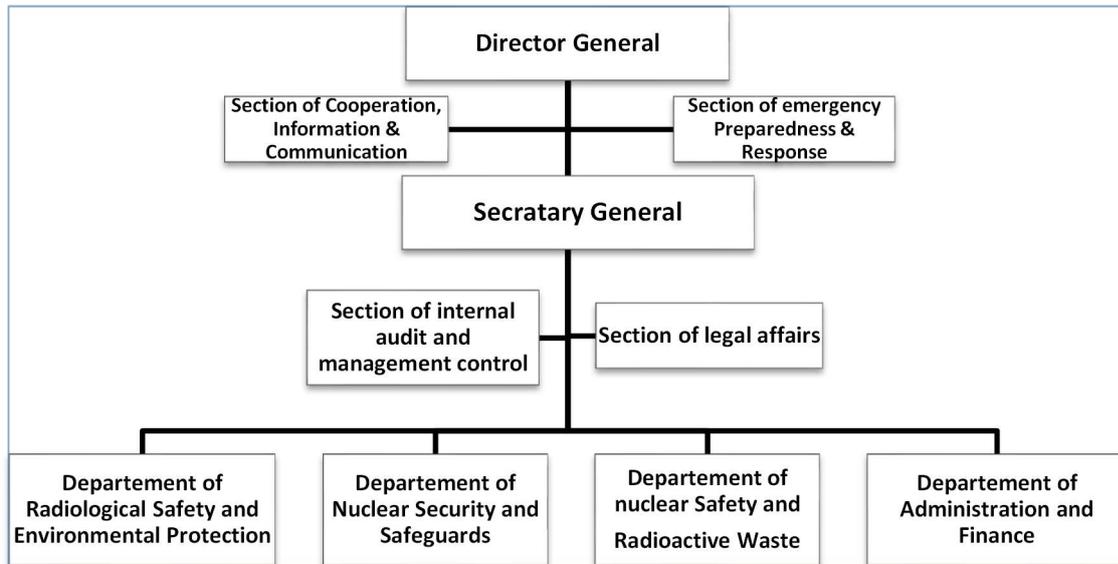
Support functions, directly attached to the Director General assisted by the Secretary General, are:

- The Section in charge of cooperation, information and communication;
- The Section in charge of Emergency Preparedness and Response;
- The Section in charge of legal affairs;
- The Section in charge of internal audit and management control.

In conclusion, the flowing chart integrates the following entities:

- A Direction with a Director General and a Secretary General;
- Three Core Departments;
- A Support Department;
- 10 Divisions;
- 25 Sections.

In summary the organizational flowchart of AMSSNuR is presented as follows:



**Fig 1: Flowchart of AMSSNuR**

#### 4. Upgrading the regulatory framework

In 2017, AMSSNuR created a National Regulatory Framework Committee (CCR) to implement the first Strategic Objective 2021, to the upgrade of the current regulatory framework.

The CCR first identified 17 regulatory texts to develop / upgrade, regulations (Decrees or regulatory texts) for the application of Law 142-12. These regulations address the main regulatory functions of AMSSNuR, including authorization, agreement for service providers, inspection, radiological and nuclear safety and security, response to nuclear and radiological emergencies and nuclear material accounting and control. Thus, and thanks to the efforts made within the CCR comprising 34 members representing all the departments and institutions concerned, AMSSNuR submitted to the Head of Government at the end of June 2019 nine draft regulations as follows :

##### 4.1. Seven draft decrees in 2018

- The authorization and declaration regime of facilities and activities involving sources of ionizing radiation;
- Protection of the public, workers and the environment against the potential harmful effects of ionizing radiation;
- The use of ionizing radiation for medical, forensic, dental and veterinary purposes;
- The security of radioactive sources in use, transport and storage;
- The implementation of nuclear safeguards;
- The safety of radioactive waste management, disused radioactive sources and spent fuel;
- Emergency preparedness and response.

These regulations are currently being reviewed by the General Secretariat of the Government.

##### 4.2. Two draft regulations prepared and forwarded to the Head of Government in 2019

- Draft decree laying down the conditions and procedures for granting authorization to bodies providing technical services in the field of radiation protection;
- Draft decree on the safety and authorization of Category I facilities and activities.

##### 4.3. Five draft regulations under development

- Import and export of nuclear material;
- Physical protection of nuclear material and associated facilities;
- Training on radiation protection;

- Training, the qualifications required for and the missions of the medical radiophysicist as well as the conditions of his intervention;
- Exemption and clearance levels.

**4.4. Three draft regulations scheduled for 2020**

- The technical arrangements of the inspections carried out by AMSSNuR;
- Safe transport of nuclear and other radioactive material;
- The licensing process for the extraction and processing of radioactive ores.

All the aforementioned draft regulations will be supplemented by orders, requirements or technical regulations, some of which are being developed.

**5. INTEGRATED MANAGEMENT SYSTEM (IMS) OF AMSSNR**

As part of its long-term capacity development for safety, security and safeguards, AMSSNuR, in accordance with the provisions of the national regulatory framework and IAEA recommendations, initiated in 2018 the development of an integrated management system whose processes are identified and which will be evaluated on a regular basis for continuous improvement. It is planned implementation of such IMS will start in 2020.

In accordance with IAEA guidance and international best practices, the objectives of this management system are to:

- Ensure that the responsibilities entrusted to AMSSNuR are effectively exercised;
- Maintain and improve the performance of AMSSNuR through the planning, control and supervision of its safety, security and safeguards activities;
- Foster and promote a culture of nuclear and radiological safety and security within AMSSNuR through the acquisition and strengthening of skills.

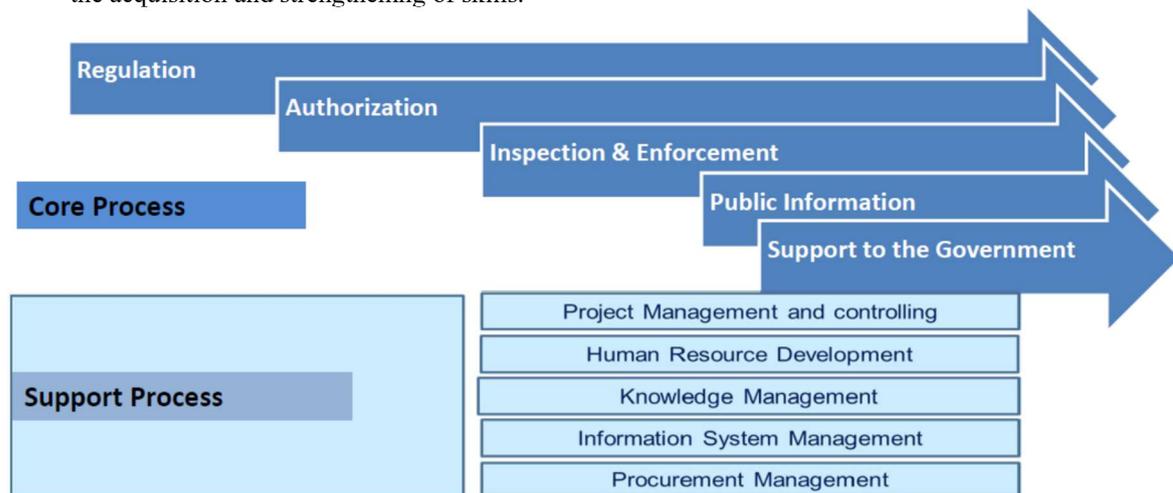


Fig 2: Diagram of IMS

Regarding the "Inspection and Enforcement" Process, a macro procedure has been established and will be evaluated before its approval by the AMSSNuR Management, by experts under the cooperation between AMSSNuR and the European Commission.

Plans for evaluating the aspects of safety, security and control of nuclear material accountancy under the safeguards framework are under development process knowing that interim evaluation plans have been developed for the conduct of inspections during the transition period.

Thus, for security inspections, Table 1 below provides a summary of the evaluation plans and associated documents and the status of their development to date.:

Table 1: Evaluation plans and associated documents

Title of the procedure	Progress stage			Date of writing
	Yes	No	In progress	
Nuclear Research Reactor Site Checklist		Red		
Checklist of Facilities and Activities Involving Class 1 Sealed Radioactive Sources	Green			15/02/2019
Checklist of Facilities and Activities Involving Class 2 Sealed Radioactive Sources-Fixed Devices	Green			15/02/2019
Checklist of Facilities and Activities Involving Class 2 Sealed Radioactive Sources-Mobile Devices	Green			15/02/2019
Vehicle Checklist for Enhanced Security Level	Green			15/02/2019
Vehicle Checklist for Basic Security Level	Green			11/06/2019
Checklist of Facilities and Activities Involving Class 3 Sealed Radioactive Sources-Fixed Devices	Green			21/05/2019
Checklist of Facilities and Activities Involving Class 3 Sealed Radioactive Sources-Mobile Devices		Red		
SSP Evaluation Plan	Green			03/05/2019
Performance Testing Guide			Yellow	
Radiological Security Inspection Guide			Yellow	
Table of violation of regulatory requirements		Red		
Inspection Report Template			Yellow	
Corrective Action Plan Template		Red		
Evaluation plan of the corrective action plan		Red		
Inspection Reports Approval Form		Red		
Notice of Violation Template		Red		
Enforcement Manual		Red		

## 6. SKILLS DEVELOPPEMENT

The Kingdom of Morocco uses a few hundred radioactive sources including a few dozen of categories 1, 2 & 3. It also operates a nuclear research reactor and has a national interim storage facility. This relatively limited number of materials does not fully justify the setting up of an academic training in the field of nuclear security. However, some university education programmes, particularly in safety and radiation protection, offer modules on nuclear security. The newly recruited staff of AMSSNuR therefore had little or no nuclear security expertise. For AMSSNuR, it was a real challenge.

To overcome this problem and using a systematic approach to training and identification of training needs, AMSSNuR has set up an internal committee, made up of representatives of the core departments assisted by the human resources division. This committee has prepared a model adapted to the needs of AMSSNuR, drawing on the IAEA's 'Systematic Assessment of the Regulatory Competence Needs (SARCoN)<sup>3</sup> tool.

The committee started by defining the job description sheets. As a first step, it was decided to identify a generic job, called "inspector job", which covers the regulatory core activities of AMSSNuR (Regulations, Authorization, Inspection and Enforcement). Each core department has developed its own sheet relating to the specific activities of the department, knowing that part of the sheet is common.

Thus, the specific skills for each "inspector job" were developed based on the KSAs (Knowledge, Skills and , Attitude) of the SARCoN tool. However, knowing that the tool used only deals with safety aspects, AMSSNuR has developed itself the skills required for nuclear security taking into account the different components of a nuclear security system to be evaluated during the inspection of facilities containing radioactive material Category 1, 2 & 3 and nuclear research reactor.

So far, a tool for self-assessment of acquired skills is being developed to measure the impact of the established training program that nuclear security department staff have benefited from. This will make it possible to assess the gaps and thus establish action plans to fulfill them.

## 7. INSPECTION PROGRAM

In 2017 AMSSNuR initiated its inspection program by establishing a multi-year program taking into account facilities and activities involving ionizing radiation, the recommended frequency according to international standards as well as the human and financial resources of AMSSNuR. Although the actual inspections focused mainly on safety and radiation protection aspects, given the absence of approved specific nuclear security and safeguards regulations, AMSSNuR took a step-by-step approach focusing initially on awareness of operators and their staff on the importance of implementing physical protection measures and on the consideration of the insider threat. In 2019, inspectors in nuclear security have begun to assess the management of security and security measures implemented by the operators and issue some recommendations to enhance security. These recommendations are based on the requirements set out in the draft regulations currently under revision by the Government. AMSSNuR has also established a best practices guidance on security plan in drafting form and had presented this document to users in the framework of a site security drafting workshop.

In addition, AMSSNuR has made the choice since its inception, to take into consideration the safety-security interface in all stages of its regulatory functions. In particular, inspection activities are generally conducted by teams of joint inspectors (safety and security) except for complex installations. Thus, safety measures are understood and taken into consideration when assessing security aspects and vice versa. Some courses are also open to staff from other the two safety and security departments for better understanding and security culture implementation.

## 8. CONCLUSION

In its 2021 vision, AMSSNuR aims to become an independent, effective, credible and transparent regulatory body. After three years of existence, AMSSNuR has made good progress and reached some of its goals in putting in place the necessary tools and procedures to achieve this. The approach described in this paper was undertaken for all of its regulatory functions with particular emphasis on inspection.

The establishment of a new regulatory authority requires a clear vision, strategies and action plans with a lot of effort from the top management and the staff of AMSSNuR at all levels. It also requires the involvement and support from the Board of Directors and contributions from different stakeholders. Finally, the contribution of regional and international bodies such as the IAEA, the European Commission and assistance programs from certain countries with whom AMSSNuR signed MoUs is not left out. However, optimizing resources remains a key element to succeed while avoiding unnecessary duplication of effort.

To this end, it is suggested that the IAEA, with the support of donor countries and regional and international organizations, consider the possibility of setting up medium-term training for the qualification of nuclear security inspectors. a theoretical and practical training could lead to certification following knowledge evaluation tests. It could be conducted in one of the Nuclear security Training Centers set up by some countries for the conduct of inspection simulations on practical cases or by 3D simulation, especially when it comes to performance testing.

## REFERENCES

- (1) MOROCCAN AGENCY FOR NUCLEAR AND RADIOLOGICAL SAFETY AND SECURITY (AMSSNuR), web site: [https://amssnur.org.ma/?page\\_id=101](https://amssnur.org.ma/?page_id=101)
- (2) AMSSNuR Organization chart
- (3) IAEA TECDOC SERIES: "Methodology for the Systematic Assessment of the Regulatory Competence Needs (SARCoN) for Regulatory Bodies of Radiation Facilities and Activities