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INTEGRATED REGULATORY REVIEW SERVICE (IRRS)

MISSION

TO

the Kingdom of Morocco

Rabat, Morocco

27 November – 6 December 2023

DEPARTMENT OF NUCLEAR SAFETY AND SECURITY

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REPORT OF THE
INTEGRATED REGULATORY REVIEW SERVICE (IRRS) MISSION
TO
THE KINGDOM OF MOROCCO

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Mission dates:	*27 November – 6 December 2023*
Regulatory body visited:	*Agence Marocaine de Sûreté et de Sécurité Nucléaires et Radiologiques (AMSSNuR)*
Location:	*Rabat*
Regulated facilities, activities, and exposure situations in the mission scope:	*Research reactor, radiation sources facilities and activities, waste management facilities, decommissioning activities, transport, emergency preparedness and response, medical exposure, occupational exposure, public exposure, interface with nuclear security*
Organized by:	*IAEA*

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The number of recommendations, suggestions and good practices is in no way a measure of the status of the national infrastructure for nuclear and radiation safety. Comparisons of such numbers between IRRS reports from different countries should not be attempted.

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EXECUTIVE SUMMARY

At the request of the Government of the Kingdom of Morocco (hereinafter Morocco), an international team of senior safety experts met representatives of the "Agence Marocaine de Sûreté et de Sécurité Nucléaires et Radiologiques" (AMSSNuR), the Regulatory Body for nuclear and radiation safety and security of Morocco, from 27 November to 6 December 2023 to conduct an Integrated Regulatory Review Service (IRRS) mission. The IRRS team met with representatives of the Ministry of Energy Transition and Sustainable Development, Ministry of Health, and Social Protection, and of the General Secretariat of the Government to discuss the current situation of the legal and regulatory framework for nuclear and radiation safety in Morocco. The IRRS team consisted of 11 senior regulatory experts from eight IAEA Member States, two IAEA facilitators and three IAEA staff members.

The purpose of this mission was to review the Moroccan governmental, legal, and regulatory framework for nuclear and radiation safety, against the IAEA safety standards and the Codes of Conduct (for research reactors and radioactive sources) as international benchmarks for safety. The mission was also used to exchange information and experience between the IRRS team members and their Moroccan counterparts in the areas covered by the IRRS, as well as the regulatory implications of the COVID-19 pandemic.

Morocco conducted a self-assessment in preparation for the mission and developed a preliminary action plan to address areas identified for improvement. The results of the self-assessment and supporting documentation were provided to the IRRS team as advance reference material prior to the mission.

The IRRS team reviewed the following areas: responsibilities and functions of the government; the global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities of the regulatory body including the authorization, review and assessment, inspection and enforcement processes, and development and content of regulations and guides; emergency preparedness and response; research reactor; radiation sources facilities and activities; radioactive waste management facilities; decommissioning; transport of radioactive material; control of medical exposures, occupational exposures and public exposures; and interface of safety with nuclear security. All types of nuclear and radiation facilities and activities and exposures regulated in Morocco were included in the scope of the mission. The IRRS mission included a policy issue discussion on "Nuclear and Radiation Safety Regulatory Responsibilities". Therefore, the IRRS Mission to Morocco was a full-scope mission.

The IRRS team conducted interviews and discussions with AMSSNuR staff. Members of the IRRS team also observed regulatory oversight activities at the research reactor, a cyclotron for isotopes production and their transport, a radioactive waste management facility, a radiotherapy department in a clinic and a company for industrial radiography. These visits included discussions with management and staff of the facilities.

The IRRS team developed a broad understanding of Morocco's regulatory infrastructure and recognized that Morocco has made significant progress in establishing an effective and consistent regulatory framework for nuclear and radiation safety covering the full range of facilities, activities, and exposure situations. AMSSNuR, established in 2016, is an independent regulatory authority whose staff is committed to delivering the regulatory statutory obligations effectively and with the willingness to improve.

The IRRS team identified the following areas of good performance for AMSSNuR:

- The promotional and supporting actions aiming to enhance nuclear and radiation safety in the region;
- The proactive communication with the interested parties;

- The comprehensive integrated management system, considering that AMSSNuR was created in 2016;
- The Geographic Information System (GIS) application displaying the location of all facilities and important features of radioactive sources being directly available to the Ministry of Interior for emergency preparedness and response purposes.

In the spirit of continuous improvement, the IRRS mission report includes recommendations and suggestions intended to enhance the Morocco regulatory infrastructure and practices to oversee nuclear and radiation safety. The IRRS team concluded that the following actions, if addressed by the government and the regulatory body, would further enhance the overall effectiveness of the regulatory system:

The Government:

- Establish and implement: a national policy and strategy for safety, a national policy and strategy for the management of radioactive waste and spent fuel, and a national policy and strategy for decommissioning activities;
- Continue the promulgation of regulations for nuclear and radiation safety, implementing the Law No. 142-12, that will improve the consistency of the regulatory oversight with the IAEA safety standards;
- Ensure that authorization decisions for category I facilities are made according to modalities that do not affect the regulatory independence so that the decision maker is free from any interests that could unduly influence its decision making;
- Define a mechanism for provision of financial resources for the safe management of radioactive waste.

The Government and AMSSNuR improve the regulatory oversight of the research reactor with regards to the periodic safety review and the inspection programme.

AMSSNuR:

- Consider as first priority the completion of the set of draft regulations in line with the IAEA safety standards, including regulations for existing exposure situations, and their subsequent submission to the government for examination and approval;
- Continue liaising with the government to ensure that the regulations to be promulgated are consistent with the IAEA safety standards;
- Continue improving its capabilities and tools in the area of emergency preparedness and response.

Many of the IRRS team observations had already been identified by Morocco during the self-assessment performed prior to the mission and relevant actions for their completion are addressed in the resulting action plan.

The IRRS team considers that the main challenge for Morocco is to complete the transition phase started after the promulgation of the Law 142-12 of 2014, leading to the reconfiguration of the oversight authorities - with creation of AMSSNuR as independent regulatory body - and to the major effort to bring the regulations in line with IAEA safety standards.

The IRRS team considers the invitation from Morocco of a full scope international peer review to be a sign of openness, transparency, and commitment to continuous improvement for nuclear and radiation safety.

The IRRS team received full cooperation from all parties in the regulatory, technical, and policy issue discussions which were conducted in a very open, transparent, and frank manner throughout the mission.

The IAEA issued a press release upon conclusion of the mission.

I. INTRODUCTION

At the request of the Government of the Kingdom of Morocco (therein after Morocco), an international team of senior safety experts met representatives of the "Agence Marocaine de Sûreté et de Sécurité Nucléaires et Radiologiques" (AMSSNuR), the regulatory body for nuclear and radiation safety and security of Morocco, from 27 November to 6 December 2023 to conduct an Integrated Regulatory Review Service (IRRS) mission. The purpose of this peer review was to review the Moroccan governmental, legal, and regulatory framework for nuclear and radiation safety.

The review mission was formally requested by the Government of Morocco on 5th June 2020. The information and preparatory meetings were organized virtually between AMSSNuR headquarters in Rabat and the IAEA on 26 to 27 October 2020, to discuss the purpose, objectives, and detailed preparations of the review in connection with regulated facilities and activities in Morocco and their related safety aspects and to agree the scope of the IRRS mission. The Terms of Reference (ToR) of the IRRS mission were signed at that time. The planned IRRS Mission was postponed due COVID-19 pandemic travel restrictions. Three more face to face and on-line meetings were held on 9 November 2021, 23 March 2023 and 14 June 2023. The ToR were revised but not signed upon mutual agreement.

The IRRS team consisted of 11 senior regulatory experts from 8 IAEA Member States, two IAEA facilitators and 3 IAEA staff members. The IRRS team carried out the review in the following areas: responsibilities and functions of the government; the global nuclear safety regime; responsibilities and functions of the regulatory body; the management system of the regulatory body; the activities of the regulatory body including the authorization, review and assessment, inspection and enforcement processes; development and content of regulations and guides; emergency preparedness and response; occupational radiation protection, control of medical exposure, public and environmental exposure control, transport of radioactive material, waste management and decommissioning, and interface with nuclear security. A policy issue on "Regulatory responsibilities: creating regulatory synergy between AMSSNuR and other ministries (energy and health)" was discussed.

The mission was also used to exchange information and experience between the IRRS team members and the Moroccan counterparts in the areas covered by the IRRS and the national regulatory implications of the COVID-19 pandemic.

AMSSNuR conducted a self-assessment in preparation for the mission and prepared a preliminary action plan. The results of AMSSNuR self-assessment and supporting documentation were provided to the IRRS team as advance reference material for the mission. During the mission, the IRRS team performed a systematic review of all topics within the agreed scope through review of the Morocco advance reference material, conduct of interviews with management and staff from AMSSNuR and direct observations of regulatory activities at regulated facilities. Meetings with representatives of the Ministry of Energy Transition and Sustainable Development, Ministry of Health and Social Protection, and the General Secretary of the Government were also organized.

All through the mission, the IRRS team received full cooperation from AMSSNuR.

II. OBJECTIVE AND SCOPE

The purpose of this IRRS mission was to review the Moroccan radiation and nuclear safety governmental, legal, and regulatory framework and activities against the relevant IAEA safety standards, to report on effectiveness of the regulatory system and to exchange information and experience in the areas covered by the IRRS including the regulatory implications of the COVID-19 pandemic in Morocco.

The agreed scope included all facilities and activities in Morocco, therefore, the IRRS mission was a full scope. It is expected this IRRS mission will facilitate regulatory improvements in Morocco and other Member States, utilizing the knowledge gained, and experiences shared between Morocco and IRRS reviewers and the evaluation of the Moroccan regulatory framework for nuclear and radiation safety, including its good practices.

The key objectives of this mission were to enhance the national legal, governmental, and regulatory framework for nuclear and radiation safety, and national arrangements for emergency preparedness and response through:

a) Providing an opportunity for continuous improvement of the national regulatory body through an integrated process of self-assessment and review;

b) Providing the host country (regulatory body and governmental authorities) with a review of its regulatory technical and policy issues;

c) Providing the host country (regulatory body and governmental authorities) with an objective evaluation of its regulatory infrastructure with respect to IAEA safety standards;

d) Promoting the sharing of experience and exchange of lessons learned among senior regulators;

e) Providing key staff in the host country with an opportunity to discuss regulatory practices with IRRS team members who have experience of other regulatory practices in the same field;

f) Providing the host country with recommendations and suggestions for improvement;

g) providing other states with information regarding good practices identified in the course of the review;

h) Providing reviewers from Member States and IAEA staff with opportunities to observe different approaches to regulatory oversight and to broaden knowledge in their own field (mutual learning process);

i) Contributing to the harmonization of regulatory approaches among states;

j) Promoting the application of IAEA safety requirements;

k) Providing feedback on the use and application IAEA safety standards;

l) Providing feedback on the regulatory implications of pandemic situations.

III. BASIS FOR THE REVIEW

A) PREPARATORY WORK AND IRRS TEAM

At the request of the Government of Morocco, a preparatory meeting for the IRRS was conducted from 26 to 27 October 2020. The preparatory meeting was carried out by the appointed Team Leader Mr Fabien

Feron, Deputy Team Leader Mr Faizan Mansoor and the IRRS IAEA representatives, Mr Hilaire Mansoux IAEA Coordinator (at that time) and Mr Ugur Bezdeguemeli Deputy IAEA Coordinator.

The IRRS mission preparatory team had discussions regarding regulatory programmes and policy issues with the senior management of AMSSNuR represented by its Director General and by Mr Taïb Marfak, Head of Department of Nuclear Safety and Management of Radioactive Waste, other senior management, and staff. It was agreed that the regulatory framework with respect to the following facilities and activities would be reviewed during the IRRS mission in terms of compliance with the applicable IAEA safety requirements and compatibility with the respective safety guides:

- Research reactors;
- Waste management facilities;
- Radiation sources facilities and activities;
- Decommissioning;
- Transport of radioactive materials;
- Control of medical exposure;
- Occupational radiation protection;
- Public and Environmental exposure control;
- Waste management; and
- Selected policy issues.

Mr Taïb Marfak delivered presentations on the national context, the current status of AMSSNuR and the self-assessment results to date.

IAEA staff presented the IRRS principles, process, and methodology. This was followed by a discussion on the tentative work plan for the implementation of the IRRS in Morocco.

The proposed composition of the IRRS team was discussed and tentatively confirmed. Logistics including meeting and workplaces, counterparts and Liaison Officer identification, proposed site visits, lodging and transportation arrangements were also addressed.

The AMSSNuR Liaison Officer for the IRRS mission was confirmed as Mr Taïb Marfak.

As the planned IRRS Mission was postponed due to COVID-19 pandemic travel restrictions, three additional face to face and on-line meetings were held on 9 November 2021, 23 March 2023 and 14 June 2023. The ToR were revised but not signed, upon mutual agreement.

AMSSNuR provided IAEA with the advance reference material (ARM) for the review at the end of September 2023. In preparation for the mission, the IAEA team members reviewed the Moroccan ARM and provided their initial impressions to the IAEA Team Coordinator prior to the commencement of the IRRS mission.

It was considered to be in the interest of Morocco and consistent with the IRRS goals to perform this review using the laws and regulations currently in force but also the regulations already submitted to the government and are at the final stage of adoption process. These submitted regulations were generally not in the ARM and were therefore consulted during the mission.

B) REFERENCES FOR THE REVIEW

The relevant IAEA safety standards and the Codes of Conduct on the Safety and Security of Radioactive Sources and of the Research Reactors were used as review criteria. The complete list of IAEA publications used as the references for this mission is provided in Appendix VIII.

C) CONDUCT OF THE REVIEW

The initial IRRS team meeting took place on Sunday, 26 November 2023 at Flower Town Hotel-Rabat, directed by the IRRS Team Leader and the IRRS IAEA Coordinator. Discussions encompassed the general overview, the scope, and specific issues of the mission, clarified the bases for the review and the background, context, and objectives of the IRRS programme. The understanding of the methodology for review was reinforced. The agenda for the mission was presented to the team. As required by the IRRS Guidelines, the reviewers presented their initial impressions of the ARM and highlighted significant issues to be addressed during the mission.

The host Liaison Officer was present at the initial IRRS team meeting, in accordance with the IRRS Guidelines, and presented logistical arrangements planned for the mission.

The IRRS entrance meeting was held on Monday, 27 November 2023, with the participation of AMSSNuR senior management and staff. Representatives of the Ministry of Energy Transition and Sustainable Development, Ministry of Health and Social Protection (represented by National Center for Radiation Protection), Ministry of Equipment, Transport, Logistics and Water, Ministry in charge of the National Defense, Ministry of Interior, General Direction of the Civil Protection, General Direction of National Safety, National Center of Energy and Technical Sciences, Inspection of the Health Services of the Royal Army, Gendarmerie Royale, Scientific and Audit Committees representing the Board of Directors of AMSSNuR, also participated. Opening remarks were made by Mr Saïd Mouline, Director General of AMSSNuR and Mr Fabien Feron, IRRS team Leader. Mr Taïb Marfak gave an overview of the Morocco context, the national regulatory framework, and a summary of the results of the pre-mission self-assessment.

During the IRRS mission, a review was conducted for all review areas within the agreed scope with the objective of providing relevant Moroccan Authorities and AMSSNuR with recommendations and suggestions for improvement and where appropriate, identifying good practices. The review was conducted through meetings, interviews and discussions, visits to facilities and direct observations regarding the national legal, governmental, and regulatory framework for safety.

The IRRS team performed its review according to the mission programme given in Appendix II.

The IRRS exit meeting was held on Wednesday, 6 December 2023. The opening remarks at the exit meeting were presented by Mr Saïd Mouline, Director General of AMSSNuR and were followed by the presentation of the results of the mission by the IRRS team Leader Mr Fabien Feron. Closing remarks were made by Ms Lydie Evrard, Head of the Department of Nuclear Safety and Security and IAEA Deputy Director General.

An IAEA press release was issued.

1. RESPONSIBILITIES AND FUNCTIONS OF THE GOVERNMENT

1.1. NATIONAL POLICY AND STRATEGY FOR SAFETY

AMSSNuR has prepared a draft of the national nuclear and radiation safety policy with the objective to protect the workers, the public, and the environment from harmful effects of ionizing radiation. The draft policy applies to all relevant parties, such as governmental departments and agencies with responsibilities of promoting the use of nuclear applications, authorized parties, technical support organizations and AMSSNuR and to all nuclear and radiological activities and facilities during their entire life cycle, as well as to all associated practices and during all regulatory processes. In the draft policy, the government commits itself implementing the policy in an integrated and coordinated manner by all relevant stakeholders according to graded approach and depending on national circumstances.

Under the draft policy, Morocco commits itself through its consistent and long term commitments in oversight and support to the relevant processes through:

1. Strengthening and implementing the legislative and regulatory framework;
2. Abiding by the IAEA fundamental safety principles and by applying a graded approach;
3. Ensuring that the use of radiation sources in facilities and practices is justified with respect to socioeconomic benefits of the society and by application of safety requirements;
4. Supporting a regulatory decision-making process to ensure safety;
5. Ensuring provision of human and financial resources for building and maintaining competencies and safety measures of all parties having responsibilities in relation to the safety of facilities and activities, including provisions and a framework for research and development for safety;
6. Promoting transparency and openness among all concerned parties in accordance with the legislative and regulatory framework;
7. Facilitating the public involvement (consultation and information) regarding the risks due to exposure according to the legislative and regulatory framework;
8. Ensuring an effective coordination mechanism among relevant parties involved in the decision-making process related to facilities and activities involving ionizing radiation sources;
9. Ensuring continuous improvement, through e.g. active participation in peer reviews;
10. Fostering international cooperation, including regional cooperation in the field of nuclear and radiation safety;
11. Contributing to the global nuclear safety regime through sharing experiences and implementing best international practices.

The draft safety policy covers various aspects as required under GSR Part 1 (Rev. 1). Although, the draft policy refers to the IAEA fundamental safety principles, all ten safety principles mentioned in IAEA SF-1 are not explicitly addressed, such as the government commitment for promotion of leadership and management for safety, including safety culture.

The draft policy was submitted to the government in 2020 but has not yet been approved and issued.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Morocco has drafted a nuclear safety policy. This policy is under approval process.*	
(1)	**BASIS: GSR Part 1 (Rev. 1) Requirement 1 states that** *"The government shall establish a national policy and strategy for safety, the implementation of which shall be subject to a graded approach in accordance with national circumstances and with the radiation risks associated with facilities and activities, to achieve the fundamental safety objective and to apply the fundamental safety principles established in the Safety Fundamentals."*
R1	**Recommendation: The government should establish a national policy and strategy for nuclear and radiation safety consistent with IAEA safety standards.**

1.2. ESTABLISHMENT OF A FRAMEWORK FOR SAFETY

The Law No. 142-12, hereinafter called 'the Law', establishes the legal framework for regulation of nuclear and radiological safety, security, and safeguards and for the establishment of AMSSNuR as an independent nuclear regulatory authority in Morocco. The Law was promulgated in August 2014 and is applied to all activities and facilities using radiation sources. These activities include design, construction, commissioning tests, operation, and maintenance of the facilities, as well as their final closure including, if applicable, their decommissioning and their dismantling, fabrication, acquisition, import, export, transit, distribution, detention, use, transfer, transport, storage and evacuation of ionizing radiation sources, management of radioactive waste, mining, and processing of radioactive ores. These activities as well as the facilities and the associated radiation sources are structured into two categories; category I includes nuclear and disposal facilities and associated activities while category II includes the facilities and activities involving radioactive sources, radioactive materials -with the exception of nuclear materials-, devices containing these radioactive materials, devices emitting ionizing radiation or particle accelerators. Exposure situations that are not governed by the Law are also identified.

The Law defines the role of various parties such as government, administration, regulatory body, operators regarding nuclear and radiation safety and security. It further defines AMSSNuR responsibilities, mainly those related to the control of safety and security of radioactive material and their facilities; safety of radioactive waste, radiation protection of workers, patients, the public, and the environment; safeguards of nuclear materials and nuclear security.

The Law addresses the development of regulations and guides related to nuclear and radiation safety, security, and safeguards. In this respect:

- AMSSNuR proposes the regulations to the government for approval while technical requirements and regulations applicable to facilities and activities related to nuclear and radiation safety, nuclear security and safeguards are approved by the "Administration";
- The authority for publishing guides intended for operators rests with the AMSSNuR.

The responsibility of the operator for safety and security is specified in the Law. Provisions for inspections, enforcement, emergency preparedness, etc., are also addressed in the Law.

The authorizations of category I facilities and activities are issued by the Administration while for category II facilities and activities by AMSSNuR. The project of construction of a category I facility is subjected to a public enquiry to allow the public to be aware of the project and to express any comments. The public inquiry is led by the president of the communal council concerned.

The Law does not specifically include provisions for appeals against a regulatory decision. An appeal mechanism against any regulatory decision is addressed in the Law No. 55-19 relating to "the simplification of administrative procedures and formalities" which describes the appeal provisions, whenever a decision is required from an administration, a regulatory body or a public service. Decree 2-20-131stipulates that in the case of denial of authorization, the applicant may ask the Agency to re-examine his or her file if he or she provides the justifying evidence for the request for re-examination. As established in the Law, AMSSNuR's mandate includes proposing to the Government legislation and regulations relating to nuclear and radiological safety and security. A strategy has been developed to upgrade the national regulatory framework and to enhance the level of safety and security, according to the provisions of the Law and taking into account, among other inputs, the IAEA safety standards as well as international best practices.

This strategy includes the establishment of a national forum to support a concerted approach, the National Committee for Upgrading the Regulatory Framework for Nuclear and Radiological Safety and Security (CCR). CCR is composed of more than thirty-five ministerial departments, public organizations, scientific and professional societies, NGOs and representatives of operators.

As result of this strategy, by the end of 2021, 15 Decrees (covering both nuclear and radiation safety and security, emergency preparedness and response, radioactive waste management and safeguards), 45 Ordinances and Technical Prescriptions, and 30 Guides have been developed.

By November 2023, six regulations have been approved by the government and are in force, with transitional arrangements.

It was considered to be in the interest of Morocco and consistent with the IRRS goals to perform this review using the current laws and regulations (identified as "current" throughout the text) but also the draft regulations already submitted to the government. The IRRS team concluded that the national regulatory framework would benefit from these future regulations, as the consistency with the IAEA safety standards requirements is significantly improved.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Current regulations are not systematically consistent with IAEA safety standards. Many draft regulations have been developed. Some of them have been approved and others are under approval process.*	
(1)	**BASIS: GSR Part 1 (Rev. 1) Requirement 2 states that** *"The government shall establish and maintain an appropriate governmental, legal and regulatory framework for safety".*
(2)	**BASIS: GSR Part 1 (Rev. 1) Requirement 2 para. 2.5 states that** *"The government shall promulgate laws and statutes to make provision for an effective governmental, legal, and regulatory framework for safety. This framework for safety shall set out the following: […] (9) The authority and responsibility of the regulatory body for promulgating (or preparing for the enactment of) regulations and preparing guidance for their implementation;"*
(3)	**BASIS: GSR Part 1 (Rev. 1) Requirement 32 states that** *"The regulatory body shall establish or adopt regulations and guides to specify the principles, requirements and associated criteria for safety upon which its regulatory judgements, decisions and actions are based."*
(4)	**BASIS: GSR Part 1 (Rev. 1) Requirement 33 states that** *"The Regulations and guides shall be reviewed and revised as necessary to keep them up to date, with due consideration of relevant international safety standards and technical standards and of relevant experience gained."*

(5)	**BASIS: GSR Part 1 (Rev. 1) Requirement 34 para 4.61 states that** *"The government or the regulatory body shall establish, within the legal framework, processes for establishing or adopting, promoting, and amending regulations and guides. These processes shall involve consultation with interested parties in the development of the regulations and guides, with account taken of internationally agreed standards and the feedback of relevant experience. Moreover, technological advances, research and development work, relevant operational lessons learned, and institutional knowledge can be valuable and shall be used as appropriate in revising the regulations and guides."*
(6)	**BASIS: GSR Part 1 (Rev. 1) Requirement 34 para. 4.62 states that** *"The regulations and guides shall be kept consistent and comprehensive, and shall provide adequate coverage commensurate with the radiation risks associated with the facilities and activities, in accordance with a graded approach…."*
R2	**Recommendation: The government should complete the ongoing update of the regulatory framework by adopting new or revised regulations that are consistent with the IAEA safety standards.**

1.3. ESTABLISHMENT OF A REGULATORY BODY AND ITS INDEPENDENCE

The government established AMSSNuR in 2016 as an independent regulatory body vested with the responsibility for the regulation and control of the activities involving ionizing radiation sources under the Law. Some regulatory responsibilities of the Ministries in charge of Health and Energy were transferred to AMSSNuR. As the national nuclear and radiation safety and nuclear security authority, AMSSNuR is placed under the authority of the Head of Government and is not under any department overseeing the promotion of nuclear applications. The necessary competences and financial resources needed by AMSSNuR to fulfill its statutory obligations are to be provided by the government within the State budget. In case of conflicts, the Head of the Government has the final authority to resolve the conflict taking into consideration the national regulatory framework and international commitments.

The IRRS team was informed that where the "Administration" is mentioned in the Law for issuing authorization to category I facilities (i.e., nuclear facilities and radioactive waste disposal facilities), based on the submitted regulations on authorization and control of nuclear facilities, it would mean that the Minister of Energy has the authority to issue the authorization.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The authorization process for Category I nuclear facilities, according to the national regulations, involves all relevant Departments throughout the various authorization phases, including construction, liquid and gaseous effluent discharges, commissioning tests, operation, decommissioning, and permanent shutdown. The Ministry of Energy has the authority to make proposals for authorizations, which are discussed by the relevant Moroccan Departments, including AMSSNuR. Ultimately, it is the Ministry of Energy that takes the decision and issues, among others, the license for operation, through a Ministerial order. The Ministry has also the responsibility for promoting and utilizing the nuclear energy and conducting nuclear activities.*	
(1)	**BASIS: GSR Part 1 (Rev.1) Requirement 4 states that** *"The government shall ensure that the regulatory body is effectively independent in its safety related decision making and that it has functional separation from entities having responsibilities or interests that could unduly influence its decision making."*

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
(2)	**BASIS: GSR Part 1 (Rev.1) Requirement 4 para. 2.8 states that** *"To be effectively independent from undue influences on its decision making, the regulatory body:* *(c) Shall be able to make independent regulatory judgements and regulatory decisions, at all stages in the lifetime of facilities and the duration of activities until release from regulatory control, under operational states and in accidents;* *(d) Shall be free from any pressures associated with political circumstances or economic conditions, or pressures from government departments, authorized parties or other organizations;"*
R3	**Recommendation: The government should ensure that authorization decisions for category I facilities are made at a level that does not affect the regulatory independence.**

1.4. RESPONSIBILITY FOR SAFETY AND COMPLIANCE WITH REGULATIONS

According to provision of article 51 of the Law, the authorized party has the prime responsibility for the safety and security of the authorized facilities and activities. Under the article 67, the operator is required to give the required priority to safety and security. The draft national policy for nuclear and radiation safety also stipulates the licensee's prime responsibility for safety. However, the Law and the draft safety policy do not include provision that mere compliance with regulations and requirements established or adopted by the regulatory body does not relieve the person or organization responsible for a facility or an activity of its prime responsibility for safety.

The Law further requires the operator to designate at least one competent person in radiation protection as the person in charge of radiation safety issues. The submitted decree on nuclear safety stipulates that the responsibility for safety cannot be transferred or delegated. However, the license holder may designate a suitably qualified person to carry out tasks relating to these responsibilities, but the license holder retains the prime responsibility for protection and safety.

1.5. COORDINATION OF AUTHORITIES WITH RESPONSIBILITIES FOR SAFETY WITHIN THE REGULATORY FRAMEWORK

AMSSNuR is the nuclear and radiation safety regulator in Morocco. However, there are other Ministerial departments that have certain responsibilities in areas of nuclear and radiation safety and protection such as emergency preparedness and response (EPR) and environmental impact assessment.

To enable effective stakeholder involvement in the development of regulations, AMSSNuR has set up the CCR to validate the drafted regulations before their submission to the Head of the Government.

A submitted decree mentions the creation of a national committee for the management of nuclear, radiological, biological, and chemical risks. This committee contains representatives of concerned ministerial departments.

More generally, AMSSNuR has initiated contacts and meetings with concerned parties to establish coordination, one of the goals being to conclude memoranda of understanding aiming to create national synergies through coordinated plan and strategies such as upgrading the regulatory framework, emergency plan, security plan, education and training, environmental surveillance, etc. These memoranda of understanding are aimed to reduce gaps or duplication/overlap of responsibilities, to manage potential conflict of interest, to clarify the relation with the authorized parties as well as operational matters. Such memoranda of understanding have so far not been established.

In the field of the medical use of ionizing radiation, the Ministry in charge of Health and AMSSNuR exercise regulatory control with their own authorization and inspection systems in accordance with the provisions of their respective laws i.e., the Law and Law No. 131-13 on the practice of medicine and its implementing decree 2-15-447 as well as the Law No. 84-12 on medical devices. In particular:

- Ministry in charge of Health issues authorizations for healthcare activities and registration certificates for medical devices and is notified in case of an incident or risk of incident which caused the deterioration of the health condition of a patient involving these device or source and carries out control and inspection missions.
- AMSSNuR controls activities and practices involving ionizing radiation sources in the medical sector, issues authorizations for activities involving ionizing radiation sources, inspects these activities, investigates declarations of incident mentioned above.

Similarly, nuclear facilities and activities, and disposal facilities of category I are subject to authorization of the administration after considering the opinion of AMSSNuR. Ministries of Employment and Social Affairs and Industry, Trade and Investment and the Digital Economy would be in charge of regulation of non-radiological risks which can appear in nuclear facilities of category I. It is not clear how parties interact and liaise with each other and whether assessment of non-radiological risks of the category I nuclear facilities are performed.

It is therefore essential to formalize the cooperation and clearly define interfaces from an operational point of view, to make the system easier to understand for those in charge of nuclear activities and to develop synergies facilitating the effective and efficient exercise of regulatory functions (authorization, inspection and regulation).

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *In most cases, where cooperation between authorities is called for, while collaboration is currently taking place, there are no formal arrangements to help ensure consistency of effective coordination. AMSSNuR has initiated contact with concerned parties to establish coordination in the form of memoranda of understanding.*	
(1)	**BASIS: GSR Part 1 (Rev. 1) Requirement 7 states that** *"Where several authorities have responsibilities for safety within the regulatory framework for safety, the government shall make provision for the effective coordination of their regulatory functions, to avoid any omissions or undue duplication and to avoid conflicting requirements being placed on authorized parties."*
(2)	**BASIS: GSR Part 1 (Rev. 1) Requirement 7 para. 2.18 states that** *"Where several authorities have responsibilities for safety within the regulatory framework for safety, the responsibilities and functions of each authority shall be clearly specified in the relevant legislation. The government shall ensure that there is appropriate coordination of and liaison between the various authorities concerned in areas such as:…* *(3) Applications of radiation in medicine, industry and research;* *This coordination and liaison can be achieved by means of memoranda of understanding, appropriate communication and regular meetings. Such coordination assists in achieving consistency and in enabling authorities to benefit from each other's experience."*
S1	**Suggestion: The government should consider ensuring that there is appropriate coordination of and liaison between the various authorities having responsibilities for safety.**

1.6 SYSTEM FOR PROTECTIVE ACTIONS TO REDUCE EXISTING OR UNREGULATED RADIATION RISKS

The Law prohibits various activities such as addition of radioactive materials in the production of foodstuffs, cosmetics, goods and products for household, consumer products and building materials; use of radioactive materials in the manufacturing of toys; import and export of such goods, foodstuffs and toys. However, a system for protective actions to reduce undue radiation risks associated with unregulated sources (of natural or artificial origin) and contamination from past activities or events are not fully addressed in the Law. Article 62 of the Law addresses NORM associated with mining and processing of ores. The decree no. 2-23-151 on radiation protection deals with the existing exposure situations.

The Law provides powers to inspectors, when they believe it is necessary to exercise powers to protect the health and safety of people or to protect the environment. These powers include entering premises, searching premises, seizing hazardous things, and issuing directives to the authorized parties.

AMSSNuR is developing a national strategy for search and recovery of orphan sources. A plan is drafted within the framework of the cooperation project of AMSSNuR and the European Union. The guidelines and mechanisms of the strategy and the program of its implementation are also under development. In the framework of protection strategy, generic and operational criteria are established based on the principles of optimization and justification which allow the transition from an emergency exposure situation to an existing exposure situation.

A national orphan source recovery programme, that is intended to establish the policy and strategies for detecting and bringing orphan sources under regulatory control, is under development under the leadership of AMSSNuR. In the development of this program, AMSSNuR is encouraged to utilize guidance such as SSG-17 "Control of Orphan Sources and Other Radioactive Material in the Metal Recycling and Production Industries" and provisions in the Code of Conduct on the Safety and Security of Radioactive Sources and its Supplementary Guidance.

AMSSNuR is further encouraged to:

- Develop monitoring programmes, conducted either by AMSSNuR or upon request to other authorized bodies, to detect orphan sources;
- Address funding mechanisms to manage discovered orphan sources where the responsible party cannot be identified, so as not to discourage people from detecting such sources and reporting such discovery.

1.7. PROVISIONS FOR THE DECOMMISSIONING OF FACILITIES AND THE MANAGEMENT OF RADIOACTIVE WASTE AND OF SPENT FUEL

The Law addresses regulation of decommissioning, radioactive waste management (RWM) and spent fuel (SF) management including authorization and regulatory supervision of such activities. A draft decree related to safety of radioactive waste and spent fuel management and disused sealed radioactive sources (DSRS) was developed by AMSSNuR and submitted to the government for examination and approval. The team was informed that the decree sets out the criteria and safety requirements for the storage of radioactive waste, including design, operation and closure, and institutional control. Technical regulations and technical prescriptions dealing with all phases of storage will be established by AMSSNuR to complete the regulatory framework. It is important to note that, only low and intermediate level, short lived, and very short-lived radioactive waste are generated in Morocco, from applications in medicine, industry, agriculture, and research. Morocco does not generate any high-level radioactive waste nor long-lived contaminated waste.

The general principles regarding radioactive waste management as laid down in the Law and in law 12-03 on environmental impact studies conform to the IAEA safety standards and to the safety objectives of the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management. At present, there is no approved national policy and strategy for RW and SF management. Although the draft national policy and strategy refers in the title to SF management, no provision is included with respect to the future management of SF.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Morocco has developed a national policy dealing with the long-term safe management of radioactive waste and spent nuclear fuel. The process of its approval is ongoing.*	
(1)	**BASIS: GSR Part 5 Requirement 2 states that** *"To ensure the effective management and control of radioactive waste, the government shall ensure that a national policy and a strategy for radioactive waste management are established. The policy and strategy shall be appropriate for the nature and the amount of the radioactive waste in the State shall indicate the regulatory control required, and shall consider relevant societal factors. The policy and strategy shall be compatible with the fundamental safety principles and with international instruments, conventions and codes that have been ratified by the State. The national policy and strategy shall form the basis for decision making with respect to the management of radioactive waste."*
(2)	**BASIS: SSR - 5 Requirement 2 para 3.8 states that** *"General standards for the protection of people and the environment are usually set out in national policy or in legislation…"*
(3)	**BASIS: SF-1 Principle 7 para 3.29 states that** *"Radioactive waste must be managed in such a way as to avoid imposing an undue burden on future generations; that is, the generations that produce the waste have to seek and apply safe, practicable and environmentally acceptable solutions for its long term management…"*
R4	**Recommendation: The government should establish a national policy and strategy for long term safe management of radioactive waste and spent nuclear fuel.**

The Law assigns AMSSNuR with the regulatory control of RWM facilities and activities and maintaining the national inventory of radiation sources in Morocco. The radioactive waste generator keeps up to date an inventory of its waste and submits an annual report to AMSSNuR on the status of the radioactive waste that manages. AMSSNuR itself is responsible for making the inventory of all radiation sources present in the country.
According to the law 1-95-98, CNESTEN is assigned with the collection, treatment and long term storage of radioactive materials. From the moment of transfer of the waste from the waste generator to CNESTEN, the latter takes over all issues pertaining to ownership, liability, and safety. CNESTEN can be ordered to accept orphan sources in its installations.

No policy and strategy have been developed and approved for decommissioning. Current regulations do not require an initial decommissioning plan as part of the application for authorization to operate, nor a final decommissioning report at the end of decommissioning activities. The IRRS team noticed that a requirement on funding is included in the submitted regulation on safety and authorization of category I facilities.

In the case of facilities or activities using radioactive sources, the decree 2-20-131 on the authorization of category II facilities, requires as part of the license application, the applicant to provide information on the

financial guarantees to cover the cost of recovering disused sealed sources as well as the dismantling of the facility and remediation of the site.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There is no policy and strategy on decommissioning of facilities.*	
(1)	**BASIS: GSR Part 1 (Rev. 1) Requirement 10 para. 2.28 states that** *"Decommissioning of facilities and the safe management and disposal of radioactive waste shall constitute essential elements of governmental policy and the corresponding strategy over the lifetime of facilities and the duration of activities..."*
(2)	**BASIS: GSR Part 3 Requirement 2 para. 2.24 states that** *"The government shall ensure that arrangements are in place for the safe decommissioning of facilities…"*
R5	**Recommendation: The government should establish a policy and strategy on decommissioning, as an essential element of its policy and the corresponding strategy for safety over the lifetime of facilities and the duration of activities.**

According to the Law and the "polluter pays principle", the radioactive waste generator pays fees for the collection, treatment, and storage of its generated waste. Current regulations do not specify the funding mechanism for the management of radioactive waste from generation to disposal, e.g. how this should be organized and controlled and how frequently the fees should be re-calculated.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation*: The legal and regulatory framework does not define how to ensure financial provisions for safe management of radioactive waste from generation to disposal, with clear allocation of responsibilities.*	
(1)	**BASIS: GSR Part 5 Requirement 1 states that** *"The government shall provide for an appropriate national legal and regulatory framework within which radioactive waste management activities can be planned and safely carried out. This shall include the clear and unequivocal allocation of responsibilities, the securing of financial and other resources, and the provision of independent regulatory functions. ..."*
R6	**Recommendation: The government should define in the legal and regulatory framework the mechanism for provision of financial resources for safe management of radioactive waste, along with clear allocation of responsibilities of parties involved.**

1.8. COMPETENCE FOR SAFETY

Requirements regarding the staff competences for all parties with radiation and nuclear safety and security responsibilities are addressed in the Law. The financial needs for the competence development for AMSSNuR staff are included in the annual budget according to the provisions of the Law and law No. 69-00 on financial control of public establishments.

Following the IAEA Methodology for the Systematic Assessment of the Regulatory Competence Needs (SARCoN), AMSSNuR has conducted the assessment to identify its competence needs for its regulatory functions and training programmes in nuclear and radiation safety and security at internal and national levels. AMSSNuR is currently implementing education and training programmes with all the national stakeholders as well as with international partners. AMSSNuR has established agreements with CNESTEN

and many national universities to develop education, training, and knowledge management programmes in radiation safety, safety culture and nuclear security.

The Law assigns to the authorized parties the prime responsibility for safety and provides the requirements on ensuring and acquiring adequate competences for this purpose. Moreover, the Law further makes it mandatory for the authorized parties to make available adequate financial resources and sufficient qualified staff for activities related to the safety of a nuclear facility throughout its lifetime. Availability of qualified staff with required competences is a pre-condition for granting an authorization under the Law. AMSSNuR, through its regulatory functions especially authorization and inspection processes, makes sure that the operators, the owner or the authorized parties take appropriate measures to fulfill this condition.

1.9. PROVISION OF TECHNICAL SERVICES

The National Centre of Radiation Protection (CNRP) under the Ministry of Health and Social Protection, is the national Technical Support Organization, and in accordance with the current regulations (decree 2-94-285, and decree 2-14-562) provides technical services such as personal dosimetry, calibration of radiation equipment, environmental monitoring and radiological assessment of drinking water and foodstuffs, as well as technical support to the authorized parties and applicants. CNESTEN also provides some technical services such as calibration of radiation equipment, dosimetry, and training.

Under the Law, any organization wishing to provide technical services should be approved by AMSSNuR. For this purpose, AMSSNuR has developed and submitted a decree on recognition of technical services which describes the modalities and criteria for their recognition.

1.10 POLICY ISSUE DISCUSSION: NUCLEAR AND RADIATION SAFETY REGULATORY RESPONSIBILITIES

The cooperation among authorities who share responsibilities and the preservation of the effective independence of the regulatory authority are challenges that AMSSNuR is facing in exercising its regulatory functions.

I. Cooperation with the Ministry in charge of Health

According to legal provisions, AMSSNuR and the Ministry in charge of Health, both have responsibilities in the oversight of medical exposure, which could lead to duplication of activities and misunderstanding from interested parties.

In many countries, the cooperation between two authorities who share responsibilities in the field of regulating radiation safety and protection in the medical area, is a challenge. Cooperation problems could also include regulatory areas such as radon exposure, drinking water control and consumer products.

The experts who participated in the policy issue discussion had similar concerns and the approaches they followed to deal with the issue were also similar. These include the clear allocation of responsibilities set by law and regulations, establishment of memoranda of understanding (or protocols) specifying the terms of cooperation and practical arrangements, regular meetings to share information and resolve any common issues, means of systematic communication and competence of the staff in the medical area, joint inspections, are the minimum necessary measures for a fruitful cooperation without duplications or gaps in the regulatory control.

The experts present in the meeting agreed that this situation requires immediate attention soon after the establishment of the regulatory authority for safety. Time, effort and good will are needed to achieve a fruitful cooperation in favor of radiation safety and radiation protection.

In bigger countries, additional measures such as establishment of cooperation protocols, memoranda of understanding (or protocols) at regional level might be needed in addition to national ones to consider regional specificities and local actors. On the contrary, countries with smaller governmental infrastructures might have safety and health authorities under the same organization. Mutual respect was recommended as the secret of success. Internal rules of procedures may help in achieving effective independence.

There are also countries that do not face similar problems and don't need even cooperation agreements, and still manage to cooperate fruitfully through regular meetings and correspondence.

II. Authorization of nuclear facilities

In Morocco, according to the Law, the authorization of category I facilities (nuclear and radioactive waste facilities) is assigned to the Ministry of Energy Transition and Sustainable Development. At the same time, the Ministry is one of the promoters of nuclear energy.

Experts coming mostly from countries with nuclear facilities shared their experiences and the approaches followed in their countries on this topic. When a potential conflict of interest could exist, the independence of the regulator and of the decisions taken were openly questioned.

Some of the approaches followed to resolve the problem and enhance the independence of the regulator are: (a) the separation of authorities, (b) the establishment of two organizations, one for the nuclear safety and one for the promotion of nuclear energy, (c) the responsibility of authorizing nuclear facilities to be attributed to the highest level possible of the administrative hierarchy (e.g. the prime minister).

Few examples of showing effective independence were cases where the authority for nuclear safety had to interrupt the operation of nuclear facilities, on safety grounds.

1.11 SUMMARY

The Government of Morocco, implementing the Law, established AMSSNuR in 2016 as an independent regulatory authority for the oversight of nuclear and radiation safety and nuclear security, and safeguards. Necessary human and financial resources are available to AMSSNuR for discharging its regulatory responsibilities as well as competence building.

AMSSNuR has developed a draft nuclear and radiation safety policy and submitted it to the government, however, the safety policy and the implementing strategy have not been approved by the government. Policies and strategies for decommissioning and management of radioactive waste and spent fuel and funding mechanisms need to be established.

Most of the regulations in force were established before the creation of AMSSNuR. A number of regulations are under various stages of development and finalization, and their consistency with IAEA safety standards needs to be verified before promulgation.

Regulatory independence in the authorization of category I facilities and associated activities should be ensured to avoid potential conflict of interest and any undue influence in regulatory decision making.

Mechanisms to achieve effective operational coordination among various authorities involved in activities related to the regulation of safety are to be improved.

2. THE GLOBAL SAFETY REGIME

2.1. INTERNATIONAL OBLIGATIONS AND ARRANGEMENTS FOR INTERNATIONAL COOPERATION

Morocco is an IAEA Member State since 1957 and is a signatory country to all relevant international conventions and international agreements for ensuring nuclear and radiation safety, nuclear security, and safeguards. Morocco has made a political commitment to implement the Code of Conduct on the Safety and Security of Radioactive Sources, nominated a Point of Contact for the purpose of facilitating the export and/or import of radioactive sources and has notified the IAEA of its intention to act in accordance with the Supplementary Guidance on the Import and Export of Radioactive Sources. Accordingly, Morocco has made available its responses to the Importing and Exporting States Questionnaire. The IRRS team encourages Morocco to notify the IAEA of their commitment to implement the Supplementary Guidance on the Management of Disused Radioactive Sources. Morocco has expressed support to the Code of Conduct on the Safety of Research Reactors.

Morocco is a party of the Revised Supplementary Agreements Concerning the Provision of Technical Assistance by the IAEA (RSA) and has accepted the African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA) in 2020.

The Government of Morocco supports international activities of AMSSNuR and nominates many participants to represent Morocco in various international fora. Morocco is involved in the development and promotion of the IAEA safety standards. Morocco is a member of the IAEA Commission on Safety Standards (CSS). Morocco is encouraged to nominate members in IAEA safety standards review committees, such as the Nuclear Safety Standards Committee (NUSSC), Radioactive Waste Safety Standards Committee (WASSC), Radiation Safety Standards Committee (RASSC), Transport Safety Standards Committee (TRANSSC), Emergency Preparedness and Response Standards Committee (EPReSC), Nuclear Security Guidance Committee (NSGC).

Morocco invited IAEA EduTA mission in 2007 (and its follow-up in 2010), INIR mission in 2015, ORPAS mission in 2017 (and its follow-up in 2022) and an EPREV mission in 2022.

AMSSNuR acts as the national point of contact in the IAEA's: International Nuclear and Radiological Event Scale (INES), Incident Reporting System for Research Reactors (IRSRR), Incident and Trafficking Database (ITDB), Spent Fuel and Radioactive Waste Information System (SRIS) and Progress Monitoring System for Nuclear Safety Capacity Building (PROMIS).

Additionally, Morocco participates in the Regulatory Cooperation Forum (RCF) and the Global Nuclear Safety and Security Network (GNSSN), the Forum of Nuclear Regulatory Bodies in Africa (FNRBA), and the African Commission on Nuclear Energy (AFCONE).

AMSSNuR has established a cooperation strategy aiming to enhance nuclear safety and security at national and regional levels in areas such as the regulatory framework and control, public information and EPR. In this framework, more than 17 MoUs have been established to exchange information through multilateral cooperation (e.g. MoUs with the regulatory bodies of Canada, USA, Russian Federation, Germany, Spain, MoUs with 5 African countries, MoUs with TSOs such as IRSN, etc.).

In the area of Education and Training, Morocco hosts the IAEA Postgraduate Educational Course in Radiation Protection and the Safety of Radiation Sources (PGEC) for the Africa region in French language and AMSSNuR coordinates and provides training for the module IV on "International Radiation Protection System and Regulatory Framework". AMSSNuR hosts sessions of the School for new regulators as well as School on Drafting Regulations for the Africa region and in French language, hosts the IAEA School of

Radiation Emergency Management for the Africa region in English and French languages, participates in the International Network for Education and Training for Emergency Preparedness and Response (iNET-EPR).

Additionally, AMSSNuR is designated as Nuclear Security Capacity Building, Capacity Building Center for Emergency Preparedness and Response and has signed on the margins of the 67th IAEA General Conference Practical Arrangements with IAEA on cooperation in the area of establishing and strengthening regulatory infrastructure for radiation safety in Africa.

CNESTEN is the designated Regional Centre for Safety of Radioactive Sources and Transport for French speaking African countries. Morocco through AMSSNuR, CNESTEN, ONEE, CNRP and other organizations such as ONSSA, INRA, INO and CHU participate in the IAEA's Technical Cooperation (TC) Programme coordinated by the Ministry of the Energy Transition and Sustainable Development. AMSSNuR, as well as others national organizations, are supporting the IAEA's TC Programme by hosting training events, by accepting fellows for on the-job training and by providing expertise in other countries of the region, mostly in the French speaking African countries.

AMSSNuR is also involved in several national university programs to provide training on regulatory control of practices involving ionizing radiation sources, to further promote radiation safety standards.

The IRRS team acknowledges that Morocco through AMSSNuR actively promotes the nuclear and radiation safety and nuclear security in the African region and extensively support African countries to establish their regulatory infrastructure for safety in line with IAEA safety standards. Therefore, the IRRS team considers the promotional and supporting actions on AMSSNuR aiming to enhance nuclear and radiation safety in the region an area of good performance.

2.2 SHARING OF OPERATING EXPERIENCE AND REGULATORY EXPERIENCE

One of the AMSSNuR's strategic objectives is related to transparency, openness, sharing and exchange of experience. AMSSNuR has established a documented procedure under its management system for receiving and analyzing national and international operating and regulatory experiences and for sharing the experiences and the analysis outcome with relevant national and international stakeholders. Accordingly, it has identified information sources for receiving and obtaining experiences, responsibilities for analyzing and assessing the information and sharing of the information.

As AMSSNuR acts as the national point of contact in several international instruments such as INRS, IRSRR, ITDB, SRIS, PROMIS, … and shares with other countries the regulatory experience. AMSSNuR publishes its activities and experience on its website to make it available to others.

2.3. SUMMARY

Morocco fulfills its international obligations in areas of nuclear and radiation safety and nuclear security and actively participates in international arrangements (bilateral and multilateral). The IRRS team encourages Morocco to make its political commitment to implement the IAEA Guidance on the Management of Disused Radioactive Sources. AMSSNuR is sharing its regulatory experience, domestically and internationally. The promotional and supporting actions on AMSSNuR aiming to enhance nuclear and radiation safety in the region are recognized as an area of good performance.

3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY

3.1. ORGANIZATIONAL STRUCTURE OF THE REGULATORY BODY AND ALLOCATION OF RESOURCES

AMSSNuR is the regulatory body in Morocco responsible for nuclear and radiation safety, except that the authority to issue authorization for category I facilities rests with the Minister of Energy. **Recommendation R3 in section 1.3 addresses this issue**. The establishment of AMSSNuR is described in section 1.3 above. The roles and responsibilities of AMSSNuR are clearly defined in the Law. AMSSNuR is provided with adequate human and financial resources to carry out its regulatory functions and to fulfill its statutory obligations under the Law.

AMSSNuR is headed by the Director General who reports to the AMSSNuR's Board of Directors. The organizational structure of AMSSNuR was endorsed by the Board of Directors in 2016, in accordance with the Law. The organizational structure of AMSSNuR was developed with the aim to enable AMSSNuR to effectively discharge its responsibilities and perform its functions in a manner commensurate with the radiation risks associated with facilities and activities being carried out in the country. The AMSSNuR's Director General has the authority to modify the organizational structure with the approval of the Board of Directors, thereby rendering it flexible and adaptable to different circumstances and demands.

The organizational structure of AMSSNuR comprises Secretariat General, 5 units, three of which are falling directly under the office of the Director General, namely, Cooperation Unit, Information and Communication Unit, Emergency Preparedness and Response Unit, while the two others units are falling directly under the office of the Secretary General namely Internal Audit Unit and Legal Affairs Unit; and the following 4 departments, Nuclear Safety Department, Nuclear Security and Safeguards Department, Radiological Safety and Environmental Protection Department, and Finance & Administration Department. There are several divisions operating under these 4 departments. The roles and responsibilities of the various departments, divisions, and units of AMSSNuR, as well as the responsibilities of the Director General, the Secretary General, the Heads of Department, Divisions and Services and other staff of the AMSSNuR are well defined and documented. There is a fair distribution of human resources, adopting a graded approach, within the organizational structure of AMSSNuR. However, there is room for optimization of the resources.

The organizational structure of AMSSNuR has proven to be rather effective and efficient considering the achievements of the organization since its establishment in 2016. AMSSNuR is in the process of reviewing its organizational structure to adapt itself to the evolution of the organization and the emerging needs of the country. AMSSNuR is encouraged to pursue its efforts to review its organizational structure for an optimization of its resources to ensure effective and efficient discharge of its regulatory functions.

3.2. EFFECTIVE INDEPENDENCE IN THE PERFORMANCE OF REGULATORY FUNCTIONS

The Law established AMSSNuR as an independent regulatory body under the direct authority of the Head of the Government of Morocco. The annual budget of AMSSNuR is provided by the government in accordance with procedures governing the state budget. All revenues collected by AMSSNuR are directly transferred to its bank account and controlled by the government according to the provision of the article 171 of the Law. AMSSNuR has financial autonomy, and its budget is managed by the Board of Directors, and this contributes to ensure effective independence in the performance of its regulatory functions.

AMSSNuR has established a comprehensive integrated management system, with a clear assignment of responsibilities for safety, security and safeguards. A comprehensive set of procedures for the execution of its core regulatory functions is also well established. AMSSNuR ensures that its decision-making process

for safety is not based on individual staff members. AMSSNuR also ensures that there is no conflict of interest while hiring services from technical service organizations and advisory bodies.

According to the provisions of the Law, AMSSNuR exercises its duties without engaging in or undertaking any activity related to the use of nuclear energy or ionizing radiation sources. There are also adequate provisions in the Law, for AMSSNuR to perform all its regulatory functions without any undue influence from parties having an interest in the application of nuclear technology.

In accordance with the Law, AMSSNuR inspectors have the authority to stop any activity that is an immediate risk to nuclear or radiation safety. Based on the provision of the Law, any inspector of AMSSNuR having a direct or indirect interest with a facility or activity in relation to their service, that it is likely to compromise their independence, cannot be designated as an inspector for the control of this facility or activity.

3.3. STAFFING AND COMPETENCE OF THE REGULATORY BODY

At its inception in 2016, AMSSNuR had 17 staff. The number of staff at AMSSNuR has gradually increased, and presently AMSSNuR has a total of 81 staff, comprising 33 technical staff with different technical backgrounds to perform the core regulatory functions.

AMSSNuR has established a human resource plan which is being implemented. Considerable progress has been made by AMSSNuR to have sufficient qualified and competent staff to fulfill its obligations.

According to its Human Resource Plan, AMSSNuR has planned to further expand its workforce. AMSSNuR is actively pursuing its efforts for the recruitment of additional staff to ensure that it has a sufficient number of qualified and competent staff to effectively perform all its assigned regulatory functions. Most of AMSSNuR staff have academic degrees and have passed through a rigorous selection process including written and oral examinations. The new recruits are provided with the necessary training to acquire the necessary knowledge, skills, and competence to effectively carry out their assigned duties. Besides the training provided by AMSSNuR, the staff also benefit from the training provided through the various international cooperation projects with the IAEA, European Union (EU) and other partners.

With the assistance of the IAEA and the EU, AMSSNuR has conducted a competence gap analysis exercise using the Systematic Assessment of Regulatory Competence Needs (SARCoN) tool. The tool was modified and adapted to the need of AMSSNuR for a comprehensive competence gap analysis. Based on the results of the exercise, AMSSNuR has developed a training programme for its staff which is being implemented.

In accordance with the Law, AMSSNuR gives its advice to the Administration for the authorization of category I facilities. However, the IRRS team noted that AMSSNuR needs to further develop specialized competence to reassess all safety related subjects in regulating the nuclear research reactor. In such a case, AMSSNuR should therefore consider either building the necessary in-house competence or hiring the services of external experts having the necessary competence for the re-assessment. This issue is addressed in the Suggestion S2 below.

Under the legal framework, AMSSNuR has the authority to regulate radioactive sources and radiation generators, except those specifically exempted, applying notification and authorization processes; the authorization process includes both licensing and registration. However, historically the authorization for possessing radiation sources was granted by the previous regulatory bodies in-perpetuity upon approval of an import request. Therefore, entities who gained possession of radioactive sources and radiation generators under the previous regulatory system will be required to apply for an authorization or to submit a registration, as applicable to comply with the requirements of the decree 2-20-131 published in 2021 and entered into force in October 2023. This implies that AMSSNuR will receive a significant number of applications for authorization. This will constitute a significant increase in workload for all the core

regulatory functions including safety and security assessment, authorization, inspection, and enforcement, which needs to be considered by AMSSNuR in its human resource plan.

The IRRS team acknowledges the need for AMSSNuR to enhance technical competence in some specialized areas to effectively regulate all the safety aspects of the nuclear research reactor such as site evaluation or criticality safety and the new practices planned to be introduced in the country, related to mining and processing of radioactive ores. **Suggestion S2 below addresses this issue.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *AMSSNuR has made significant progress in implementing its human resource plan to ensure it has sufficiently qualified and competent staff to fulfill its assigned responsibilities. However, in a few specialized areas there are gaps in the technical competence of AMSSNuR to regulate the nuclear research reactor and the new practices planned to be introduced in the country, in particular related to mining and processing of radioactive ores.*	
(1)	**BASIS: GSR Part 1 (Rev.1) Requirement 18 states that** *"The regulatory body shall employ a sufficient number of qualified and competent staff, commensurate with the nature and the number of facilities and activities to be regulated, to perform its functions and to discharge its responsibilities."*
(2)	**BASIS: GSR Part 1 (Rev.1) Requirement 18 para. 4.11 states that** *"…A human resources plan shall be developed that states the number of staff necessary and the essential knowledge, skills and abilities for them to perform all the necessary regulatory functions."*
S2	**Suggestion: AMSSNuR should consider updating its human resource plan and implementing it to ensure that the necessary specific technical competence to regulate all safety aspects of the nuclear research reactor, and new practices planned to be introduced in the country is available.**

3.4. LIAISON WITH ADVISORY BODIES AND SUPPORT ORGANIZATIONS

According to the Law, AMSSNuR may seek external consultants to get advice or support. AMSSNuR has a mechanism in place to hire the services of advisory bodies and technical scientific organizations (TSOs). In cases where AMSSNuR would require hiring the services of an external consultant for advice or support, there are adequate provisions in place to ensure that there will be no conflict of interest and that AMSSNuR will retain responsibility for all regulatory actions. There are also provisions for AMSSNuR to exercise due diligence to ensure that there is impartially in the advice being provided by consultants or TSOs.

AMSSNuR obtains services from TSOs in the country, from CNRP for the personal radiation monitoring of its technical staff, and from CNSTEN for the calibration of its radiation detecting equipment. A draft decree has been developed to ensure the impartiality and independence of these service providers.

3.5. LIAISON BETWEEN THE REGULATORY BODY AND AUTHORIZED PARTIES

While maintaining its independence, AMSSNuR has created and maintains communication channels with the authorized parties to achieve their common objectives in ensuring safety. AMSSNuR regularly organizes meetings with the authorized parties to discuss safety related issues.

It is possible for authorized parties to communicate with AMSSNuR using official letters, emails, face-to-face meetings and various social media and IT platforms.

AMSSNuR has developed a series of guidance documents to assist the authorized parties in complying with the regulatory requirements.

3.6. STABILITY AND CONSISTENCY OF REGULATORY CONTROL

AMSSNuR has established an integrated management system with clearly defined processes and procedures for the execution of its core regulatory processes. There are also internal guidelines, checklists and working instructions for the execution of the core regulatory functions, thereby ensuring the stability and consistency of regulatory control.

The supervision of the core regulatory processes is well established at AMSSNuR. The heads of departments, divisions, and services exercise adequate supervision of the various regulatory processes and ensure compliance with the established procedures and working instructions, thereby avoiding subjectivity in the execution of the regulatory processes. AMSSNuR has developed performance indicators for each of its processes to evaluate its performance and this ensures consistency of the regulatory control.

The authorization and inspection processes have been digitalized. The processes are being now managed by 'Système Intégré de Gestion des Activités Métiers' (SIGAM), the new information management system developed by AMSSNuR. It is planned that SIGAM will be further developed to handle other regulatory processes. The digitalization of the regulatory processes has further contributed to improving the stability and consistency of the regulatory control being exercised by AMSSNuR.

Through its well-established communication strategy, AMSSNuR maintains effective communication of its regulatory processes to all interested parties using various communication channels.

3.7. SAFETY RELATED RECORDS

AMSSNuR maintains all relevant safety related records. However, the national dose register for the occupational exposure of radiation workers is currently being maintained by the CNRP, the former regulatory body. It is planned that these records be transferred and maintained by AMSSNuR (in accordance with the Decree 2-23-151). There are also provisions in place for AMSSNuR to require the authorized parties to maintain the relevant safety records.

AMSSNuR uses different electronic systems to maintain its safety related records. SIGAM is the new information system developed by AMSSNuR for managing and archiving all its regulatory information. The system has been launched, in October 2023, and is currently managing all the online applications for authorization. SIGAM is linked with the PortNet system, the unified electronic platform being used in Morocco for import and export authorization.

The national register of sources is being maintained by AMSSNuR using RAIS 3.4 Web. The national register of sources was previously maintained by the CNRP. AMSSNuR is in the process of verifying and updating the national register of sources. It is planned that the national register of sources will be maintained under SIGAM.

All other safety related records are being digitalized and maintained using a shared electronic folder on the local area network which is accessible to the staff of AMSSNuR. Another electronic system has also been recently developed by AMSSNuR to maintain the documents of its integrated management system and to render them easily accessible to the staff.

AMSSNuR has planned to further develop SIGAM to maintain all its safety related records in one single electronic system for them to be easily retrieved and be readily available for use in support of its regulatory functions.

3.8. COMMUNICATION AND CONSULTATION WITH INTERESTED PARTIES

AMSSNuR is committed to a high level of transparency and openness and, as part of its new strategic plan 2022-2026, has established a proactive communication strategy with an aim to strengthening public

confidence in its organizational role. In implementing its communication strategy, AMSSNuR has developed a comprehensive communication plan focusing on the following areas:

- Institutional communication;
- Media and non-media communication;
- Digital communication;
- Internal communication;
- Communication in case of a nuclear or radiological emergency;
- International communication.

Besides establishing relationships with interested parties through the media, AMSSNuR has set up a non-media communication programme, through the holding of meetings with operators and other national authorities in the nuclear and radiological sectors. AMSSNuR has strengthened its internal communication, and established and maintains good communication with countries in the region and international organizations, including the IAEA and the EU.

AMSSNuR makes optimum use of the various online social media platforms, namely LinkedIn, X (formerly Twitter), Facebook, Instagram, and YouTube, for effective communication and consultation with all its interested parties in an open and transparent manner. The number of subscribers on social media accounts of AMSSNuR has increased from 4,800 in 2021 to 6,651 in 2022, and this has clearly demonstrated the effectiveness of the AMSSNuR's communication strategy. The website of AMSSNuR has also been revamped and currently has more than 17000 visitors annually. AMSSNuR annual reports are published regularly on its website and disseminated to all relevant stakeholders. SIGAM is also being used by AMSSNuR as a tool for communication.

The communication strategy established by AMSSNuR has proven to be very effective and efficient. The IRRS Team acknowledges the implementation of a proactive communication strategy by AMSSNuR with an optimum use of the various online social media platforms for effective communication with interested parties and considers it a good performance.

3.9. SUMMARY

Morocco has established AMSSNuR as the sole independent regulatory body for the regulatory control of radiation facilities and activities. AMSSNuR has the necessary resources and effective independence to carry out its regulatory functions.

Overall, the responsibilities and functions of AMSSNuR are in good compliance with the IAEA safety standards. However, it is suggested that AMSSNuR considers an update of its human resource plan for effective competence and knowledge management within the organization.

The communication strategy of AMSSNuR, being comprehensive, transparent, and proactive, is recognized by the IRRS team as a good performance.

4. MANAGEMENT OF THE REGULATORY BODY

In Morocco, the core regulatory functions for radiation and nuclear safety and security are performed by AMSSNuR. In 2018, AMSSNuR, in cooperation with the European Union and the assistance of the IAEA, established a strategy for designing, implementing, and improving its Integrated Management System (IMS) based on IAEA safety standards, best practices and other international standards. Within AMSSNuR there is an IMS unit directly under the Directorate General and two staff are entrusted with the tasks related to the implementation and continuous improvement of the IMS.

4.1. RESPONSIBILITY AND LEADERSHIP FOR SAFETY

AMSSNuR's senior management has developed the organizational policies and strategies, such as regulatory oversight policy, quality policy, strategy for upgrading the regulatory framework, IMS development and implementation strategy, communication strategy and cooperation strategy.

AMSSNuR has designated a steering committee that is responsible for directing the production of the IMS manual and procedures and implementing the developed processes of the organization, in accordance with the IAEA safety standards.

The heads of departments have set goals for safety and security. They are actively seeking information on safety performance within their area of responsibility and demonstrating commitment to improving safety performance. According to its strategic objectives, AMSSNuR establishes annual specific goals.

In cooperation with the IAEA, AMSSNuR is engaged in the development and reinforcement of leadership as well as appropriate attitudes and behavior for safety and security. Individual and institutional expectations are set out in a document on staff status of AMSSNuR. The expectations are also expressed by the mission and vision defined in the IMS.

AMSSNuR is communicating internally and externally on its values dealing with safety and security and ensuring that the manager's actions serve to encourage the reporting of safety related problems, to develop questioning and learning attitudes, and to identify and correct acts or conditions that are averse to safety. The AMSSNuR Director General communicates with the senior management and staff, encouraging questioning and learning attitudes. The entire staff is interviewed every year to collect their opinions and experiences performing in their work areas.

4.2. RESPONSIBILITY FOR INTEGRATION OF SAFETY INTO THE MANAGEMENT SYSTEM

The IMS manual contains all AMSSNuR policies, including the Director General Statement on Nuclear and Radiological Safety and Security Policy. Based on ISO 9001:2015 standard, the certification process of AMSSNuR's IMS is in progress and it is expected to be obtained in the first half of 2024.

AMSSNuR's senior management has established the goals and strategies in such a manner that safety is not compromised by other priorities. The management system of AMSSNuR is supported by their digital documentation platform containing more than 285 documents, and where its policies, procedures and working instructions are managed. SIGAM is used to record and archive all the data and information generated by AMSSNuR regulatory functions.

The Radiation and Nuclear Safety and Security policy is broken down into objectives established at all levels of the organization and are measurable and consistent with the strategies of AMSSNuR.

AMSSNuR regularly conducts self-assessments of its goals and strategic action plans to increase its performance in terms of safety and security as a priority. All personnel were involved in reviewing AMSSNuR's strategy in order to establish the new strategic plan for the period 2022-2026.

4.3. THE MANAGEMENT SYSTEM

AMSSNuR has established and is applying its IMS, which integrates safety, health, environmental, security, quality, human and organizational factor, societal, and economic elements.

The organizational structures, processes, responsibilities, accountabilities, levels of authority, and interfaces are specified in the IMS, and are aligned with the safety goals of the organization.

The IRRS team noted that for organizational changes in AMSSNuR there is no formal documented process to manage its organizational changes and appropriately analyze them to determine if they could have significant implications for safety. AMSSNuR is encouraged to define and to document a formal process in its management system for organizational changes that could have significant implications for safety.

The documentation of the IMS is controlled, and versions are tracked. Documents can only be created and revised by people assigned with editorial rights. All revised documents undergo a re-approval procedure in the same way as for the first release.

The regulatory decision-making process is documented in the IMS, including a detailed process flowchart for all the regulatory functions that displays the planned and systematic actions necessary to ensure all requirements are met. If necessary, a legal expert revises the decision before the final approval of Director General.

In the case of lower-level decision-making involving several AMSSNuR's departments, each head of department reviews the decision, and can request legal review, if necessary.

As a part of its safety and security culture strategy, AMSSNuR encourages teamwork to ensure the safety-security interface. In case conflict arises, the conflict will be resolved by the head of departments.

AMSSNuR has specified and defined the criteria used to prioritize the development and application of its IMS considering the safety and security importance. The graded approach is demonstrated, inter alia, in the inspection and authorization processes where facilities with higher risks are inspected more frequently, and in the authorization process, where the magnitude of evaluation depends on the category of the facility.

The documentation of the IMS is issued, controlled, and recorded according to the IMS procedures that define the responsibilities for the review, control, and approval of documents.

The IMS unit of AMSSNuR has developed its digital document platform, to be part of AMSSNuR digitalization strategy. This platform aims to ensure comprehensive accessibility to all documentation produced within the IMS Unit, thus contributing to the enhancement of organizational efficiency.

This platform is designed to facilitate access to all documents, serving as both a communication tool and a dynamic, interactive platform for the dissemination of information, soliciting suggestions for improvements, and fostering discussions on the progress of processes.

The IRRS team recognizes the development of AMSSNuR IMS as being an area of good performance considering the fact that AMSSNuR was created in 2016.

By establishing SIGAM (integrated business activity management system), AMSSNuR ensures that necessary information is available and accessible both internally and externally.

As part of the digitalization of its business processes, AMSSNuR has set up a management information system for its business functions covering, among other things, regulatory development, regulatory control,

support for the State, monitoring, public information, and international cooperation. The system was recently launched officially.

This system is intended not only to facilitate data exchange with various partners, but also to improve the quality of services provided to importers and exporters, and equipment subject to authorization, inspection and monitoring of regulated activities involving ionizing radiation sources. Through this system, AMSSNuR offers online services such as the ability for applicants and authorized parties to easily file, process, and track various types of authorization applications. SIGAM also enables the digitalization of the documentation demonstrating Morocco's fulfillment of its obligations for the application of safeguards under the Treaty on the Non-Proliferation of Nuclear Weapons and the country's commitments under the Additional Protocol.

In addition to the payment methods currently in use, SIGAM offers the option of online payment of authorization application fees. SIGAM now interfaces with the PortNet (national platform to facilitate end-to-end international trade and supply chain processes) and is open to data exchange with other systems.

4.4. MANAGEMENT OF RESOURCES

AMSSNuR adopted the IAEA SARCoN methodology and used the respective tool to determine necessary competences and resources to perform its regulatory functions. AMSSNuR has established a strategy to develop its own internal human capacity. When it’s not possible to build in-house capacity, AMSSNuR has the option to obtain external expert consultations.

AMSSNuR has established an evaluation and responsibility system to ensure that individuals at all levels are competent to perform their assigned tasks and to work in accordance with safety and security principles. AMSSNuR has adopted a systematic approach for training including verifying and evaluating the effectiveness of the training in relation to the regulatory needs and objectives.

The competence in leadership is ensured at all management levels through training sessions, teamwork, internal communication, reporting, etc. In 2022, AMSSNuR delegated two people from its management to participate in a two-year training in a European training program named “Leadership and Culture for Safety and Security”. The IRRS team was informed that an additional four people, if accepted by the training organizers, will participate in this training program, starting in 2024.

4.5. MANAGEMENT OF PROCESSES AND ACTIVITIES

Processes necessary for the performance of regulatory core functions are developed, modified, managed, and documented in the IMS. Each process considers interfaces with the other processes. The interactions between the different processes, in terms of input and output elements of each process, are reproduced in separate sheets specific to each process and on the flowcharts.

All processes are supported by procedures aligned with AMSSNuR’s strategic objectives.

AMSSNuR has established 23 processes, 36 procedures, and 23 sub-procedures to govern and guide their work. Even though AMSSNuR’s management system was only recently established, the processes for coverage of the regulatory activities are very close to completion (see section 4.3.), and the implementation of processes is ongoing.

The IRRS team was informed that each process has its own performance indicators, but the criteria of assessment have not been defined. AMSSNuR is encouraged to define those criteria.

AMSSNuR retains the overall responsibility when contracting out any project and when receiving any item, product, or service in the supply chain. In the IMS there are requirements for purchasing critical goods and services (including data handling) that are specified in accordance with the overall policy for the

procurement of critical goods and services. AMSSNuR specifies the scope and standard of a required product or service to assess whether the product or service supplied meets the applicable requirements.

AMSSNuR adopted processes for support activities, such as selection, evaluation, procurement, and oversight of the supply chain, which are connected and interfaced with core processes. Suppliers are selected according to safety criteria, and they are evaluated and rated before being retained in the supply chain in accordance with the purchasing process. For recurring needs and in order to not affect safety, the supply of goods and services is done by conventions and contracts between AMSSNuR, and the suppliers selected after evaluation.

4.6. CULTURE FOR SAFETY

A strategy has been established to develop, foster, and sustain a strong safety and security culture involving all staff and management in support of the principles of safety and security, and good behavior and attitudes for safety and security. The IMS promotes a strong safety culture by including documented mechanisms for exchanging ideas, involving staff in decision-making, and encouraging a questioning and learning attitude.

AMSSNuR's staff foster a strong safety and security culture based on communication, consultation, trust, collaboration, knowledge transfer and continuous improvement of practices. AMSSNuR's staff benefits from several training courses related to safety and security culture. During the last three years, AMSSNuR organized more than 60 events and more 370 person-week worth of training for its personnel. The objective is to prepare everyone to have common understanding of safety and security principles, safety and security culture, and their responsibilities by adopting the values dealing with transparency. AMSSNuR gives a high priority for training, teamwork and project management based on personal accountability in general manner and especially in relation to safety and security.

AMSSNuR has developed an evaluation sheet for each process. Using this sheet, AMSSNuR staff can anonymously indicate any problem and suggest any improvement related to the processes. AMSSNuR staff are encouraged to inform the department's head for any kind of concern or problem they have or have observed.

In cooperation with IAEA, AMSSNuR is engaged in the development and reinforcement of leadership as well as good attitudes and behavior in relation to safety and security on the part of individuals and teams. A strategy to develop leadership for safety and security and safety and security culture, based on IAEA requirements and international best practices, is one element of the IMS documents.

4.7. MEASUREMENT, ASSESSMENT, AND IMPROVEMENT

As part of its IMS, AMSSNuR has established a specific process and an associated procedure to manage, audit and evaluate continuously the IMS to identify opportunities for improvement.

Each process includes performance and management indicators reflecting the effectiveness of processes. Internal evaluation is carried out by the process owners and by auditors to measure and assess the effectiveness of processes and the ability to ensure safety.

AMSSNuR has established a process to assess regularly all the processes and the system both internally and through external assessment. The objective is to evaluate the complete IMS effectiveness and to identify opportunities for its improvement. Two kinds of self-assessment are conducted: internal audits and self-assessments using the IAEA SARIS tool. AMSSNuR also relies on an annual external auditor to assess its activities. AMSSNuR using a prepared questionnaire conducted safety culture self-assessment. The result has been communicated to the whole AMSSNuR staff via IMS digital document platform.

The IRRS team noted that periodic review of the IMS by the senior management is not conducted.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation*: Senior management of AMSSNuR has not conducted review of management system to confirm its suitability and effectiveness.*	
(1)	**BASIS: GSR Part 2 Requirement 13 para 6.6. states that** *"Senior management shall conduct a review of the management system at planned intervals to confirm its suitability and effectiveness, and its ability to enable the objectives of the organization to be accomplished, with account taken of new requirements and changes in the organization."*
R7	**Recommendation: AMSSNuR's senior management should conduct a review of the management system at planned intervals.**

4.8. SUMMARY

AMSSNuR has developed and implemented an integrated management system that supports its missions and is broadly consistent with the IAEA safety standards as well as European best practices.

IRRS team recommends that the senior management of AMSSNuR conducts a review of the management system to confirm its suitability and effectiveness.

Considering AMSSNuR was created in 2016, the IRRS teams recognized that the development of the comprehensive integrated management system is a good performance.

5. AUTHORIZATION

5.1. GENERIC ISSUES

The responsibilities for authorization are clearly defined between government and AMSSNuR. However, there are challenges in the coordination between authorities. **Suggestion S1 in Section 1.5** addresses the issue. According to the Law, AMSSNuR is responsible for making necessary arrangements for informing relevant stakeholders on regulatory processes and the aspects relating to the safety and security of authorized activities.

The authorization process is different for categories I and II facilities and activities. Authorizations of category I facilities are issued by the Administration. AMSSNuR issues authorizations for category II facilities. The Law requires applicants to submit documents demonstrating the safety of regulated facilities or activities to support their authorization applications, based on a graded approach. There are regulations specifying the documents to be submitted for the different facilities and activities. A submitted regulation pending approval would specify the ways to apply a graded approach in the regulatory activities with criteria, requirements, and safety objectives. The availability of technical competence to ensure independent assessment of authorization of the nuclear research reactor is addressed in Suggestion S2 in section 3.3.

AMSSNuR has made available on its website the various application forms for each type of authorization request with details on the list of documents to be submitted with the application forms.

In the Law, certain information, or activities that applicants and authorized parties must provide or obtain to support review and assessment by AMSSNuR for radiation sources authorization must be developed or performed by a recognized technical service provider. Currently, there are two service providers in Morocco, CNRP and CNESTEN, who can provide such services. No technical services have been authorized up to the present date, however, there is a submitted regulation that establishes the minimum requirements for these services that include provisions for the approval of national and foreign providers, with transitional provisions. Additionally, there are some services, such as neutron dosimetry and measurements that are not currently available in Morocco. This is considered within the submitted regulations. **Recommendation R2 in section 1.2 addresses the issue**.

Category I facilities were put in operation before AMSSNuR was created. Hence, AMSSNuR has no experience to serve as input for feedback into the licensing process. Nevertheless, the Law has provisions for every licensing step but siting. Decommissioning steps are described in submitted regulations.

AMSSNuR does not clearly include consideration of non-radiological risk in its authorization process. The environmental impact study process identifies each risk, radiological and non-radiological but it is not clear whether both are considered for safety studies, especially for category I facilities where non-radiological risks may be more significant. The Ministries of Industry and Commerce and of Employment and Social Affairs assess the conventional risks of nuclear facilities. Separate review can jeopardize the overall safety and security especially for CNESTEN facilities. **Suggestion S1 in section 1.5 addresses the issue of cooperation between authorities for authorization process.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The authorization process doesn't take into account the non-radiological risks.*	
(1)	**BASIS: GSR Part 1 (Rev. 1) Requirement 26 para 4.47 states that: "***Risks that are not related to radiation may arise in the operation of facilities or the conduct of activities, and these risks shall also be taken into account in the decision-making process of the regulatory body."*
S3	**Suggestion: AMSSNuR should consider developing an integrated safety approach including risks not related to radiation within the authorization process.**

5.2. AUTHORIZATION OF RESEARCH REACTORS

Morocco has one Research Reactor (TRIGA Mark II of 2 MW), which had been authorized for operation in 2009. This authorization was granted by the Ministry of Energy before the creation of AMSSNuR. AMSSNuR took over the responsibility for regulating the safe operation of the reactor when it was already in operation. Concerning the annual safety reports and other safety assessment reports conducted before 2015, they haven't been yet transferred to AMSSNuR. AMSSNuR is encouraged to continue pursuing access to all existing safety records from before its establishment.

In the case of new reactor projects, the IRRS team noted that there would be a need to develop the site evaluation guidance of category I facilities.

The form and content of the advice of AMSSNuR required by the law to Ministry of Energy is not defined in the IMS. In practice, AMSSNuR submits its advice to the Ministry through formal letters.

The reactor is mainly used to conduct training and no significant modifications have been reported yet. Provisions for authorization of modifications to the reactor facility are included in submitted regulation. The maintenance of the reactor, without modifications, is carried out on a scheduled basis.

5.3. AUTHORIZATION OF RADIOACTIVE WASTE MANAGEMENT FACILITIES

At present, the Law and Decree 2-20-131 establish the framework for licensing category I and II facilities and activities. According to the Law, category I facilities are authorized by the Administration whereas category II facilities are authorized by AMSSNuR.

In Morocco, radioactive waste is generated through the use of radioisotopes in medical, industrial, education and research activities. It concerns mainly disused sealed and unsealed sources, contaminated solid materials and liquid radioactive waste from the medical sector. So far, no spent fuel (SF) has been generated by the research reactor. It is foreseen that SF would be stored in a pool at the reactor building.

According to the Law 1-95-98, CNESTEN is assigned with the collection, treatment, and long term storage of radioactive materials. According to the article 84 of the Law, the transfer of the responsibility of radioactive waste from the generator to the institution in charge of the centralized management of radioactive waste begins when waste is received by this institution.

The Law requires disused sealed sources to be taken back by the producer. If this is not possible, CNESTEN takes charge of it. Operators of facilities and activities store the waste in their sites until their transferred to CNESTEN at the Mâamora nuclear center (CENM). Waste treatment and storage facilities at CENM were authorized by the Ministry of Energy in 2002, according to the Decree related to the authorization and control of nuclear facilities.

In line with the regulatory framework, RWM facilities are licensed by AMSSNuR as category II /class I facilities. Fissile material is not allowed in these facilities. The IRRS team encourages AMSSNuR and CNESTEN to address the treatment and storage of fissile material in future. Disposal is considered as the ultimate and sustainable solution for radioactive waste. Disposal facilities in Morocco will be authorized as category I facilities.

5.4. AUTHORIZATION OF RADIATION SOURCES FACILITIES AND ACTIVITIES

Under the regulatory system of Morocco, radiation sources facilities and activities are designated as category II, which is divided into Class I (highest) to Class V (lowest) commensurate with radiation risk. In accordance with the graded approach, Class I-IV radiation sources, facilities and activities are subject to authorization. Class V radiation sources facilities and activities are subject to notification. Regulations providing for the exemption levels are established.

AMSSNuR has developed procedures for the authorization or notification processes as well as forms and some guidance documents for the applicants. The forms for applications for authorization are available on AMSSNuR's website and additional guidance can be provided, if needed.

An authorization under category II will be issued for a maximum of five years and will be granted or renewed by AMSSNuR upon review and acceptance of an application that includes, but is not limited to, the following:

- The requested radiation source has been certified;
    - AMSSNuR accepts the certifications of other regulatory or certifying bodies;
    - for medical applications, AMSSNuR requires a certificate of registration issued by the Ministry of Health (see sections 5.8 and 9.8);
- There is appropriate qualification of the radiation protection officer and relevant staff in radiation protection;
- The submission of a safety analysis report that includes protection measures for workers, the public, and the environment against the effects of ionizing radiation;
- The equipment for detecting and measuring ionizing radiation is available;
- Exposure and medical monitoring of exposed workers is provided for;
- A radiological emergency plan is developed;
- A nuclear security plan a of facilities (if applicable);
- A transport plan (if applicable);
- A plan for management of radioactive waste (if applicable);
- An agreement with a supplier to return disused radioactive sources (if applicable).

Submission of applicable information for the renewal or modification of existing authorizations is required to support the decision-making process.

The IRRS team noted that the Law requires that certain information, including the safety analysis report to be submitted with an application, must be developed by a "recognized technical organization." However, no technical organizations have been recognized. Therefore, AMSSNuR directs applicants to use the services of CNESTEN or CNRP for non-medical applications, and for medical practices, the safety analysis report is typically prepared by the medical physicist. The IRRS team was informed that the situation is as such because the submitted regulations stipulating the conditions for seeking and granting recognition has yet to be approved. **Recommendation R2 in section 1.2 addresses this issue**.

5.5. AUTHORIZATION OF DECOMMISSIONING ACTIVITIES

Decommissioning of a nuclear facility is subject to authorization. No application for decommissioning has yet been initiated.

At present, no policy and strategy has been developed and approved for decommissioning. The regulations do not require an initial decommissioning plan as part of the application for authorization to operate, nor a final decommissioning report at the end of decommissioning activities. The IRRS team was informed that the submitted regulations dealing with the safety and authorization of category I facilities and activities, contain provisions for establishing an initial decommissioning plan and for making financial provision for decommissioning. **Recommendation R2 in section 1.2 addresses this issue.**

In the case of facilities or activities using radioactive sources, the Decree 2-20-131 on the authorization of category II facilities, requires from the authorized parties, as part of the authorization application, to provide information on the financial guarantees to cover the cost of managing disused sealed sources as well as the dismantling of the facility and remediation of the site to its original state.

5.6. AUTHORIZATION OF TRANSPORT

According to the Law, authorization for category I facilities and activities, including transport of nuclear material, requires authorization by the Administration following the advice of AMSSNuR. Authorization for category II facilities and activities, including transport of radioactive material, requires authorization by AMSSNuR. The Law provides that technical regulations for the transport of nuclear and radioactive material are set by AMSSNuR.

For the transport of radioactive material, AMSSNuR requires and reviews applications for authorization of shipment based on the requirements in regulations.

Approval of designs and shipments in the cases specified in SSR-6 (Rev. 1) is required in the dangerous goods transport regulations IMDG code, ICAO-TI and Law 30-05, as well as in the draft technical regulations.

Currently, there is no design of packages or special form radioactive material in Morocco, and there is no need for most of the other authorizations required in SSR-6 (Rev. 1). But there are, from time to time, packages for fissile material shipped to or through Morocco, which according to SSR-6 (Rev. 1) require multilateral approval of the design. These packages, designed and approved in other countries, should receive validation of the original package design approval or some other form of multilateral approval in Morocco. This need for multilateral approvals would significantly increase if Morocco decide to establish a nuclear power programme.

The above-mentioned multilateral approvals for designs of packages for the transport of fissile material, based on assessment of the compliance with the applicable regulations, are not done in Morocco. There is no staff trained specifically for performing assessment for these approvals. The approval of shipments solely relies on certificates issued in the countries where the packages were designed. **Suggestion S2 in section 3.3 addresses this issue.**

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *The design of packages containing fissile material is not approved as required in SSR-6* (Rev. 1).	
(1)	**BASIS: SSR-6 (Rev.1), para. 802 states that** *"Competent authority approval shall be required for the following: (a) Designs for: …(v) Packages containing fissile material, unless excepted by para. 417, 674 or 675 (see paras 814–816 and 820); ..."*
(2)	**BASIS: SSR-6 (Rev.1), para. 814 states that** *"Each package design for fissile material that is not excepted by any of the paras 417(a)–(f), 674 and 675 shall require multilateral approval."*
R8	**Recommendation: The competent authority should approve the design of packages containing fissile material in the cases required in SSR-6 (Rev.1).**

5.7. AUTHORIZATION ISSUES FOR OCCUPATIONAL EXPOSURE

An IAEA Occupational Radiation Protection Appraisal Service (ORPAS) mission was held in 2017, with the follow up in 2022, resulting in several recommendations to AMSSNuR, to service providers and to end users. Most of these recommendations have resulted in corrective actions.

The Department of Radiological Safety and Protection of the Environment of AMSSNuR has 15 staff involved in occupational radiation protection, public protection, and protection of the patient. A further four people are in the process of being recruited. The IRRS team was informed that all the staff in the department contribute to occupational radiation protection authorization, review and assessment, enforcement, and development of regulations. The basic occupational radiation protection legislation is the Law supported by the regulation 2-23-151. Additional submitted regulations were considered in the IRRS team review.

The regulation 2-23-151 is based on Council Directive 2013/59/EURATOM, that differs in some respects from the requirements of GSR Part 3, such as categorization of workers into categories "A" and "B", and the criteria for the establishment of controlled areas. Regulation 2-23-151 establishes the radiation protection principles of justification, optimization and limitation and includes annual dose limits for occupationally exposed workers, members of the public, trainees and pregnant workers that are in line with GSR Part 3. Optimization is achieved through dose constraints which are defined on a case-by-case basis by the applicant or authorized party and approved by AMSSNuR in the authorization documentation.

No technical services have been authorized by AMSSNuR. There is a submitted decree on the authorization of services that will be enforced after publication. **Recommendation R2 in section 1.2 addresses this issue.** Two services provide external individual monitoring services for photon and beta radiation, the National Radiation Protection Centre (CNRP) under the Ministry of Health and CNESTEN under the Ministry of Energy. There are currently around 6,000 radiation workers being provided personal radiation monitoring service. CNESTEN uses optically stimulated luminescence (OSL) dosimetry and is an ISO 17025 accredited laboratory. CNRP uses both optical stimulated luminescence (OSL) and thermoluminesence (TL) technology and has initiated the work necessary for ISO 17025 accreditation. The CNRP dosimetry service is the "official" external dosimetry service and the CNRP dose results are included in the National Dose Registry. CNRP provides dose reports in Hp(10) and Hp(0.07) for whole body dosimetry and provides extremity dosimeters and Hp(3) eye-dosimeters.

There is no national service for neutron individual dosimetry, calibration of neutron dose rate meters or radon dosimetry. There is a plan to map out radon concentrations in air in Morocco, with special attention to NORM. This plan will require many passive dosimeters, possibly justifying a radon dosimetry service in

Morocco. Article 18 of the submitted regulation on the approval of technical services states that when a service is not provided in Morocco, approval may be granted to a foreign service provider approved in its country of origin under conditions at least equivalent to those required by national regulations. It is therefore considered by the IRRS team that these services will be supplied to Morocco in an adequate manner. The Moroccan Accreditation Board of the Ministry of Industry and Commerce carries out the ISO 17025 accreditation of laboratories.

CNESTEN conducts in vivo internal dosimetry and calibrates photon dose rate meters and surface contamination equipment. CNESTEN also provides qualified expert services in the areas of safety assessment, workplace monitoring, shielding calculations, and others. The IAEA conducts the 5-month postgraduate training course in radiation safety in CNESTEN for French speaking African countries. Some training providers for Radiation Protection Officers (RPO) and qualified operators that are certified in France provide training services. AMSSNuR has not initiated the authorization process for training providers as the submitted regulation is not yet published. **Recommendation R2 in section 1.2 addresses this issue.** The National Dose Registry (NDR) is operated by CNRP. The NDR only contains information on external doses and is in the process of being transferred to AMSSNuR. This will facilitate the evaluation of national doses to enable optimization and for the establishment of inspection priorities.

The decree no 2.20-131 requires mine operators to curry out radiological characterization of other products. If NORM is exceeding the exemption levels and if the radiological impact is significant, the exposure of workers and the public is considered as planned exposure situation, and the practices are subject to the regulatory control either by declaration or by granting authorization. Further studies of the radiological conditions in these activities are encouraged by the IRRS team.

There are no requirements on the occupational radiation protection of aircrew for commercial flights and no calculation and recording of the effective doses. As the maximum commercial flying altitudes of Moroccan airlines is below 15km, there is no obligation to assess the aircrew doses in Morocco. However, there is a regulatory requirement from the Ministry of Transport to estimate aircrew doses for flights above 15km.

5.8. AUTHORIZATION ISSUES FOR MEDICAL EXPOSURE

The Regulation specifies the activities involving ionizing radiation and medical exposure that require an authorization from AMSSNuR and define the role and responsibilities of the different actors involved in the medical exposure. The authorization process reflects a graded approach depending on risk with different application forms developed depending upon the medical applications (radiotherapy, radiosurgery, nuclear medicine, interventional radiology, radiology), which require different levels of documentation to be submitted by the applicant. Only ionizing radiation equipment approved by the Ministry of Health can be used for medical purposes. Similarly, radiopharmaceuticals require prior radiopharmaceutical marketing authorization which is part of the documentation.

During the authorization process, the applicant is required to demonstrate the implementation of justification and optimization of patient doses through several documents: qualification and training of staff (medical practitioners, medical physicists, professionals handling sources and in charge of radiation protection of patients), a quality assurance program including the quality control of radiation sources for medical purposes, and responsibilities of actors in patient radiation protection in particular to ensure the application of all procedures related to justification and optimization. For nuclear medicine and brachytherapy, the applicant must include details of the procedures and measures put in place to ensure the radiation protection of the carers and comforters. In addition, when applying for renewal of the authorization, the file must also include a description of events or incidents, as well as feedback from these events.

In the field of the medical use of ionizing radiation, authorizations for the setting up and operation of private healthcare establishments and registration certificates for medical devices are under the authority of the Minister of Health and Social Protection while authorizations for the import, installation and use of ionizing radiation equipment are under the authority of AMSSNuR. AMSSNuR also grants prior approval for construction based on an assessment of the conformity of the design and layout of the premises. AMSSNuR carries out on-site pre-authorization inspections of facilities (class I and II) to ensure compliance with design and layout regulations, as part of the authorization process. Good coordination between the Ministry of Health and Social Protection and AMSSNuR is essential to improve the efficiency of the regulatory oversight. **Suggestion S1 in section 1.5 addresses this issue.**

5.9. AUTHORIZATION ISSUES FOR PUBLIC EXPOSURE

While providing for authorization of facilities and activities, the Law established the need of authorized parties to implement the measures necessary to protect the members of the public and the environment. As part of the documentation to be submitted to AMSSNuR, applicants for an authorization are required to prepare a safety assessment that includes an evaluation of doses to members of the public to demonstrate compliance with regulatory requirements, including by setting dose constraints values specific for public exposures that will be approved by AMSSNuR.

According to submitted regulations, applicants for an authorization to operate a facility or conduct an activity that involves the release of radioactive material to the environment are required to provide information on the source term, the discharge systems, and the provisions to be implemented for the control and monitoring of discharges. On the basis of this information, AMSSNuR establishes in the authorization the discharge limits to be observed to comply with approved dose constraints. In addition, the operator is required to implement a radiological environmental monitoring programme that is approved by AMSSNuR as part of the authorization granted.

Guidance on elements to be considered in the safety assessment and radiation protection programme to be provided by applicants as part of an application for authorization is available on AMSSNuR's website for several practices.

5.10. SUMMARY

AMSSNuR has established an authorization system covering the majority of facilities, activities and exposure situations, in accordance with the principle of a graded approach. Provisions for the authorization of some activities such as decommissioning are under submitted regulation pending approval.

Regulations require applicants for authorization to demonstrate compliance with requirements relevant for safety.

However, the IRRS Team identified the following areas for improvement:

- To develop an integrated safety approach including risks not related to radiation within the authorization process for facilities and activities.
- To provide for approval of the design of packages containing fissile material in the cases required in SSR-6 (Rev. 1).
- To initiate the approval process, by AMSSNuR for the service providers (e.g. dosimetry, calibration, training etc) as soon as possible.

6. REVIEW AND ASSESSMENT

6.1. GENERIC ISSUES

In accordance with provisions of the Law, AMSSNuR is empowered to request from the applicants or authorized parties, all documentation needed for the regulatory decision-making process on safety related matters.

Before issuing the authorization, AMSSNuR proceeds to the review and assessment in a way that is commensurate with the radiation risks associated with such facilities and/or activities. AMSSNuR has established, within its IMS, a formal process for review and assessment for category I and II facilities and associated procedures, guides, and evaluation plans in accordance with the graded approach covering all regulated facilities and activities and all aspects relevant to safety, security, and safeguards.

However, some basis for the review and assessment is included in draft regulatory documents submitted to the Government. **Recommendation R2 addresses this issue**.

These processes are also applicable to the review and assessment of reports to be provided periodically by authorized parties. The main steps are:

- Receiving the submission and ensuring its formal completeness;
- Conducting the preliminary review, by relevant staff, to ensure technical completeness;
- Conducting the review according to the evaluation plan;
- Performing the required consultations in-house and with relevant external stakeholders;
- Preparing the authorization.

This process is implemented by procedures specific to the various facilities and activities. Evaluation is based on a graded approach and includes the interface between safety and security, when applicable, to allow the reviewers to give an appreciation on the compliance or consistency with applicable requirement and guidance. The criteria of the review and assessment are consistent with and generally derived from the requirements stipulated in the national legislation and regulations. Evaluation plans are reviewed annually to include lessons learned from operating experience and new regulatory requirements.

During review and assessment, AMSSNuR might request additional information, organize meetings, and perform site visits or inspections to support the review.

6.1.2. ORGANIZATION AND TECHNICAL RESOURCES FOR REVIEW AND ASSESSMENT

AMSSNuR has set a strategy to recruit sufficient and qualified staff according to its needs (see Section 4). Moreover, as stated in the Law, AMSSNuR can use consultants or contractors, if needed. AMSSNuR has established MoUs with mature regulatory bodies throughout the world under which technical assistance and expertise may be requested, if needed.

6.1.3. BASES FOR REVIEW AND ASSESSMENT

The general regulatory review and assessment principles and the regulatory process implemented by AMSSNuR are established in the regulations and described in the AMSSNuR IMS.

6.2. REVIEW AND ASSESSMENT FOR RESEARCH REACTORS

No periodic safety review (PSR) of the CNESTEN research reactor has been performed despite nearly 15 years of operation. The role of the Ministry of Energy and AMSSNuR for organizing a PSR is not completely clear regarding provisions of art 183 of the Law. PSR requirements are stipulated in submitted

regulation. Nevertheless, the Ministry of Energy may request at any time the carrying out of a safety review in application of the nuclear facilities control decree 2-94-666. The review period is set at 10 years in the submitted decree on authorization of category I facilities and activities as is international practice.

AMSSNuR has not yet received a master document detailing the various activities to be performed, nor an associated schedule with major milestones, for carrying out a PSR, with related project and quality assurance processes.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *No periodic safety review (PSR) has been carried out on the CNESTEN research reactor since it has been put in operation in 2009. The authorization of this research reactor does not include when such PSR should be performed.*	
(1)	**BASIS: GSR Part 1 (Rev.1) Requirement 26 para. 4.39A states that** "*The regulatory body, in accordance with a graded approach, shall ensure that authorized parties routinely evaluate operating experience and periodically perform comprehensive safety reviews of facilities, such as periodic safety reviews for nuclear power plants [11]. These comprehensive safety reviews shall be submitted to the regulatory body for assessment or shall be made available to the regulatory body. The regulatory body shall ensure that any practicable safety related improvements identified in the reviews are implemented in a timely manner."*
(2)	**BASIS: SSR-3 Requirement 5 para. 4.25 states that** *"Systematic periodic safety reviews of the research reactor in accordance with the regulatory requirements shall be performed throughout its operating lifetime, with account taken of operating experience, the cumulative effects of ageing, applicable safety standards and safety information from all relevant sources."*
(3)	**BASIS: Code of Conduct on Research Reactors para. VI.19.(d) states that** *"The regulatory body should: …(d) Review and assess submissions on safety from the operating organization both prior to authorization and periodically during the life of the research reactor as appropriate, including in relation to modifications, changes in utilization and experimental activities important to safety;…"*
(4)	**BASIS: Code of Conduct on Research Reactor para. VI.20(c) states that** *"The regulations and guidance established by the State or the regulatory body according to national arrangements should:… (c) Require the operating organization to undertake periodic safety reviews at intervals determined by the regulatory body and to make proposals for upgrading and refurbishment arising from such reviews as necessary…"*
R9	**Recommendation: AMSSNuR should define the regulatory requirements for a PSR of the CNESTEN TRIGA Mark II reactor, so that the PSR can be conducted as soon as possible.**

AMSSNuR needs to develop a strategy to review and assess safety related files based on strong competences. There is no TSO identified to support AMSSNuR in its task, especially in some specialized cases (criticality, fire protection, civil engineering…) even if AMSSNuR lacks some technical competencies. **Suggestion S2 in section 3.3 addresses this issue**.

The authorized party reports any significant event for review and assessment by AMSSNuR. In the safety analysis report, there is a non-exhaustive list of ten events to be reported by the authorized party about safety related events. An order is part of the submitted regulation to the government for events management and notification enhancement.

Finally, there is no decommissioning plan provided for in the authorization documents of CNESTEN Reactor. This area has to be included in the PSR and reviewed accordingly. **Recommendation R13 in section 9.5 addresses this issue**.

6.3. REVIEW AND ASSESSMENT FOR WASTE MANAGEMENT FACILITIES

The applicants for authorizations of categories I and II facilities and activities require a safety analysis. For category I facilities, AMSSNuR evaluates the application files and advises the Administration about the nuclear and radiation safety and nuclear security aspects of the facility/activity. For waste management facilities (category II, class I) AMSSNuR grants the authorization.

Review and assessment of the application files are performed according to IMS procedures for category I, and category II facilities and activities. For each authorization phase (construction, operation, decommissioning) of a waste management (or disposal) facility, an update of the information needs to be be provided by the applicant, as well as for a modification of the facility, having impact on safety, security, or safeguards. The Law requires the authorized parties to perform a review of the potential impact on the safety and on the environment, to be evaluated by AMSSNuR. Although the Law specifies that the operator shall perform a PSR at regular intervals as defined in the authorization, , no periodicity for the review of the safety and security of the facility or activity is documented. The submitted regulation on safety and authorization of category I facilities and the submitted regulation on safety of radioactive waste, disused radioactive sources and spent fuel management both include a periodicity of 10 years for the review of safety and security of a facility. **Recommendation R2 in section 1.2 addresses this issue.**

6.4 REVIEW AND ASSESSMENT FOR RADIATION SOURCES FACILITIES AND ACTIVITIES

The review and assessment process and procedures to support the issuance of an authorization for category II radiation sources facilities, and activities are well developed. AMSSNuR has established several documents that include the timelines for review and assessment, the general flow of the review and assessment and provide internal guidance to staff in carrying out review and assessment for different types of facilities and activities with radiation sources. These tools are not only used for new applications but also for the renewal and modifications of existing ones. These documents also include both safety and security aspects in the review and assessment process.

The Law requires justification for any use of radiation and prohibits certain practices and activities. AMSSNuR requires applicants to include their justification in the application for authorization. AMSSNuR also reviews the justification as part of the review and assessment of the application and guidance is given in the procedures on the broad principle of justification. However, there is no specific criteria or considerations specific to non-medical human imaging in the guidance that would allow AMSSNuR to ensure that review and assessment is consistent and that the conclusions drawn are in keeping with the radiation safety principles that Morocco has defined. For example, there is no criteria, consistent with IAEA safety standards, including that human imaging using radiation for theft detection purposes shall be deemed to be not justified.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *There are no specific criteria or considerations to review the justification of practices for non-medical human imaging.*	
(1)	**BASIS: GSR Part 3 Requirement 10 para. 3.20 states that** *"Human imaging using radiation for the detection of concealed objects for anti-smuggling purposes shall normally be deemed to be not justified. If, in exceptional circumstances, the government or the regulatory body decides that the justification of such human imaging is to be considered, the requirements of paras 3.61–3.67 shall apply."*
(2)	**BASIS: GSR Part 3 Requirement 10 para. 3.21 states that** *"Human imaging using radiation for the detection of concealed objects that can be used for criminal acts that pose a national security threat shall be justified only by the government. If the government decides that the justification of such human imaging is to be considered, the requirements of paras 3.61–3.67 shall apply."*
(3)	**BASIS: GSR Part 3 Requirement 18 para. 3.61 states that** *"…The justification process shall include the consideration of:* *(a) The benefits and detriments of implementing the type of human imaging procedure;* *(b) The benefits and detriments of not implementing the type of human imaging procedure;* *(c) Any legal or ethical issues associated with the introduction of the type of human imaging procedure;* *(d) The effectiveness and suitability of the type of human imaging procedure, including the appropriateness of the radiation equipment for the intended use;* *(e) The availability of sufficient resources to conduct the human imaging procedure safely throughout the intended period of the practice."*
S4	**Suggestion: AMSSNuR should consider including specific criteria and considerations in the justification process of non-medical human imaging practices.**

6.5. REVIEW AND ASSESSMENT FOR DECOMMISSIONING ACTIVITIES

Decommissioning activities are currently not being conducted in Morocco. Therefore, no specific issues are reported.

6.6. REVIEW AND ASSESSMENT FOR TRANSPORT

AMSSNuR reviews and assesses applications for authorization of transport against applicable regulations. As part of this assessment, the radiation protection program, suitability of the transport conveyances, training of the workers and arrangements for emergency response are checked. This assessment is consistent with the requirements of SSR-6 (Rev.1). But since Morocco does not approve designs and shipments according to the requirements of SSR-6 (Rev.1), as described in section 5.6, the systematic review and assessment for these approvals required by SSR-6 (Rev.1) are not carried out.

6.7. REVIEW AND ASSESSMENT FOR OCCUPATIONAL EXPOSURE

The actions of review and assessment are carried out by the Department of Radiological Safety and Protection of the Environment using dedicated checklists. Applicants are required to demonstrate compliance with the current and submitted decrees and regulations, in particular decree 2-20-131. Some guidance documents are available to authorized parties and applicants such as the content of radiation

protection programme. The required documentation for review and assessment includes the safety analysis report or risk assessment, the radiation protection programme, classification of areas, categorization of occupationally exposed workers, protective measures, individual and workplace monitoring and recording, information on the RPO, the medical doctor, and the preparation of local instructions and work procedures.

6.8. REVIEW AND ASSESSMENT FOR MEDICAL EXPOSURE

Review and assessment of medical applications is performed by the radiological safety department of AMSSNuR, that review applications for authorizations and perform inspections.

AMSSNuR staff have at their disposal a procedure on the examination, evaluation and authorization and procedures relating to the receipt of the authorization file and an inspection guide for verifying compliance. As part of the process for authorization application, a pre-authorization inspection is systematically carried out for radiology practices, radiotherapy, radiosurgery, and nuclear medicine services. The assessment focuses on documents in the authorization application file that demonstrate the implementation of justification and optimization of patient doses, measures put in place to ensure the radiation protection of carers and comforters, as well as feedback of events or incidents, if relevant.

Review and assessment are also carried out during planned inspections and the inspectors have at their disposal a guide describing the points to be checked during inspection on requirements relating to patient radiation protection: responsibility of the professionals, qualification, justification, optimization, management of incident situations, dose constraints.

6.9. REVIEW AND ASSESSMENT FOR PUBLIC EXPOSURE

Provisions to be implemented by authorized parties for the protection of members of the public are verified during the review of licensing documentation, specifically of the safety assessment and radiation protection programme. The Law requires the authorized parties to perform, at intervals approved by AMSSNuR, periodic reassessments of safety of authorized facilities and activities under their responsibility, and report to AMSSNuR on the results of this new assessment together with the measures to be implemented for improvement, when needed. Based on this information, AMSSNuR might impose new limits and conditions to the authorization. Other provisions require authorized parties discharging radioactive material to the environment to record the results of monitoring programmes and report them to AMSSNuR to demonstrate compliance with limits and conditions imposed in the authorization, with the intent of protecting the public and the environment against these releases.

6.10. SUMMARY

For occupational, public, and medical exposures and for category II facilities and activities, the licensee's documentation required for review and assessment is well defined, as is the review and assessment process.

The IRRS team identified areas for improvement regarding review and assessment:

- The PSR of research reactor to be submitted to AMSSNuR;
- Review and assess approvals of designs and shipments for transport activities;
- Regulate the non-medical human imaging by establishing criteria and considerations for reviewing and assessing justification of this type of practice.

7. INSPECTION

7.1. GENERIC ISSUES

In Morocco facilities and activities under regulatory control are inspected by AMSSNuR in accordance with a graded approach. Inspections may combine different aspects related to the facility or activity, like safety and security, or operation of the facility and transport of radioactive materials related to this operation.

AMSSNuR develops multi-year inspection programmes. From this multi-year planning annual inspection plans are derived. In category II facilities some unannounced inspections are performed.

Inspections are based on AMSSNuR internal guidance. These internal guides are generally considered suitable for preparing and performing the inspections for category II facilities and activities.

The inspection procedures are integrated in the IMS.

Inspections might involve interviewing the licensee and workers, verification of documents, observation of practices in the facility, measurements, and sampling. At the end of the inspection, licensees are informed about non-compliances observed during the inspection and of corrective actions or improvements to be made. Following the inspection, a report is prepared, and a letter is sent to the authorized party highlighting the deadline to provide the action plan for the implementation of corrective actions. Inspectors monitor the implementation of corrective actions and inspection recommendations, and inspections may be carried out to verify that corrective actions have been implemented. However, the procedures do not provide the criteria for planning a follow-up inspection to verify the implementation of the corrective actions. AMSSNuR is encouraged to include in its procedures the criteria under which it is appropriate to carry out follow-up inspections.

7.2. INSPECTION OF RESEARCH REACTORS

A multi-year inspection programme for the research reactor was formalized in a document of 2018 named “Inspection programme of TRIGA Mark II reactor operated by CNESTEN”. A joint visit of the site by AMSSNuR and IAEA was performed in 2017 to formalize the document. The annual inspection programme is defined in the action plan of AMSSNuR.

While AMSSNuR has the authority for regulatory oversight of this reactor facility they do not have all documentation, records, or reports upon which to ensure that oversight is appropriate for the current operations and the operational history. For example, an IAEA INSARR mission was performed in Morocco in 2005 but AMSSNuR does not have access to the mission report.

In the inspection programme, different types of inspection are defined such as routine or reactive. The 2017 IAEA mission report provides for two inspections per year for the research reactor. The first inspection by AMSSNuR was performed in 2018. A total of 9 inspections have been performed resulting in documented inspection reports, findings and follow up actions. The timeframe needed to complete the entire inspection cycle to cover all the identified inspection areas has not been defined by AMSSNuR, neither the inspection frequency has been determined.

The inspection guidance is developed as needed, adding thematic areas whenever an inspection is scheduled. So far 15 checklists for safety related areas have been developed.

Reactive inspections are provided in the IMS and can be performed in case of accidents, events, or information from the licensee. The inspection programme allows for both announced and unannounced

inspections, but no unannounced inspections have been performed in the research reactor. Unannounced inspections are important to be able to observe the licensee in a real-life situation.

AMSSNuR is currently developing a new inspection programme for the CNESTEN reactor facility to both enhance and complete the existing programme. Most thematic areas recommended by IAEA have been included in the inspection programme since 2018 but other specialized areas remain to be addressed. For some of these specialized areas, AMSSNuR will need to acquire specific competences to perform their regulatory functions. **Suggestion S2 in section 3.3 addresses this issue**.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Current AMSSNuR inspection programme for TRIGA Mark II facility does not cover some specialized safety areas and no unannounced inspections have been performed by AMSSNuR.*	
(1)	**BASIS: GSR Part 1 (Rev. 1) Requirement 28 states that** *"Inspections of facilities and activities shall include programmed inspections and reactive inspections; both announced and unannounced."*
(2)	**BASIS: GSR Part 1 (Rev 1.) Requirement 29 para 4.52 states that** "*Regulatory inspections shall cover all areas of responsibility of the regulatory body… These inspections may include, within reason, unannounced inspections. The manner, extent and frequency of inspections shall be in accordance with a graded approach*."
(3)	**BASIS: GSR Part 1 (Rev. 1) Requirement 29 para 4.50 states that** *"The regulatory body shall develop and implement a programme of inspection of facilities and activities, to confirm compliance with regulatory requirements and with any conditions specified in the authorization. In this programme, it shall specify the types of regulatory inspection (including scheduled inspections and unannounced inspections),and shall stipulate the frequency of inspections and the areas and programmes to be inspected, in accordance with a graded approach."*
(4)	**BASIS: GSR Part 1 (Rev. 1) Requirement 29 para. 4.52 states that** *"Regulatory inspections shall cover all areas of responsibility of the regulatory body, and the regulatory body shall have the authority to carry out independent inspections."*
(5)	**BASIS: GSG-13 para. 3.232 states that** *"For verification of the overall performance of the authorized party, inspections of adequate depth should be conducted in a wide range of subject areas and at appropriate intervals. Each planned inspection should have objectives that have previously been specified by the regulatory body to serve to the extent practicable as guidance for inspectors."*
R10	**Recommendation: AMSSNuR should enhance the inspection programme for the research reactor by** **-Including additional specialized safety related areas;** **-Stipulating the associated frequencies;** **-Performing unannounced inspections.**

7.3. INSPECTION OF WASTE MANAGEMENT FACILITIES

Inspections are organized following a generic inspection process and procedures integrated in the IMS. Inspectors use facility specific inspection guides, containing a checklist of items. Up to now, inspections for safety and security are performed separately. It is planned that from 2024 on, they will be performed in

a coordinated/integrated manner for the waste management facilities. AMSSNuR inspectors ensure the follow-up of inspection findings and observations made during the inspection or as result of the evaluation of procedures and reports. Inspections in waste management facilities are mainly announced inspections, but can be unannounced or reactive, as the result of an unforeseen event.

7.4. INSPECTION OF RADIATION SOURCES FACILITIES AND ACTIVITIES

AMSSNuR has developed a process and procedures for inspections of radiation facilities. The procedures include steps for developing annual inspection programme based on a graded approach taking into consideration inputs such as AMSSNuR's strategic action plan, previous years' inspection programme, authorizations granted, the national registries, results of past inspections and incident reports. The minimum frequency of inspections is set out in an internal procedure.

Announced and unannounced inspections are carried out. The scope of the inspections covers both safety and security of radiation sources and involve inspectors from relevant technical departments. AMSSNuR has qualified staff who have been trained to conduct proper inspections and there are internal guides and detailed checklists to facilitate inspections. The IRRS team was informed that during inspections, the inspectors, in addition to reminding applicants or authorized parties about AMSSNuR's mission and providing information about the inspection as specified in the inspection procedures, inform them of any relevant changes to the regulatory framework.

AMSSNuR conducts an evaluation of its inspection processes and an analysis of inspections findings between 2017 to 2022 was carried out. Such analysis and inspection results are used as feedback to the regulatory process.

For the performance of their duties, AMSSNuR inspectors only have access to facilities, premises and means of transport in the presence of the operator or their representative. In the event that the operator cannot be reached or if they oppose the access, or if it is a private property, inspectors can ask the competent public prosecutor to authorize them to access the premises.

7.5. INSPECTION OF DECOMMISSIONING ACTIVITIES

No decommissioning activities are ongoing.

7.6. INSPECTION OF TRANSPORT

AMSSNuR conducts inspections of the transport of radioactive material, both announced and unannounced. Inspections of transport activities are performed at the sites of the consignor, the carrier, or the consignee and can be combined with inspections of other areas of work of the facility or as stand-alone transport inspections.

Planning for inspections is carried out some years in advance, adjusting the frequency of the inspections to the risk associated with the transport operation. From this multi-year planning, annual plans are developed. High risk activities such as transport of non-destructive testing devices containing radioactive sources, are inspected annually.

AMSSNuR has created a special guide for transport inspections. This guide has been derived from the Technical Guide "Compliance Inspections by the African Competent Authorities on the Transport of Radioactive Material". All stages of an inspection are correctly specified in this guide.

7.7. INSPECTION OF OCCUPATIONAL EXPOSURE

For category II facilities and activities, reactive, announced, and unannounced inspections can be conducted, however, most inspections performed are announced. The licensee's compliance with occupational radiation protection requirements in the current and submitted legislation and regulations is verified. Compliance checks include, for example, the authorized party's risk assessment; classification of workers; dose records, controlled and supervised areas; proper use of dosimeters, calibration, testing and maintenance of equipment; competence and training programs; and records of occupational dose and compliance with dose constraints and dose limits.

Inspections consist of interviews of management and employees involved in radiation use and radiation protection, reviews of the authorized parties' documentation and records regarding radiation protection, and observations of work techniques and work practices.

7.8. INSPECTION OF MEDICAL EXPOSURE

Inspections in the medical sector are performed by inspectors from the radiological safety department of AMSSNuR for medical applications, who also examine authorizations. They are accompanied by inspectors from the nuclear security and safeguards department in certain situations (high-activity sources, radioactive waste).

An inspection program has been defined for medical applications, with a risk-based graded approach. High-risk medical applications are inspected every year (radiotherapy, radiosurgery, therapeutic nuclear medicine, interventional radiology). Inspectors are provided with checklists for each medical application. For medical exposure, inspection areas include the training of professionals using radiation for medical exposure, discharge instructions given to patients who have undergone a nuclear medicine or brachytherapy procedure, justification (prescription), measures taken to optimize doses (quality control programme, calibration, maintenance of medical devices, optimization protocols), measures taken for pregnant and breast-feeding women, traceability of various checks (patient dose monitoring, quality control, maintenance, etc.), incident and accident management.

The inspectors carry out dose rate and contamination check during their inspections.

7.9. INSPECTION OF PUBLIC EXPOSURE

AMSSNuR has developed a procedure and checklists for inspection of radiation facilities that include, as applicable, the equipment used for the monitoring of discharges, the status of records of radioactive materials in use and waste produced. During the inspections, the provisions for the protection of the public established in the safety assessment approved by AMSSNuR as part of the authorization are verified. Inspectors carry out measurements of dose rate in public areas in the facilities and check, where applicable, the provisions for the control of visitors to supervised and controlled areas.

7.10 SITE VISITS

Inspection of the research reactor, radioactive waste treatment and storage facilities

The IRRS team observed an announced inspection at CNESTEN research reactor and waste treatment and storage facility at the site of Kénitra. The purpose of the inspection was to verify the implementation of the research reactor maintenance program and assessment of the safety of radioactive waste management. A checklist of all requirements applicable to the subject of the inspection had been prepared prior to the inspection.

The IRRS team observed the entrance meeting where the management of CNESTEN was present and accompanied the inspection of the reactor building and of the treatment and waste storage facilities.

The inspection team was led by a chief inspector and included a group of five inspectors from the safety department of AMSSNuR. This inspection was planned to take place over two days. AMSSNuR requested CNESTEN to provide relevant documentation before the inspection. However, CNESTEN provided the requested documentation during the entrance meeting. The first day activities included an entrance meeting during which the objectives of the inspection were communicated, and previously requested documentation was reviewed by the inspector. The entrance meeting was followed by an inspection to the facility. The second day was planned to discuss inspection findings with the operator and for the exit meeting where the main conclusions and recommendations of the inspection were to be presented by AMSSNuR.

The IRRS team observed that AMSSNuR and the licensee exchanged opinions in a structured way and maintained very good communication throughout the discussions. The licensee managers confirmed the good relationship and open communication with AMSSNuR and suggested the inspectors to give priority in the inspection report to the regulatory requirements for safety related issues. They recognized the improvement in the competence of the inspectors, while highlighting that there is still some room for further improvement.

Inspection of a radiation source facility

The IRRS team attended an announced inspection at a non-destructive testing company in Casablanca. The IRRS team noted that the inspection was prepared and performed in a professional manner by AMSSNuR inspectors who demonstrated a high level of competency and understanding of all issues discussed during the inspections.

Two AMSSNuR inspectors concentrated on radiation safety, including occupational radiation protection, verification of the source and device inventory, examination of operational procedures, training and qualification of RPOs and qualified operators, discussion of the emergency plan, and examination of records of leak testing. Two additional AMSSNuR inspectors focused on security including a review of the security plan changes and verification of the list of persons with authorized access to the radioactive sources. After the entrance meeting, that included the management, the RPO and associate RPO, and the records verifications, the inspectors had the licensee demonstrate the arrangements for the transport of the NDT equipment, including verification that emergency contact information was available in the transport vehicle, and a physical inventory was taken of the NDT projectors in the main bunker. The security inspectors also evaluated the security systems around the storage bunker. The inspection finished with the closing meeting where the inspectors presented their observations to the licensee.

The licensee commented that they have a cooperative relationship with AMSSNuR and expressed that the inspectors appear to have the necessary level of competence and professionalism. The licensee also noted that the evolution of the radiation safety and security framework, since the establishment of AMSSNuR, has been a positive experience and that they consider the improvements in safety and security to be beneficial and worthy of the investment.

The IRRS team also observed that the inspectors were well prepared for conducting the inspection. Each inspector had a role in the inspection, and they worked as a team. Finally, the inspection team demonstrated the application of appropriate radiation protection considerations by utilizing appropriate radiation detection equipment and dosimetry.

Inspection of transport

The IRRS team observed announced inspections for transport at two sites. The inspections were well organized, prepared and carried out very professionally.

The licensee pointed out that the communication with AMSSNuR is very good and stressed the importance of having guidance available for supporting the application of the regulations.

Inspection of a radiotherapy facility

The IRRS team observed a planned and announced inspection performed by AMSSNuR at a private clinic. Three inspectors carried out the inspection.

The inspection started with an entrance meeting where the following subjects, based on document review, were covered : review of authorization to identify changes in equipment and personnel, organization of radiation protection and medical physics, source inventory, roles and responsibilities of personnel (delegation of tasks) including radiation protection officers, qualification and training of personnel in radiation protection of workers and patients, radiation protection of workers with a special focus on pregnant women, incident management and feedback, maintenance, calibration and quality control of equipment. A physical inspection was then carried out to verify compliance with reference to a checklist. The inspectors carried out some verification measurements (e.g. dose rates at the scanner door during operation). The inspection closed with the inspectors sharing the results of the inspection and the authorized party providing feedback on regulatory matters.

The IRRS team observed that inspectors conducted themselves in a professional manner and they were well-prepared with inspection plans. Inspectors also informed the authorized party about the recent approval of the decree on radiation protection of workers, the public and environment, and provided clarifications on the new requirements and information on the SIGAM system.

The authorized party described the relationship with AMSSNuR as fluid and collaborative, stating that AMSSNuR was doing a good job. The authorized party shared their view that there should be better coordination between AMSSNuR, the Ministry of Health and other institutions having roles in radiation protection such as the dosimetry service provider, and that there were sometimes conflicting requirements or arrangements. They mentioned the need to streamline the authorization processes for importation of radioactive sources.

7.10. SUMMARY

Generally, the inspection programmes are appropriate. However, AMSSNuR should enhance its inspection programme addressed to the research reactor.

Inspections are well planned and carried out. The inspectors are well trained and behave professionally.

8. ENFORCEMENT

8.1. ENFORCEMENT POLICY AND PROCESS

The Law sets out enforcement powers to ensure the safety of facilities and the protection of workers, the public, the patients, and the environment, and establishes offences and penalties that can be imposed. The Law lists sanctions of two types: administrative and criminal. Under the Law, AMSSNuR is empowered to:

- Issue formal notices requiring the operator to implement corrective actions;
- Suspend the operation of category I facilities;
- Recommend to the Administration the final shutdown of category I facilities;
- Suspend or withdraw the authorization of category II facility or activities.

AMSSNuR adopts a graded approach in enforcement. The protection of people and the environment is the first criterium on the implementation of the corrective actions necessary to deal with non-compliances, and inspectors are required to ask for preventive and corrective actions. A broad enforcement policy has been set out for enforcement actions to be determined taking into consideration the importance of the real or potential consequences of the situations encountered and the proactive attitude or not of those responsible for the activities. The actions may include dialogue, coercion and imposing of sanctions or a combination of these. AMSSNuR is empowered to take appropriate enforcement actions in situations where an immediate health or safety concern is identified.

AMSSNuR has developed a process and procedures for imposing sanctions. Inspection reports and other reports or findings of non-compliance serve as inputs to the process. Inspection procedures also describe broadly how inspectors should approach non-compliances. However, existing processes and procedures do not provide criteria or detailed guidance on assessing the severity of non-compliances to determine the enforcement action to be taken.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *AMSSNuR has not established criteria for taking enforcement actions and internal guidance on actions to be taken for non-compliances.*	
(1)	**BASIS: GSR Part 1 (Rev.1) Requirement 31 para. 4.58 states that** *"The regulatory body shall establish criteria for corrective actions, including enforcing the cessation of activities or the shutting down of a facility where necessary..."*
R11	**Recommendation: AMSSNuR should establish criteria for corrective actions, including enforcing the cessation of activities or shutting down of a facility where necessary, and associated internal guidance.**

8.2. ENFORCEMENT IMPLEMENTATIONS

When a non-compliance is identified or confirmed by inspections, licensees are informed verbally, during the inspection of the non-compliance and corrective actions to be made. For imposing the administrative sanctions, AMSSNuR must issue a formal notice on the corrective actions to be carried out, with a deadline set by AMSSNuR for compliance. If the operator refuses to comply, a sanction decision letter is sent to the operator. Subsequently, AMSSNuR may suspend or withdraw the authorization for category II facilities and activities, depending on the non-compliance in accordance with the law. For criminal sanctions, a report describing the non-compliance must be sent to the competent royal prosecutor. These actions are included

in the sanction process and procedures. In the Moroccan Constitution only the judiciary has penal decision powers.

In practice, there have been very few enforcement actions. In the field of medical applications, AMSSNuR has issued two formal notices for the use of medical equipment without holding an appropriate authorization to distribute sources and devices emitting ionizing radiation.

The Law establishes that a detection of a non-compliance may lead to a review of the authorization. The sanctions process sets out the resources required and includes the evaluation of sanctions on a quarterly basis.

8.3. SUMMARY

AMSSNuR has established a broad enforcement policy in accordance with a graded approach, along with processes and procedures to carry out enforcement. The process should be supplemented with development of criteria or detailed internal guidance on assessing the severity of non-compliances to determine the enforcement action to be taken.

9. REGULATIONS AND GUIDES

9.1. GENERIC ISSUES

According to the Law, AMSSNuR's mandate includes the preparation of draft regulations to be proposed to the government for examination and approval. The government may also revise draft regulations.

As mentioned in Section 1.2, by the end of 2021, AMSSNuR, implementing the provisions of the Law, had developed 15 Decrees (covering both nuclear and radiation safety and security, emergency preparedness and responses, radioactive waste management and safeguards), 45 Ordinances and Technical Prescriptions, and 30 Guides.

At the time of the IRRS Mission:

I. Regulations adopted and published (current regulation):

1. Decree No. 2.20.131 relating to authorizations and declarations of activities, installations and associated sources of ionizing radiation falling within Category II.
2. Order of the Head of Government No. 3.12.21 setting the levels of exemption for activities, installations and sources of ionizing radiation associated therewith falling under category II.
3. Order of the Head of Government No. 3.15.23 establishing the classification of activities, facilities and associated ionizing radiation sources falling under category II.
4. Decree No. 2.20.452 implementing the provisions of Article 34 of Law No. 142.12, designating the MTEDD as the government authority responsible for authorizing the import, export, and transit of materials nuclear weapons whether by land, river, airport, or port.
5. Decree no. 2.23.151 relating to the protection of workers, the public and the environment against ionizing radiation.

It is note worthing that the Decree 2.23.151 was promulgated the 27 November 2023 - the first day of the IRRS Mission.

II. Submitted regulations (still under examination and approval):

1. Draft decree relating to the recognition of technical service providers.
2. Draft decree on the use of ionizing radiation for medical purposes.
3. Draft decree relating to the implementation of safeguards.
4. Draft decree relating to the safety and authorization of category I facilities and activities.
5. Draft Order of the Head of Government authorizing activities, facilities and associated ionizing radiation sources belonging to category II under public health institutions, public services, institutions, and public companies under the supervision of the State.

The drafting of additional regulations and guides is in progress in AMSSNuR.

The IRRS team used for its review the current regulations and the five (5) regulations submitted to the government for approval (submitted regulations). The IRRS team considered these submitted regulations without performing a systematic and comprehensive review of their consistency with IAEA safety standards as such drafts may still be amended during the final steps of their approval. **Recommendation R2 in section 1.2 that addresses this issue.** Comments on these drafts were made whenever inconsistencies with the safety standards were identified. The IRRS team concluded that the national regulatory framework would benefit from these future regulations, as the consistency with the IAEA safety standards requirements would be significantly improved.

AMSSNuR has developed several guides. The IRRS Team was informed that AMSSNuR plans to develop more guides and to publish them on the AMSSNuR website when they are ready and when the submitted relevant regulations have been promulgated. AMSSNuR is encouraged to continue developing and issuing all relevant guides.

9.2. REGULATIONS AND GUIDES FOR RESEARCH REACTORS

Legislation and regulation governing the operation of the research reactor is currently based on the Law and decree 2-94-666 from 1994 relating to the authorization and control of nuclear facilities. Recognizing the need to update the decree 2-94-666, AMSSNuR has submitted regulations on modification categorization and criteria regarding the reporting of significant events. **Recommendation R2 in section 1.2 addresses this issue.**

Associated with submitted regulations on the safety and authorization of category I facilities and activities are a number of related draft regulations including:

- Order relating to the periodic safety review of research reactors;
- Order relating to the safety of modifications to research reactors;
- Order relating to the criteria and procedures for declaring significant events applicable to the research reactor;
- Order relating to the content and form of the safety analysis report according to the type of installation;
- Order relating to the content and form of the decommissioning program;
- Order relating to the annual report on the operational safety of research reactors and associated facilities;
- Technical regulations relating to the IMS.

Guidance, that do not need Government approval, for following subjects are under development by AMSSNuR. Nevertheless, AMSSNuR would need the regulations to be promulgated prior to finalizing the guidance:

- Authorization process for nuclear facilities and activities of category I;
- Safety culture;
- Interface between safety and security;
- Maintenance management applicable to the research reactor and associated facilities;
- Ageing management program applicable to the research reactor and associated facilities;
- Radiation protection programme for research reactors;
- Experience feedback in operation.

The IRRS Team consulted the submitted regulation on the authorization process for safety modifications and for the criteria and procedures for notification of significant events. AMSSNuR is encouraged to review again the submitted regulation and bring it in line with the IAEA safety standards.

9.3. REGULATIONS AND GUIDES FOR WASTE MANAGEMENT FACILITIES

Main elements and principles related to management of RW and of SF such as interdependencies, waste minimization, and stakeholders' involvement, are integrated in the Law. Although "graded approach" is not explicitly mentioned in the Law, the decree 2-20-131 on authorization and regulatory control of facilities and activities using ionizing radiation is based on a graded approach and is clearly demonstrated in

regulations for the authorization and classification of category II facilities and activities and on levels of exemption for facilities, activities and associated sources of ionizing radiation falling within Category II. The IRRS Team noted that the exemption criteria and levels are in line with IAEA safety standards.

Discharge of radioactive waste to the environment requires authorization from AMSSNuR but clearance criteria and clearance levels have not been established in regulation. AMSSNuR has recognized this shortcoming with respect to IAEA safety standards and has developed a draft order on clearance. The IRRS Team noted that clearance criteria and clearance levels in submitted regulation are consistent with the requirements of the IAEA safety standards. AMSSNuR also developed a draft order on characterization of radioactive materials, that is submitted for approval. **Recommendation R2 in section 1.2 addresses this issue.**

Solid waste (conditioned and non-conditioned) are stored in the authorized CENM storage facility. Liquid wastes are treated (evaporation, cementation) in the waste treatment building. A radioactive waste classification is not formally established in the current regulation. However, a waste classification, consistent with GSG-1, is integrated in the draft national policy on the management of RW and SF, as well as in the submitted regulation on safety of RW and SF management. Both documents are submitted for approval. **Recommendation R2 in section 1.2 addresses this issue**.

During the site visit, the IRRS team noted that, although the waste classification system is not established in the regulation, it is applied in practice.

9.4. REGULATIONS AND GUIDES FOR RADIATION SOURCES FACILITIES AND ACTIVITIES

There are regulatory requirements applicable to facilities and activities using radiation sources. In particular, there are regulations that set the conditions for notification (declaration) and authorization, including exemption levels, to ensure that radiation sources are used in a safe and secure manner.

For notification ("declaration") and authorization it is required to provide information relating to the proper installation and use of the radiation generator or radioactive source and its associated radiation risks, including performance specifications, instructions for operating and maintenance, and instructions for protection and safety. Suppliers of radiation generators and radioactive sources are not specifically required to ensure that this information is made available to operators.

AMSSNuR has developed some guides on the format and content of documents to be submitted in support of an application for authorization of radiation sources, such as on radiation protection program for industrial radiography activity.

There are no provisions or arrangements in place for ensuring protection and safety in the handling of deceased persons or human remains that contain sealed or unsealed radioactive sources. AMSSNuR has submitted regulations on release of patients, which includes provisions for handling deceased persons. **Recommendation R2 of section 1.2 addresses this issue.**

9.5. REGULATIONS AND GUIDES FOR DECOMMISSIONING ACTIVITIES

The IRRS team was informed on the content of the submitted regulations for safety and authorization of category I facilities and activities that contain provisions for decommissioning, such as establishing an initial decommissioning plan and a decommissioning program according to a graded approach, and their continuous update through the life of the facility. They also contain provisions for financing future decommissioning activities and site clean-up. **Recommendation R2 in section 1.2 addresses this issue.**

Current regulations require information on financial guarantee for future decommissioning of category II facilities to be submitted to AMSSNuR.

Current and submitted regulations are not fully in line with GSR Part 6, as they do not require for existing category I facilities and for some category II facilities a final decommissioning report to be established at the end of the decommissioning and, for existing category I facilities the development of a decommissioning plan as soon as possible.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Current and submitted regulations do not require for existing category I facilities and for some category II facilities a final decommissioning report to be established at the end of the decommissioning and for existing category I facilities the development a decommissioning plan.*	
(1)	**BASIS: GSR Part 6 Requirement 10 para.7.3 states that** *"For a new facility, planning for decommissioning shall begin early in the design stage and shall continue through to termination of the authorization for decommissioning."*
(2)	**BASIS: GSR Part. 6 Requirement 10 para.7.4. states that** *"The licensee shall prepare and submit to the regulatory body an initial decommissioning plan together with the application for authorization to operate the facility. This initial decommissioning plan shall be required in order to identify decommissioning options, to demonstrate the feasibility of decommissioning, to ensure that sufficient financial resources will be available for decommissioning, and to identify categories and estimate quantities of waste that will be generated during decommissioning."*
(3)	**BASIS: GSR Part. 6 Requirement 10 para.7.6 states that** *"For existing facilities where there is no decommissioning plan, a suitable plan for decommissioning shall be prepared by the licensee as soon as possible. The plan shall be periodically reviewed and updated by the licensee."*
(4)	**BASIS: GSR Part. 6 Requirement 15 para. 9.1 states that** *"A final decommissioning report shall be prepared by the licensee to demonstrate that the end state of the facility as specified in the approved final decommissioning plan has been reached. This report shall be submitted to the regulatory body for review and approval."*
R12	**Recommendation: The government should update the regulations addressing the decommissioning and bring them in line with GSR Part 6 requirements.**

9.6. REGULATIONS AND GUIDES FOR TRANSPORT

Morocco is a member of the International Maritime Organization (IMO) and of the International Civil Aviation Organization (ICAO), therefore for international shipments of dangerous goods, including radioactive material by sea and air, the respective regulations apply. Road transport of dangerous goods, including radioactive material, is regulated by the Law 30-05, which refers in many aspects to the Agreement on the International Carriage of Dangerous Goods by Road (ADR).

Special domestic regulations for the safe transport of radioactive material are mentioned in the Law, stating that technical regulations shall be established by AMSSNuR. AMSSNuR has drafted technical regulations on the safe transport of radioactive material based on SSR-6 (Rev. 1) and discussed it with several national and international stakeholders, including the IAEA. The draft has been submitted to the government for approval, but some improvements are still under consideration.

The draft regulations cover all radioactive materials and all modes of transport. The IRRS team was informed that it specifies that the requirements of the IAEA Regulations for the Safe Transport of Radioactive Material SSR-6 (Rev.1) shall apply.

Since the draft technical regulations are not approved, for the areas without domestic regulations the corresponding international regulations SSR-6 (Rev.1), apply.

AMSSNuR issues guides on topics, such as the radiation protection programme for the transport of radioactive material.

AMSSNuR is making good use of international cooperation, participating in IAEA training and workshops, for example on the drafting of national regulations for transport of radioactive material.

9.7. REGULATIONS AND GUIDES FOR OCCUPATIONAL EXPOSURE

The published and submitted regulations mentioned in section 9.1 improve the consistency of the regulatory framework with the IAEA safety standards and other international standards and recommendations. Upon approval of the submitted regulations from AMSSNuR, the current regulation issued by the Ministry of Health will be repealed. Guidance documents have been published on the content of radiation protection programs for transport, industrial radiography, radiotherapy, radiology and nuclear medicine facilities and activities. The IRRS Team encourages AMSSNuR to further develop guidance documents on occupational radiation protection and make them available upon publication of the respective regulations.

Regulations or guidance, as appropriate, on: the use of dosimeters, including the exchange frequency for occupationally exposed workers, criteria as to who should use individual dosimetry; the appropriate positioning of the dosimeter (above or below the apron or both); criteria for the use of extremity and active dosimeters; investigation levels; the procedure to amend dose records; time between dosimeter delivery and the report; and criteria for internal individual monitoring, as examples, would be useful for the authorization, review and assessment and inspection processes.

Some submitted occupational radiation protection orders and technical regulations need to be revised to meet GSR Part 3 requirements. The revision would include additions of the criteria for the establishment of supervised and controlled areas; the necessity to establish the hierarchy of protective measures (engineered, administrative, PPE); requirements as to compliance by workers, and the maximum time interval between calibrations of workplace monitoring equipment. AMSSNuR is encouraged to amend the guides on radiation protection programs to include the need for the RPO to liaise with the facility staff responsible for security, industrial hygiene, industrial safety, and fire safety.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: Some of the current and submitted regulations are either not in conformity with or do not cover all the requirements of GSR Part 3 regarding occupational radiation protection.	
(1)	**BASIS: GSR Part 3 Requirement 24, para. 3.88 states that** *"Registrants and licensees shall designate as a controlled area any area in which specific measures for protection and safety are or could be required for: (a) Controlling exposures or preventing the spread of contamination in normal operation, and (b) Preventing or limiting the likelihood and magnitude of exposures in anticipated operational occurrences and accident conditions."*
(2)	**BASIS: GSR Part 3 Requirement 24, para. 3.93 states that** *"Employers, registrants and licensees shall minimize the need to rely on administrative controls and personal protective equipment for protection and safety by providing well engineered controls and satisfactory*

	working conditions, in accordance with the following hierarchy of preventive measures: (1) Engineered controls; (2) Administrative controls; (3) Personal protective equipment."
R13	**Recommendation: AMSSNuR should revise some of the current and submitted occupational radiation protection regulations to bring them in line with GSR Part 3.**

9.8. REGULATIONS AND GUIDES FOR MEDICAL EXPOSURE

Regulations governing the use of radiation for medical purposes are based on the Law and the decree n°2-97-132 of October 28, 1997 relating to the use of ionizing radiation for medical and dental purpose, as well as the regulation on authorizations for category II activities, facilities and sources of ionizing radiation and the regulations on the protection of workers, the public and the environment against ionizing radiation, for the dose constraints for carers and comforters.

The current regulations are not consistent GSR Part 3 on medical exposure regarding the following topics:

- Diagnostic reference levels for medical imaging incurred in medical imaging including image guided interventional procedures;
- Dose constraints for exposures due to diagnostic investigations of volunteers participating in a programme of biomedical research;
- Criteria for the release of patients who have undergone therapeutic radiological procedures using unsealed sources or patients who still retain implanted sealed sources;
- Generic justification of medical exposure, in particular, for volunteers as part of biomedical relevant national or international referral guidelines and for asymptomatic populations as part of a health screening programme as well as the provision of a relevant national or international referral guideline for the justification of the medical exposure of an individual patient in radiological procedure;
- Optimization of medical exposure in particular, quality control, calibration, quality assurance programme including regular and independent audits;
- Unintended and accidental medical exposures.

AMSSNuR developed a draft regulation on the use of ionizing radiation for medical purposes and submitted it for approval to the Head of Government that covers the points mentioned above. **Recommendation R2 in section 1.2 addresses this issue**.

Associated with submitted regulations on medical exposure are several related draft regulations including:

- Regulation (order) relating to the modalities for carrying out the missions assigned to the medical physicists, their clinical internship and the "ETP" ("Equivalent Temps Plein");
- Regulation (order) on diagnostic reference levels;
- Regulation (order) relating to the maintenance and quality control of equipment or ionizing radiation sources for medical use;
- Technical requirements for training healthcare professionals in patient radiation protection;
- Technical requirements relating to the collection and analysis of data on new techniques and technologies involving radiation sources, with a view to their justification;
- Technical prescriptions relating to the quality assurance systems for medical exposures;

- Technical prescriptions relating to procedures for discharging patients receiving radionuclides treatment;
- Technical prescriptions relating to the criteria for defining incidental or accidental exposures likely to harm patients' health, and the procedures for reporting them;
- Technical prescriptions on standards for the design, layout, and equipment of premises where ionizing radiation sources are used for medical purposes.

9.9. REGULATIONS AND GUIDES FOR PUBLIC EXPOSURE

Current requirements for limiting and assessing public exposure include the establishment of basic radiation protection principles, provisions for the control of radioactive releases to the environment, criteria for restricting the import, and the commercialization and use of products containing radioactive materials.

While transboundary effects of a radiological accident in Morocco are addressed in the submitted regulation on emergency preparedness and response, the provisions to ensure radiation protection of the public outside the national territory due to routine operation of categories I and II facilities and conduct of activities in Morocco, are not as clearly expressed in the regulations. These provisions would also be useful for some activities in Morocco like mining or remediation of potential existing exposure situations.

As mentioned before, the national regulations include provisions for the control of releases of radioactive material to the environment through the establishment of discharge limits and the monitoring of discharges. The IRRS team was informed that a decree on the criteria and procedures for reporting significant safety events in research reactors has been submitted for approval. However, the current regulations relevant to environmental monitoring do not include requirements for the need for reporting to AMSSNuR any deviations from normal conditions detected by monitoring programmes.

Provisions for ensuring the implementation of monitoring programmes, independent from the operator, are not in place. There are ongoing actions to ensure this, through the recognition and subsequent use of technical support organizations. A procedure for recognition of such technical support organizations that includes the environmental measurements laboratories, has been drafted by AMSSNuR. AMSSNuR has also drafted the assessment plan to be used by AMSSNuR staff to review and assess applications for recognition.

An environmental radiation monitoring network has been implemented by AMSSNuR since the end of 2020. It includes currently eight ambient dose rate measurement probes installed and commissioned in several cities across the national territory and it is foreseen to be expanded to other cities of the country. The probes have been installed considering the location of facilities that are liable to release radioactive material to the environment. AMSSNuR has drafted, in consultation with national stakeholders, a national strategy for radiological environmental monitoring that details the measures to be implemented at the national scale by various concerned parties, in order to ensure radiation protection of members of the public and the environment during planned, existing and emergency exposure situations.

Some existing exposure situations have been identified in Morocco. The main identified existing exposure situations concern radon. The Law excludes from its scope the exposures due to radon emitted by materials used in the construction of dwellings and concentrations of natural radionuclides contained in raw materials and any other source not modified by human activity. A comprehensive characterization of existing exposure scenarios identified in the country has not been completed.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *A comprehensive characterization of existing exposure situations identified in the country has not been completed.*	
(1)	**BASIS: GSR Part 3 Requirement 47 states that** *"The government shall ensure that existing exposure situations that have been identified are evaluated to determine which occupational exposures and public exposures are of concern from the point of view of radiation protection."*
R14	**Recommendation: The government should ensure the complete characterization of existing exposure situations identified in the country.**

Provisions for the remediation of areas with residual radioactive material have not yet been established in Morocco.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Provisions for the remediation of areas with residual radioactive material have not been established.*	
(1)	**BASIS: GSR Part 3 Requirement 49 states that** *"The government shall ensure that provision is made for identifying those persons or organizations responsible for areas with residual radioactive material; for establishing and implementing remediation programmes and post-remediation control measures,…."*
R15	**Recommendation: The government should ensure the establishment of provisions for the remediation of areas with residual radioactive material.**

Current regulations address exposure to radon as an existing exposure situation. The IRRS team was informed that a preliminary study on the level of radon in dwellings, workplaces and buildings with public access was conducted by CNRP and CNESTEN in collaboration with several universities. The study concluded that the majority (96%) of the controlled buildings have a radon volumetric activity less than 300 Bq m^{-3} whereas in some locations the radon levels reach values over 400 Bq m^{-3}. However, since a comprehensive characterization of the levels of radon in dwellings and public places has not been completed, these results remain preliminary and need to be confirmed by a more detailed survey to determine if there is a need to make provisions for ensuring the protection of the population from exposure to radon. AMSSNuR plans to complete this characterization and establish a radon map as part of cooperation projects with the EC/EU and other European regulatory bodies and TSOs. Based on the results of this characterization, a national radon action plan will be developed, as necessary.

It should be noted that, according to provision of article 173 of the Law, AMSSNuR has drafted a technical prescription, to be approved by order of the Minister in charge of Housing, setting the reference level for radon in areas of high public occupancy at 300 Bq m^{-3}, as well as the protective measures that should be implemented in the case where the average annual radon level exceeds 300 Bq m^{-3}.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *A comprehensive characterization of levels of radon in dwellings and public places has not been completed. An appropriate reference level for ^{222}Rn for dwellings and other buildings with high occupancy factors for members of the public has not been approved yet. A national radon action plan is in its initial phase of development.*	
(1)	**BASIS: GSR Part 3 Requirement 50 states that** *"The government shall provide information on levels of radon indoors and the associated health risks and, if appropriate, shall establish and implement an action plan for controlling public exposure due to radon indoors."*
(2)	**BASIS: GSR Part 3 Requirement 50 para. 5.19 states that** *"As part of its responsibilities, ……., the government shall ensure that:* *(a) Information is gathered on activity concentrations of radon in dwellings and other buildings with high occupancy factors for members of the public through appropriate means, such as representative radon surveys;……."*
(3)	**BASIS: GSR Part 3 Requirement 50 para. 5.20 states that** *"Where activity concentrations of radon that are of concern for public health are identified on the basis of the information gathered ……, the government shall ensure that an action plan is established comprising coordinated actions to reduce activity concentrations of radon in existing buildings and in future buildings, which includes:* *(a) Establishing an appropriate reference level for ^{222}Rn for dwellings and other buildings with high occupancy factors for members of the public, ..., that in general will not exceed an annual average activity concentration due to ^{222}Rn of 300 Bq/m^3;……."*
R16	**Recommendation: The government should:** **- Establish an appropriate reference level for ^{222}Rn in dwellings and other buildings with high occupancy factors for members of the public;** **- Complete the characterization of levels of radon in dwellings and public places;** **- Develop and implement a national radon action plan.**

Reference levels are not established in regulations for radionuclides in commodities, such as construction materials, food and drinking water. The IRRS team was informed that the control of drinking water is carried out by the Ministry of Health. AMSSNuR plans to develop regulatory provisions related to this matter.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: Reference levels for exposure due to radionuclides in commodities have not been established.	
(1)	**BASIS: GSR Part 3 Requirement 51 states that** *"The regulatory body or other relevant authority shall establish reference levels for exposure due to radionuclides in commodities."*
R17	**Recommendation: AMSSNuR, in cooperation with relevant authorities, should ensure that reference levels for exposure due to radionuclides in commodities are established.**

9.10. SUMMARY

To implement the Law and improve consistency with IAEA safety standards, AMSSNuR drafted numerous regulations and guidance documents, which are at various stages of development or approval. Some regulations have been promulgated, others are expected to be, and some are not submitted yet to the government.

The IRRS team consider that the implementation of the following will significantly improve the regulatory control:

- Approval of regulations related to transport, authorization of category I facilities, management of radioactive waste, clearance and characterization of radioactive waste, and for the handling of deceased persons or human remains that are known to contain radioactive sources;
- Revision of the current and submitted regulations dealing with occupational exposure and medical exposure;
- Establishment of provisions for the remediation of areas with residual radioactive material, for the protection of the public against exposure to radon, for the establishment of reference levels for exposures due to radionuclides in commodities;
- Development of a funding mechanism for decommissioning and waste management from generation of waste up to disposal;
- Conduct of a comprehensive characterization of existing exposure situations identified in the country;
- Development and issuance of guides on the format and content of documents to be submitted in support of an application for authorization of radiation sources.

10. EMERGENCY PREPAREDNESS AND RESPONSE – REGULATORY ASPECTS

10.1. AUTHORITY AND RESPONSIBILITIES FOR REGULATING ON-SITE EPR OF OPERATING ORGANIZATIONS

Under the Law, AMSSNuR has the authority to regulate on-site EPR arrangements of operating organizations. The Law requires applicants to submit an internal (on-site) emergency plan as part of application for authorization.

AMSSNuR drafts and submits regulations on EPR to the government for examination and approval. AMSSNuR drafts and publishes guides to facilitate the implementation of regulations.

The responsibility to establish the national radiation emergency plan (NREP) is assigned to the Ministry of Interior while AMSSNuR is responsible to provide technical assistance to the government and local authorities in developing and implementing the plans related to nuclear or radiological emergencies. The NREP has been prepared in consultation with all relevant departments at national and local levels and it is under approval process at the level of government. NREP establishes requirements for the operators to trigger on-site emergency plans, including to notify AMSSNuR and local authorities.

A protection strategy describing different protective actions and other response actions to be taken in the case of a nuclear or radiological emergency has also been drafted by AMSSNuR in coordination with relevant ministerial departments and organizations and is under approval.

AMSSNuR has the authority to verify the on-site EPR arrangements of operating organizations through review and assessment, conduct of inspections and evaluation of emergency exercises. AMSSNuR is responsible for ensuring that the on-site plans for nuclear or radiological emergencies are coordinated with other plans such as, security plans, evacuation plans, firefighting plans, and local level government plans. Through its Nuclear and Radiological Emergency Situations Unit, AMSSNuR is responsible to coordinate with national and local organizations matters related to EPR.

Morocco has facilities and activities that fall within IAEA Emergency Preparedness Categories (EPCs) - III and IV covering the research reactor, medical applications, industrial applications and transport of radioactive sources. EPC-I, II and V are not applicable for Morocco as no such facilities exist. Morocco applies a graded approach in regulating on-site EPR arrangements as inspections and exercises are conducted according to the hazards associated with the facilities and activities.

10.2. REGULATIONS AND GUIDES ON ON-SITE EPR OF OPERATING ORGANIZATIONS

In 2018, AMSSNuR submitted regulations on the management of nuclear or radiological emergencies to the government for approval. However, to implement the recommendations of Morocco's recent EPREV mission, the submitted regulations have been re-opened for review and updating.

The IRRS team noted that when considered together, provisions of the Law, submitted regulations, draft protection strategy and NREP are consistent with many of the requirements of IAEA safety standards for EPR. However, the IRRS team identified gaps and inconsistencies with the IAEA safety standards and in particular GSR Part 7. A few examples are:

- In advance designation of emergency workers;
- Protection of helpers in an emergency including defining their dose limit;
- Consideration of the results of threat assessments in conducting hazard assessment as well as non-radiation related hazards at the site;

- Mitigating the non-radiological consequences (psychological impacts, social support, restriction on export of contaminated food, etc.);
- Analysis of the nuclear or radiological emergency and the emergency response (reconstruction of emergency, root causes, improvement in emergency arrangements and regulatory control, etc.);
- Identification of the knowledge, skills and abilities necessary to perform emergency response functions;
- Termination of a nuclear or radiological emergency;
- Medical management (first aid, estimation of doses, medical transport and initial medical treatment in predesignated medical facilities, etc.) of individuals affected at facilities in EPC-III (medical management of individuals affected at facilities at EPC I and II are addressed in submitted regulations);
- Continuous availability of suitable, reliable and diverse means of communication at all facilities and applicable EPCs under the full range of emergency conditions.

Recommendation R2 in section 1.2 addresses this issue.

Moreover, AMSSNuR is developing regulatory guides that contain the associated criteria to comply with requirements in submitted regulations. Three guides are being developed on establishing onsite emergency plans for research reactors, transportation of radioactive material, and irradiators. AMSSNuR is encouraged to finalize these guides.

10.3. VERIFYING THE ADEQUACY OF ON-SITE EPR OF OPERATING ORGANIZATIONS

AMSSNuR has established a mechanism for verifying the adequacy of on-site EPR arrangements as part of its core regulatory processes. The mechanism includes review of on-site emergency plans of operating organizations received as a part of application for granting authorization. Currently, the plans are reviewed based on an "assessment plan" which includes some aspects related to emergency plans. On-site emergency plans of Category-I facilities (Nuclear and Waste Disposal facilities, as defined in the Law) are submitted for approval by the government with recommendations of AMSSNuR, while on-site emergency plans of Category -II facilities (radiation sources facilities) are approved by AMSSNuR.

AMSSNuR has submitted regulations to the government to standardize the content of emergency plans of facilities and activities in all EPCs. Once approved, all the relevant operators will be required to follow these requirements for preparing or updating their plans. Meanwhile, AMSSNuR is encouraging the operators through training, workshops, and inspections to implement the submitted regulations to prepare emergency plans.

AMSSNuR indicated that periodic review of the plans is ensured during renewal of authorization or whenever there is any change in the hazards associated with the facility. The licensees are asked to submit updated plans in the light of experience feedback and lessons learned during this period.

AMSSNuR verifies on-site EPR arrangements during regular inspections. The IRRS team noted that inspection checklists include information about availability of emergency plans and procedures, necessary equipment, training of personnel, records of any incidents, etc. Some of the aspects like conduct of emergency exercises and their evaluation are not covered in the checklists and are therefore not verified during the inspection. AMSSNuR is encouraged to review and update the checklists to cover all aspects of EPR.

Submitted regulations include the requirements for operators to develop and implement exercise programs as well as evaluation of some of the exercises by AMSSNuR. Only the research reactor conducts annual exercises with the involvement of Civil Protection Department. CNESTEN, as an operator of the reactor, has a Memorandum of Understanding with the Civil Protection Department to seek necessary support in an emergency. AMSSNuR checks exercise evaluation reports of the operator during routine inspections at CNESTEN but do not evaluate the exercises themselves. The IRRS team was informed that operators of other facilities and activities do not have exercise programs and consequently, no exercises are being conducted or evaluated.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *Operators of facilities and activities, other than research reactor, do not conduct exercises to test their on-site emergency response arrangements. AMSSNuR neither evaluates the exercises nor has a systematic process for their evaluation.*	
(1)	**BASIS: GSR Part 7 Requirement 25 para. 6.30 states that** *"Exercise programmes shall be developed and implemented to ensure that all specified functions required to be performed for emergency response, all organizational interfaces for facilities in category I, II or III, and the national* *level programmes for category IV or V are tested at suitable intervals... The exercises shall be systematically evaluated (see para. 4.10(h)) and some exercises shall be evaluated by the regulatory body."*
(2)	**BASIS: GSG 13 para. 3.330 states that** *"... In addition, it is required that the regulatory body evaluate some of the emergency exercises carried out by the authorized party (see GSR Part 7, para. 6.30 [7]). To do so, the regulatory body should develop necessary evaluation guidelines and checklists. As appropriate, this evaluation should assess the adequacy of coordination and integration of the on-site emergency arrangements with those off-site.".*
R18	**Recommendation: AMSSNuR should ensure that operators of facilities and activities in all Emergency Preparedness Categories have developed and implemented an exercise programme along with a process for systematic evaluation of the exercises.**
S5	**Suggestion: AMSSNuR should consider evaluating some of the exercises and developing the necessary evaluation guidelines and checklists.**

The IRRS team was informed that AMSSNuR ensures the integration of on-site emergency arrangements with those of relevant off-site response organizations and with other plans through review of the plans and conducting of inspections.

10.4. ROLES OF THE RB IN A NUCLEAR OR RADIOLOGICAL EMERGENCY

Under the national plan, AMSSNuR is responsible for advising the government on protective measures and to verify the measures taken by operators to ensure protection of people and environment.

AMSSNuR is responsible for performing assessment of an emergency, estimating its probable progression, and determining any possible radiological consequences. It also has the responsibility to support local response organizations by performing on-scene radiological monitoring. In addition, AMSSNuR is also responsible to contribute to public communication and collect data of radiation doses received by

emergency workers and the public. AMSSNuR has a dedicated unit responsible for public communications during both normal and emergency situations.

AMSSNuR is the national warning point and competent authority (domestic) to comply with the obligations of Early Notification and Assistance Conventions. The role of competent authority (abroad) is assigned to the Ministry of Foreign Affairs, African Cooperation and Moroccan Expatriates.

AMSSNuR is actively participating in IAEA ConvEx and in exercises conducted by General Directorate of Civil Protection, Ministry of Interior. However, AMSSNuR does not conduct internal exercises to test its arrangements for activation, capabilities for assessment and prognosis, and provision of advice to the government.

Under the Law, the submitted regulations, and the conditions of authorization, the operators have to notify AMSSNuR immediately upon declaration of an emergency. However, AMSSNuR does not have diverse means of communication to receive emergency notification. The only emergency mobile phone number is not easily available to response organizations and public.

AMSSNuR has established a Crisis Management Center (CMC) which is mandated to coordinate with national organizations and perform assessment of an emergency and its possible consequences. To strengthen the capacity of the Center, AMSSNuR is making significant efforts to acquire assessment and other relevant tools.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *AMSSNuR has established a Crisis Management Centre (CMC), however the centre lacks the necessary procedures and analytical tools required to perform assessment of emergency and its consequences.*	
(1)	**BASIS: GSR Part 7 Requirement 23 para. 6.20 states that** *"The operating organization and response organizations shall develop the necessary procedures and analytical tools to be able to perform the functions specified in Section 5 for the goals of emergency response to be achieved and for the emergency response to be effective."*
(2)	**BASIS: GSR Part 7 Requirement 24 para. 6.22 states that** *"Adequate tools, instruments, supplies, equipment, communication systems, facilities and documentation (such as documentation of procedures, checklists, manuals, telephone numbers and email addresses) shall be provided for performing the functions specified in Section 5….."*
R19	**Recommendation: AMSSNuR should develop and make available necessary procedures and analytical tools at the Crisis Management Centre (CMC) for performing assessment of emergency and its consequences.**

AMSSNuR maintains portable radiation monitoring equipment and personal protective equipment as technical support to response organizations for radiological monitoring in the field. AMSSNuR has a draft internal emergency plan describing roles and responsibilities, the activation process of CMC, information management and record keeping during an emergency, response capabilities and training programs for CMC staff, as well as a mechanism for continuous improvement.

RECOMMENDATIONS, SUGGESTIONS AND GOOD PRACTICES	
Observation: *AMSSNuR has a preliminary draft internal emergency plan for performing its assigned functions during a nuclear or radiological emergency.*	
(1)	**BASIS: GSR Part 7 Requirement 22 para. 6.17 states that** *"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..."*
(2)	**BASIS: GSG 13 para. 3.334 states that** *"... Irrespective of its assigned responsibility in emergency response, the regulatory body should develop and maintain necessary arrangements (e.g. plans, procedures, tools, equipment, training, exercises) to effectively discharge this responsibility...."*
S6	**Suggestion: AMSSNuR should consider finalizing its emergency response plan.**

AMSSNuR has a Geographic Information System (GIS) based application that displays the location of all facilities and important features of radioactive sources (activity, isotope, date of manufacturing, manufacturer, etc.) along with contact details of relevant personnel. This information about radiation hazards is directly available to the Ministry of Interior for emergency preparedness and response purposes and is being updated regularly. The IRRS team recognized this capability as an area of good performance.

10.5. SUMMARY

The Law clearly assigns the responsibility of regulating on-site EPR of operating organizations to AMSSNuR. This includes proposing regulations to the government, reviewing and approving on-site emergency plans, conducting inspections and evaluating the emergency exercises.

Areas for improvement identified by the IRRS team are for AMSSNuR to:

- Ensure that facilities and activities in all EPCs conduct emergency response exercises and systematically evaluate them;
- Evaluate some of the exercises and develop necessary evaluation guidelines and checklists;
- Make available necessary procedures and analytical tools for performing assessment of emergency and its consequences for strengthening its CMC;
- Finalize its emergency response plan.

The IRRS team considers the Geographic Information System (GIS) application displaying the location of all facilities and important features of radioactive sources being directly available to the Ministry of Interior for emergency preparedness and response purposes, to be a good performance.

11. INTERFACE WITH NUCLEAR SECURITY

11.1. LEGAL BASIS

The law gives AMSSNuR the authority to regulate nuclear and radiation safety, nuclear security and safeguards. AMSSNuR, with the help of other State officials, is working towards ensuring the

implementation of legal and regulatory provisions for nuclear and radiation safety, nuclear security and safeguards. The law assigns to the authorized parties the prime responsibility for ensuring the safety and security of the facilities, activities and materials.

11.2. REGULATORY OVERSIGHT ACTIVITIES

The team was informed that AMSSNuR's authorization process gives due consideration to the safety and security interface and ensures identification and resolution of potential risks and vulnerabilities. Practical implementation of the safety and security interface includes the joint safety and security inspections that AMSSNuR conducts. The objective of conducting these joint inspections is to verify that the safety and security measures implemented by the operator are robust enough to counter potential threats and that nuclear security measures undertaken by the operator do not compromise safety and safety measures nor nuclear security. The joint safety and security inspections are performed for facilities and activities involving IAEA category I to III radioactive sources and the research reactor.

AMSSNuR has two submitted regulations on physical protection of nuclear materials and associated facilities, and the security of radioactive sources and associated facilities to the government for examination and approval. Both submitted regulations include provision for the interface of security with safety. The submitted regulations for nuclear materials include the provision for the nuclear material accounting and control system.

11.3. INTERFACE AMONG AUTHORITIES

The legal and institutional framework has designated the national authorities responsible for safety, security and emergency preparedness and response at the national level. These include AMSSNuR, the General Directorate of National Security (DGSN), the General Directorate of Civil Protection (DGPC), National Administration of Defense and the “Gendarmerie Royale”.

To ensure effective control of safety and security interface with the national system of accounting and control of nuclear material, there is a need for cooperation and coordination between the relevant authorities and AMSSNuR. This interface requires attention and collaboration in order to facilitate the efficient management of the activities. **Suggestion S1 in section 1.5 addresses this issue.**

The submitted regulations on security of radioactive sources states that the operator shall coordinate the contingency plan with the applicable radiological emergency plan. The submitted regulations on emergency preparedness and response state that the internal emergency plan shall be coordinated with the plan established at the local level. It shall also be coordinated with the plans of all the other organizations which have responsibilities to intervene in the event of a nuclear or radiological emergency, including security plans, evacuation plans and fire-fighting plans.

11.4. SUMMARY

AMSSNuR has demonstrated its commitment to ensure that the safety and security interface is considered for all its regulatory functions. However, implementation of all the regulatory functions is pending approval of the two submitted regulations by the government.

12. REGULATORY IMPLICATIONS OF THE COVID-19 PANDEMIC

Morocco requested the inclusion, in the scope of the mission the national regulatory implications, of the COVID-19 pandemic with a focus on the actions taken by AMSSNuR to maintain delivery of its statutory obligations and responsibilities for safety. This section presents an overview of the actions taken by

AMSSNuR and the main conclusions drawn by the IRRS team from the discussions held and evaluations made during the mission.

Following the COVID-19 outbreak in Morocco in March 2020, AMSSNuR adapted its operations to continue to deliver on its mandate in particular to maintain an effective regulatory control over the facilities and activities. The health and wellbeing of the staff of AMSSNuR was at the core of all decisions from senior management in adapting the working conditions.

AMSSNuR developed and implemented a business continuity plan to cope with this unprecedented situation. The business continuity plan developed by AMSSNuR could also be used to cope with a similar situation in the future. Most of the staff of AMSSNuR worked remotely during the COVID-19 lockdown period and were provided with the necessary tools and IT equipment to be able to work from home. The staff of AMSSNuR used virtual meeting platforms and emails for communication. Only personnel performing essential tasks were required to be physically present in the office premises, to ensure the continuity of the regulatory activities and to ensure that radiation safety was not compromised.

12.1 REGULATORY FUNCTIONS

Authorization
AMSSNuR has actively collaborated with other national authorities, in particular to facilitate the authorization for the importation of medical radiation emitting equipment needed in facilities treating COVID-19 patients.

AMSSNuR has multiple mechanisms available to applicants that allow continuous communication in support of the authorization process. For example, AMSSNuR developed and made available online application forms, guidance, and applicable legislation and regulations. Additionally, AMSSNuR established systems that allow applicants to digitally submit their applications to AMSSNuR for processing and a remote payment gateway system that allows users to pay the applicable fees for the processing of their application.

Inspection
AMSSNuR suspended the conduct of its routine inspections and physical inspections were only permitted to support the authorization process and in response to emergency situations.

Development of Regulations, Guides, and Other Materials
AMSSNuR took the opportunity of the lockdown period to expedite the upgrading of the regulatory framework relating to nuclear and radiological safety and security and drafted, developed, or revised (as applicable) multiple regulations, regulatory guides, and internal processes and procedures.

Online Training Courses and Webinars
During the COVID lockdown period, AMSSNuR conducted online training courses to promote the continuous professional development of its staff. AMSSNuR also made use of the IAEA Cyber Learning Platform for Network Education and Training (CLP4NET) for its online training programme. The staff of AMSSNuR also participated in webinars organized by the IAEA on various thematic safety areas.

Self-Assessment of Regulatory Infrastructure for Safety (SARIS)
AMSSNuR also took the opportunity of the COVID lockdown period to carry out a comprehensive self-assessment of the regulatory infrastructure for safety in Morocco using the SARIS tool of the IAEA.

Emergency Preparedness and Response (EPR)
AMSSNuR highlighted that the regulatory inspection activities were affected because of the restrictions implemented during the pandemic, and only limited inspections were conducted to support the authorization process and in response to emergency situations.

Morocco developed a new system for training and tabletop exercises. They attended two IAEA ConvEx exercises and conducted one tabletop exercise and one field exercise for which all arrangements were discussed virtually. AMSSNuR had to cancel some of the activities that would have been implemented at the Capacity Building Centre, in collaboration with the IAEA.

12.2 SUMMARY

The COVID-19 pandemic posed an unprecedented challenge to AMSSNuR in performing its regulatory programme. However, it was also an opportunity for AMSSNuR to develop a business continuity plan to maintain effective regulatory control over the facilities involving ionizing radiation sources. AMSSNuR has digitalized many of its regulatory processes which has significantly contributed to maintaining an efficient regulatory control over the facilities involving ionizing radiation sources in such similar situations.

The effort made by AMSSNuR to improve its overall regulatory functions while ensuring the continuity of essential regulatory activities is consistent with what many regulatory bodies did worldwide.

APPENDIX I – LIST OF PARTICIPANTS

INTERNATIONAL EXPERTS:		
BLOMMAERT Walter	Belgium	blommaertwalter@gmail.com
BODIS Elizabeth	Hungarian Atomic Energy Authority (HAEA), Hungary	Bodis@haea.hu
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LIAISON OFFICER		
MARFAK Taib	Agence Marocaine de Sûreté et de Sécurité Nucléaires et Radiologiques (AMSSNuR), Morocco	t.marfak@amssnur.org.ma


Royaume du Maroc
Chef du Gouvernement
رئيس الحكومة
AMSSNuR

APPENDIX II – MISSION PROGRAMME

26 November - 6 December 2023

Sunday, 26 November		
IRRS Initial Team Meeting		
13:30 - 18:00	- Opening remarks by the IRRS Team Leader - Introduction by IAEA Team Coordinator - Self-introduction of all attendees - IRRS Process (IAEA) - Report writing (IAEA) - Schedule (TL, IAEA) - Administrative arrangements (host country Liaison Officer, IAEA): Detailed Mission Programme - First impressions arising from the Advance Reference Material (all team members).	Venue: Flower Town Hotel & Spa Participants: IRRS Team and Liaison Officer
18:00 – 20:00	IRRS Team dinner offered by AMSSNuR	Flower Town Hotel

Monday, 27 November		
IRRS Entrance Meeting		
09:30 – 12:00	09:30 Arrival, registration 10:00 Welcome Address – (*AMSSNuR's DG*) 10:30 IRRS Team Leader – Expectations for the Mission 10:45 IRRS Team members' and Counterparts' self-presentation 11:00 Group Photo, break 11:30 Host Institution presentation – Regulatory Overview, SARIS results (strengths, challenges, action plan)	Venue: The View Hotel Participants: Ministries representatives, AMSSNuR Management and staff, Officials from relevant national organizations, IRRS Team
12:30 - 13:30	Lunch	
13:30 - 17:00	Interviews and discussions with counterparts (parallel discussions)	Venue: AMSSNuR HQ Participants: IRRS Team and counterparts
17:00 - 18:00	Daily IRRS Team meeting	Venue: AMSSNuR HQ Participants: IRRS Team and Liaison Officer
20:00 -	Writing the report	Venue: Flower Town Hotel & Spa
Tuesday, 28 November		
Daily Discussions / Interviews		
09:00 - 17:00	Interviews and discussions with counterparts (parallel discussions)	Venue: AMSSNuR HQ Participants: IRRS Team and Counterparts
12:00 - 13:00	Lunch	
17:00 - 18:00	Daily IRRS Team meeting	Venue: AMSSNuR HQ Participants: IRRS Team and Liaison Officer

20:00 -	Writing the report	Venue: Flower Town Hotel & Spa

Wednesday, 29 November		
09:00 - 17:00	Interviews and discussions with counterparts for all modules (except those going on sites visits)	Venue: AMSSNuR HQ Participants: IRRS Team and Counterparts
	Site-visits	CNESTEN for Research Reactor and Waste storage: Pierre Juan, Walter Blommaert and Juan Thomas Zerquera. Clinic: Carole Rousse and Wendy Yuansi LPEE: (Industrial): Margaret Cervera and John Hunt Cyclotron: Ingo Reiche
12:00 - 13:00	Lunch	
	Interviews and discussions with counterparts for all modules (except those going on sites visits) High official Meetings: - General Secretary of the Government - Ministry of Energy Transition and Sustainable Development - Ministry of Health	Venue: AMSSNuR HQ Participants: Fabien Ferron, Faizan Mansoor, Vasiliki Kamenopoulou , Ugur Bezdeguemeli, Carolle Rouse
17:00 - 18:00	Daily IRRS Team meeting, including quick briefing on site-visits. *First draft of the preliminary findings*	Venue: AMSSNuR HQ Participants: IRRS Team and Liaison Officer

20:00 -	Writing the report	Venue: Flower Town Hotel & Spa
Thursday, 30 November		
Daily Discussions / Interviews		
09:00 - 12:00	Follow-up interviews and discussions with counterparts, if necessary (parallel discussions)	Venue: AMSSNuR HQ Participants: IRRS Team and Counterparts
12:00 - 13:00	Lunch	
13:00 – 16:00	Report preparation *preliminary findings (recommendations, suggestions, good practices)*	IRRS Team
16:00 – 17:00	*Preliminary findings delivery and compilation*	Venue: AMSSNuR HQ Participants: IRRS Team
17:00 – 20:00	Daily IRRS Team Meeting: recommendations, suggestions and good practices	Venue: AMSSNuR HQ Participants: IRRS Team and Liaison Officer
Friday, 1 December		
09:00 – 10:00	Policy issue discussion	Venue : AMSSNuR HQ Participants: IRRS Team, AMSSNuR
10:00 - 12:00	Finalize the first draft report	Venue: AMSSNuR HQ Participants: IRRS Team
12:00 - 13:00	Lunch	
13:00 - 15:00	Report preparation	Venue: AMSSNuR HQ Participants: IRRS Team

15:00-17:00	Discussion on the draft report with the counterparts per module.	Venue: AMSSNuR HQ Participants: IRRS Team, AMSSNuR
	Finalize observations, basis, recommendations, suggestions and good practices.	Venue: AMSSNuR HQ Participants: IRRS Team and Liaison Officer
Saturday, 2 December		
09:00 - …	- Report drafting and cross reading - Finalization of the draft report by the entire IRRS Team - IRRS Team Leads and IAEA Coordinators edit draft report. - Draft report submitted to AMSSNuR for comments.	Venue: AMSSNuR HQ and Flower Town Hotel - All team Participants: IRRS Team
Sunday, 3 December		
IRRS Team rest day and cultural events **AMSSNuR review of the draft report**		
Monday, 4 December		
09:00 - 15:00	AMSSNuR review the draft report.	
09:00 – 12:00	IRRS Team Leads and IAEA Coordinators draft: executive summary, press release, TL exit presentation	Venue: Flower Town Hotel
12:00 – 13:00	Lunch	
15:00 –	IRRS Team members review AMSSNuR comments	Venue: AMSSNuR HQ Participants: IRRS Team

Tuesday, 5 December		
10:00-12:00	IRRS Team and AMSSNuR discuss disposition of comments	Venue: AMSSNuR HQ Participants: IRRS Team
13 :00-18 :00	Report finalization by the IRRS team	Venue: AMSSNuR HQ Participants: IRRS Team
18:00 – 19:00	Submission of the Final Draft Report to the Hosts Press release finalization	Venue: AMSSNuR HQ Participants: IRRS TL, DTL, TC, DTC
19:00 – 21:00	Farewell dinner	Venue: Flower Town Hotel & Spa Participants: IRRS Team and Counterparts

Wednesday, 6 December		
10:00 - 11:00	IRRS Exit meeting	Venue: The View Hotel Participants: Government Officials, AMSSNuR Management and staff, IAEA DDG, the IRRS Team
	Main findings of the IRRS mission (Team Leader)	
	Remarks by the Host Institution in response to the mission findings	
	Closing remarks by IAEA DDG-NS	
	Publication of the IAEA press release	

List of organizations invited to the entrance (27.11.23) and exit (6.12.23) meetings of the IRRS mission

1. Ministère de la Transition énergétique et du Développement durable ;
2. Ministère de l'Equipement, du Transport, de la Logistique et de l'Eau ;
3. Ministre délégué auprès du Chef du gouvernement chargé de l'Administration de la Défense nationale ;
4. Inspection du Service de Santé des Forces Armées Royales ;
5. Inspection Génie / Forces Armées Royales ;
6. 3ème Bureau / Forces Armées Royales ;
7. Gendarmerie Royale ;
8. Marine Royale ;
9. Ministère de l'Intérieur ;
10. Direction Générale de la Protection Civile ;
11. Ministre de la Santé et de la Protection sociale ;
12. Direction Générale de la Sûreté Nationale ;
13. Centre Nationale de l'Energie des Sciences et Techniques ;
14. Office National de l'Electricité et de l'Eau potable.

APPENDIX III – SITE VISITS

1. Réacteur de Recherche CENM et installations de la gestion des déchets radioactifs (CNESTEN) ;
2. Clinique 16 novembre - Clinique de MN et radiothérapie (Rabat) ;
3. NDT company (LPEE) à Casablanca ;
4. Cyclotron (Radioisotope Méditerranée) à Bouznika.

APPENDIX IV – LIST OF COUNTERPARTS

	IRRS EXPERTS	Lead Counterpart	Support Staff
1.	**LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES**		
	MANSOOR Faizan	EL GAMOUSSI Rachida	BOUAZZAOUI Nabila
2.	**GLOBAL NUCLEAR SAFETY REGIME**		
	MANSOOR Faizan	MARFAK Taib	OUKEMENI Sofia
3.	**RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY**		
	OLLITE Faradally	EL GAMOUSSI Rachida	AIT OMAR Zakaria M. DRISSAT BOUTAYEB Samira
4.	**MANAGEMENT SYSTEM OF THE REGULATORY BODY**		
	BODIS Elizabeth	EL MAHDI Idrissi Belkasmi MAITAL Mohamed	TOUHAMI Ilham Ouazzani BAHIJE Najat ES-SAKALI Halima
5.	**AUTHORIZATION**		
	JUAN Pierre BLOMMAERT Walter CERVERA Margaret YUANSI Wendy REICHE Ingo HUNT John ROUSSE Carole	EL FASSI Youness Esserhir BEN ABDELHADI Driss JAFJAF Mohamed DAHBI Nabil	EL MABTOUL Jihane MAITAL Mohamed AIT OMAR Zakaria EL FAIÇALI Zineb HATIMI Fadoua LADOUY Anas MOUSSAID Khadija

	IRRS EXPERTS	Lead Counterpart	Support Staff
	TOMAS ZERQUERA Juan		AL MOUHAK Kaoutar LASFAR Assia MAITAL Mohamed Z. Ait Omar Zineb EL Faiçali
6.	**REVIEW AND ASSESSMENT**		
	JUAN Pierre BLOMMAERT Walter CERVERA Margaret YUANSI Wendy REICHE Ingo HUNT John ROUSSE Carole TOMAS ZERQUERA Juan	HATIMI Fadoua IDIHIA Houda EL FASSI Youness Esserhir BEN ABDELHADI Driss JAFJAF Mohamed DAHBI Nabil IDIHIA Houda FATHI Lamia	AIT OMAR Zakaria EL FAIÇALI Zineb LADOUY Anas MOUSSAID Khadija CHAFI Wiam HALLAB Reda BOUMATI Chaima ECH-CHAYKHY Youssef OUCHAHMI Karima
7.	**INSPECTION**		
	JUAN Pierre BLOMMAERT Walter CERVERA Margaret YUANSI Wendy REICHE Ingo HUNT John	EL FASSI Youness Esserhir BEN ABDELHADI Driss JAFJAF Mohamed DAHBI Nabil	AIT OMAR Zakaria LADOUY Anas MOUSSAID Khadija CHAFI Wiam HALLAB Reda BOUMATI Chaima

	IRRS EXPERTS	Lead Counterpart	Support Staff
	ROUSSE Carole TOMAS ZERQUERA Juan		ECH-CHAYKHY Youssef OUCHAHMI Karima
8.	**ENFORCEMENT**		
	JUAN Pierre BLOMMAERT Walter CERVERA Margaret YUANSI Wendy REICHE Ingo HUNT John ROUSSE Carole TOMAS ZERQUERA Juan	EL FASSI Youness Esserhir BEN ABDELHADI Driss JAFJAF Mohamed DAHBI Nabil	LADOUY Anas MOUSSAID Khadija CHAFI Wiam HALLAB Reda BOUMATI Chaima ECH-CHAYKHY Youssef OUCHAHMI Karima
9.	**REGULATIONS AND GUIDES**		
	JUAN Pierre BLOMMAERT Walter CERVERA Margaret YUANSI Wendy REICHE Ingo HUNT John ROUSSE Carole TOMAS ZERQUERA Juan	EL FASSI Youness Esserhir BEN ABDELHADI Driss JAFJAF Mohamed DAHBI Nabil	AIT OMAR Zakaria LADOUY Anas MOUSSAID Khadija CHAFI Wiam HALLAB Reda BOUMATI Chaima ECH-CHAYKHY Youssef OUCHAHMI Karima
10.	**EMERGENCY PREPAREDNESS AND RESPONSE**		
	NADEEM HUSSAIN Mahammad	BENIDER Abdelkader	LAFRIDI Samia ZOUITEN Mohamed

	IRRS EXPERTS	Lead Counterpart	Support Staff
			EL MOUTAOUAKIL Achchaymae
11.	**INTERFACE WITH NUCLEAR SECURITY**		
	MANSOOR Faizan	EL FAIÇALI Zineb	DAHBI Nabil MOUSSAID Khadija LASFAR Assia
12.	**REGULATORY IMPLICATIONS OF COVID-19 PANDEMIC SITUATIONS**		
	OLLITE Faradally	MARFAK Taib	EL GAMOUSSI Rachida OUKEMENI Sofia BOUTAYEB Samira

APPENDIX V – RECOMMENDATIONS (R), SUGGESTIONS (S) AND GOOD PRACTICES (GP)

AREA	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
1. LEGISLATIVE AND GOVERNMENTAL RESPONSIBILITIES	R1	Recommendation: The government should establish a national policy and strategy for nuclear safety consistent with IAEA safety standards
	R2	Recommendation: The government should complete the ongoing update of the regulatory framework by adopting new or revised regulations that are consistent with the IAEA safety standards.
	R3	Recommendation: The government should ensure that authorization decisions for category I facilities are made at a level that does not affect the regulatory independence.
	S1	Suggestion: The government should consider ensuring that there is appropriate coordination of and liaison between the various authorities having responsibilities for safety.
	R4	Recommendation: The government should establish a national policy and strategy for long term safe management of radioactive waste and spent nuclear fuel.
	R5	Recommendation: The government should establish a policy and strategy on decommissioning, as an essential element of its policy and the corresponding strategy for safety over the lifetime of facilities and the duration of activities.

AREA	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
	R6	Recommendation: The government should define in the national legal and regulatory framework the mechanism for provision of financial resources for safe management of radioactive waste, along with clear allocation of responsibilities of parties involved.
2. THE GLOBAL SAFETY REGIME		
3. RESPONSIBILITIES AND FUNCTIONS OF THE REGULATORY BODY	S2	Suggestion: AMSSNuR should consider updating its human resource plan and implementing it to ensure that the necessary specific technical competence to regulate all safety aspects of the nuclear research reactor, and new practices planned to be introduced in the country is available.
4. MANAGEMENT SYSTEM OF THE REGULATORY BODY	R7	Recommendation: AMSSNuR's senior management should conduct a review of the management system at planned intervals.
5. AUTHORIZATION	S3	Suggestion: AMSSNuR should consider developing an integrated safety approach including risks not related to radiation within the authorization process.
	R8	Recommendation: The competent authority should approve the design of packages containing fissile material in the cases required in SSR-6 (Rev.1).

AREA	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
6. REVIEW AND ASSESSMENT	R9	Recommendation: AMSSNuR should define the regulatory requirements for a PSR of the CNESTEN TRIGA Mark II reactor, so that the PSR can be conducted as soon as possible.
	S4	Suggestion: AMSSNuR should consider including specific criteria and considerations in the justification process of non-medical human imaging practices.
7. INSPECTION	R10	Recommendation: AMSSNuR should enhance the inspection programme for the research reactor by - Including additional specialized safety related areas, - Stipulating the associated frequencies, - Performing unannounced inspections.
8. ENFORCEMENT	R11	Recommendation: AMSSNuR should establish criteria for corrective actions, including enforcing the cessation of activities or shutting down of a facility where necessary, and associated internal guidance.
9. REGULATIONS AND GUIDES	R12	Recommendation: The government should update the regulations addressing the decommissioning to bring them in line with GSR Part 6 requirements.
	R13	Recommendation: AMSSNuR should revise some of the current and submitted occupational radiation protection regulations to bring them into line with GSR Part 3.
	R14	Recommendation: The government should ensure the complete characterization of existing exposure situations identified in the country.

AREA	R: Recommendations S: Suggestions G: Good Practices	Recommendations, Suggestions or Good Practices
	R15	Recommendation: The government should ensure the establishment of provisions for the remediation of areas with residual radioactive material.
	R16	Recommendation: The government should: - Establish an appropriate reference level for 222Rn in dwellings and other buildings with high occupancy factors for members of the public - Complete the characterization of levels of radon in dwellings and public places, - Develop and implement a national radon action plan.
	R17	Recommendation: AMSSNuR, in cooperation with relevant authorities, should ensure that reference levels for exposure due to radionuclides in commodities are established.
10. EMERGENCY PREPAREDNESS AND RESPONSE – REGULATORY ASPECTS	R18	Recommendation: AMSSNuR should ensure that operators of facilities and activities in all Emergency Preparedness Categories have developed and implemented an exercise programme along with a process for systematic evaluation of the exercises.
	S5	Suggestion: AMSSNuR should consider evaluating some of the exercises and developing necessary evaluation guidelines and checklists.
	R19	Recommendation: AMSSNuR should develop and made available necessary procedures and analytical tools at Crisis Management Centre (CMC) for performing assessment of emergency and its consequences.
	S6	Suggestion: AMSSNuR should consider finalizing its emergency response plan.

APPENDIX VI – COUNTERPART'S REFERENCE MATERIAL USED FOR THE REVIEW

Advance Reference Material (2023) and SARIS Report (2021)

Main Legal and Regulatory Documents:

1. Decree No. 2.20.131 relating to authorizations and declarations of activities, installations and associated sources of ionizing radiation falling within Category II.
2. Order of the Head of Government No. 3.12.21 setting the levels of exemption for activities, installations and sources of ionizing radiation associated therewith falling under category II.
3. Order of the Head of Government No. 3.15.23 establishing the classification of activities, facilities and associated ionizing radiation sources falling under category II.
4. Decree No. 2.20.452 implementing the provisions of Article 34 of Law No. 142.12, designating the MTEDD as the government authority responsible for authorizing the import, export, and transit of materials nuclear weapons whether by land, river, airport, or port.
5. Decree no. 2.23.151 relating to the protection of workers, the public and the environment against ionizing radiation.
6. Decree submitted for examination and approval, relating to the approval of technical bodies.
7. Decree submitted for examination and approval on the use of ionizing radiation for medical purposes.
8. Decree submitted for examination and approval relating to the implementation of safeguards.

Other Legal and Regulatory Documents:

1. Law N° 12-02 related to civil liability for nuclear damage promulgated by Dahir N° 1-04-278 of January 7, 2005.
2. Law N° 12-03 on environmental impact studies, promulgated by Dahir n ° 1-03-60 of May 12, 2003, applicable to the development of nuclear installations, including radioactive waste management installations.
3. Law N° 31-13 relating to the right of access to information promulgated by Dahir n ° 1-18-15 of February 22, 2018.
4. Law N° 30-05 of June 2, 2011, relating to the road transport of dangerous goods promulgated by Dahir N° 1-11-37 of Jun 2, 2011.
5. Law N° 17-83, promulgated by Dahir n ° 1-85-98 of November 14, 1986, establishing the CNESTEN under the Ministry of Energy, Mines and Sustainable Development.

6. Decree No. 2-14-541 of August 8, 2014, setting the powers and organization of the Ministry of Energy, Mines, Water, and the Environment.
7. Decree No. 2-90-352 of 5 May 1993, establishing the national Council for Nuclear Energy under the Prime Minister.
8. Decree N° 2-94-666 of 7 November 1994 related to the authorization and control of nuclear installations.
9. Decree N° 2-97-30 of October 28, 1997, related to the protection against ionizing radiation.
10. Decree N° 2-97-132 of October 28, 1997, related to the use of ionizing radiation for medical purposes.
11. Decree N° 2-04-563 of November 4, 2008, related to the attributions and operation of the national committee and regional committees for environmental impact studies.
12. Decree N° 2-04-564 of November 4, 2008, fixing the organizational and conduct of the public inquiry related to the projects subject to environmental impact studies.
13. Decree N° 2-99-111 of February 26, 1999, related to the authorization to build the Nuclear Studies Center of Mâamora (CEMN), which includes a research reactor and radioactive waste management facilities.
14. Decree N° 2-94-285 of November 21, 1994, related to the attributions and organization of the Ministry of Health
15. Order of the Minister of Energy, Mines, and the Environment, N° 2004-08 of January 19, 2009, authorizing the commissioning of the CEMN research reactor operated by CNESTEN.
16. Decree N°2- 14-562 of July 24, 2015, pursuant to framework law N°34-09 related to the health system and the offer of care.

<u>Other Documents:</u>

1. AMSSNuR Integrated Management System Documents
2. Drafts of Policies and Strategies
3. Preliminary Draft Mission Report of the Integrated Nuclear Infrastructure Review (INIR)
4. Morocco national report under the CNS (2023)
5. National Framework for Emergency Preparedness and Response

APPENDIX VII – IAEA REFERENCE MATERIAL USED FOR THE REVIEW

1. **INTERNATIONAL ATOMIC ENERGY AGENCY** - Fundamental Safety Principles, No SF-1, IAEA, Vienna (2006)
2. **INTERNATIONAL ATOMIC ENERGY AGENCY -** Governmental, Legal and Regulatory Framework for Safety, General Safety Requirements Part 1, No GSR Part 1 (Rev. 1), IAEA, Vienna (2016)
3. **INTERNATIONAL ATOMIC ENERGY AGENCY –** Leadership and Management for Safety, General Safety Requirements Part 2, No GSR Part 2, IAEA, Vienna (2016)
4. **INTERNATIONAL ATOMIC ENERGY AGENCY** - Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, General Safety Requirements Part 3, No GSR Part 3, IAEA, Vienna (2014).
5. **INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety assessment for facilities and activities, General Safety Requirements Part 4, No GSR Part 4 (Rev. 1), IAEA, Vienna (2016)
6. **INTERNATIONAL ATOMIC ENERGY AGENCY -** Predisposal Management of Radioactive Waste, General Safety Requirements Part 5, No GSR Part 5, IAEA, Vienna (2009)
7. **INTERNATIONAL ATOMIC ENERGY AGENCY -** Decommissioning of Facilities, General Safety Requirements No GSR Part 6, IAEA, Vienna (2014)
8. **INTERNATIONAL ATOMIC ENERGY AGENCY** - Preparedness and Response for Nuclear or Radiological Emergency, General Safety Requirements No GSR Part 7, IAEA, Vienna (2015)
9. **INTERNATIONAL ATOMIC ENERGY AGENCY -** Site Evaluation for Nuclear Installations, Specific Safety Requirements No SSR-1, IAEA, Vienna (2003)
10. **INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Nuclear Power Plants: Design, Specific Safety Requirements No SSR-2/1 (Rev. 1), IAEA, Vienna (2016)
11. **INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Nuclear Power Plants: Commissioning and Operation, Specific Safety Requirements No SSR-2/2 (Rev. 1), IAEA, Vienna (2016)
12. **INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Research Reactors, Specific Safety Requirements No SSR-3, IAEA, Vienna (2016)
13. **INTERNATIONAL ATOMIC ENERGY AGENCY -** Safety of Nuclear Fuel Cycle Facilities, Specific Safety Requirements No SSR-4, IAEA, Vienna (2017)
14. **INTERNATIONAL ATOMIC ENERGY AGENCY -** Disposal of Radioactive Waste, Specific Safety Requirements No SSR-5, IAEA, Vienna (2011)
15. **INTERNATIONAL ATOMIC ENERGY AGENCY** - Regulations for the Safe Transport of Radioactive Material, 2018 Edition, Specific Safety Requirements No SSR-6 (Rev. 1), IAEA, Vienna (2018)
16. **INTERNATIONAL ATOMIC ENERGY AGENCY** - Classification of Radioactive Waste, General Safety Guide No GSG-1, IAEA, Vienna (2009)
17. **INTERNATIONAL ATOMIC ENERGY AGENCY** - Criteria for use in Preparedness and Response for a Nuclear or Radiological Emergency, General Safety Guide No GSG-2, IAEA, Vienna 2011)
18. **INTERNATIONAL ATOMIC ENERGY AGENCY** - Communication and Consultation with Interested Parties by the Regulatory Body, General Safety Guide No GSG-6, IAEA, Vienna (2017)
19. **INTERNATIONAL ATOMIC ENERGY AGENCY** - Occupational Radiation Protection, Safety Guide No GSG-7, IAEA, Vienna (2018)

20. INTERNATIONAL ATOMIC ENERGY AGENCY - Regulatory Control of Radioactive Discharges to the Environment, Safety Guide No GSG-9, IAEA, Vienna (2018)
21. INTERNATIONAL ATOMIC ENERGY AGENCY - Organization, Management and Staffing of the Regulatory Body for Safety, General Safety Guide No GSG-12, IAEA, Vienna (2018)
22. INTERNATIONAL ATOMIC ENERGY AGENCY - Functions and Processes of the Regulatory Body for Safety, General Safety Guide No GSG-13, IAEA, Vienna (2018)
23. INTERNATIONAL ATOMIC ENERGY AGENCY Leadership, Management and Culture for Safety in Radioactive Waste Management, Safety Guide No GSG-16, IAEA, Vienna (2022)
24. INTERNATIONAL ATOMIC ENERGY AGENCY - Arrangements for Preparedness for a Nuclear or Radiological Emergency, Safety Guide No GS-G-2.1, IAEA, Vienna (2007)
25. INTERNATIONAL ATOMIC ENERGY AGENCY - Modifications to Nuclear Power Plants, Safety Guide No SSG-71, IAEA, Vienna (2022)
26. INTERNATIONAL ATOMIC ENERGY AGENCY - Recruitment, Qualification and Training of Personnel for Nuclear Power Plants, Safety Guide No NS-G-2.8, IAEA, Vienna (2002)
27. INTERNATIONAL ATOMIC ENERGY AGENCY - Environmental and Source Monitoring for Purposes of Radiation Protection, Safety Guide No RS-G-1.8, IAEA, Vienna (2005)
28. INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Radiation Generators and Sealed Radioactive Sources, Safety Guide No RS-G-1.10, IAEA, Vienna (2008)
29. INTERNATIONAL ATOMIC ENERGY AGENCY - Borehole Disposal Facilities for Radioactive Waste, Safety Guide No SSG-1, IAEA, Vienna (2009)
30. INTERNATIONAL ATOMIC ENERGY AGENCY - Deterministic Safety Analysis for Nuclear Power Plants, Specific Safety Guides No SSG-2, IAEA, Vienna (2010)
31. INTERNATIONAL ATOMIC ENERGY AGENCY - Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide No SSG-3, IAEA, Vienna (2010)
32. INTERNATIONAL ATOMIC ENERGY AGENCY - Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants, Specific Safety Guide No SSG-4, IAEA, Vienna (2010)
33. INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Conversion Facilities and Uranium Enrichment Facilities, Specific Safety Guide No SSG-5, IAEA, Vienna (2010)
34. INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Uranium Fuel Fabrication Facilities Specific Safety Guide No SSG-6, IAEA, Vienna (2010)
35. INTERNATIONAL ATOMIC ENERGY AGENCY - Safety of Uranium and Plutonium Mixed Oxide Fuel Fabrication Facilities, Specific Safety Guide No SSG-7, IAEA, Vienna (2010)
36. INTERNATIONAL ATOMIC ENERGY AGENCY - Licensing Process for Nuclear Installations, Specific Safety Guide No SSG-12, IAEA, Vienna (2010)
37. INTERNATIONAL ATOMIC ENERGY AGENCY - Geological Disposal Facilities for Radioactive Waste Specific Safety Guide No SSG-14, IAEA, Vienna (2011)
38. INTERNATIONAL ATOMIC ENERGY AGENCY - Storage of Spent Nuclear Fuel, Safety Guide No SSG-15 (Rev. 1), IAEA, Vienna (2020)
39. INTERNATIONAL ATOMIC ENERGY AGENCY - Periodic Safety Review for Nuclear Power Plants, Safety Guide No SSG-25, IAEA, Vienna (2013)
40. INTERNATIONAL ATOMIC ENERGY AGENCY - Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material Specific Safety Guide (2018 Edition) No SSG-26 (Rev.1), IAEA, Vienna (2022)

41. INTERNATIONAL ATOMIC ENERGY AGENCY - Commissioning for Nuclear Power Plants, Safety Guide No SSG-28, IAEA, Vienna (2014)
42. INTERNATIONAL ATOMIC ENERGY AGENCY - Predisposal Management of Radioactive Waste from Nuclear Power Plants and Research Reactors, Safety Guide No SSG-40, IAEA, Vienna (2016)
43. INTERNATIONAL ATOMIC ENERGY AGENCY - Predisposal Management of Radioactive Waste from Nuclear Fuel Cycle Facilities, Safety Guide No SSG-41, IAEA, Vienna (2016)
44. INTERNATIONAL ATOMIC ENERGY AGENCY - Management of Waste from the Use of Radioactive Material in Medicine, Industry, Agriculture, Research and Education, Safety Guide No SSG-45, IAEA, Vienna (2019)
45. INTERNATIONAL ATOMIC ENERGY AGENCY - Radiation Protection and Safety in Medical Uses of Ionizing Radiation, Safety Guide No SSG-46, IAEA, Vienna (2018)
46. INTERNATIONAL ATOMIC ENERGY AGENCY - Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities, Safety Guide No SSG-47, IAEA, Vienna (2018)
47. INTERNATIONAL ATOMIC ENERGY AGENCY – Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants, Safety Guide No SSG-48, IAEA, Vienna (2018)
48. INTERNATIONAL ATOMIC ENERGY AGENCY –Decommissioning of Medical, Industrial and Research Facilities, Safety Guide No SSG-49, IAEA, Vienna (2019)
49. INTERNATIONAL ATOMIC ENERGY AGENCY – Operating Experience Feedback for Nuclear Installations, Safety Guide No SSG-50, IAEA, Vienna (2018)
50. INTERNATIONAL ATOMIC ENERGY AGENCY - Accident Management Programmes for Nuclear Power Plants, Safety Guide No SSG-54, IAEA, Vienna (2019)
51. INTERNATIONAL ATOMIC ENERGY AGENCY - Preparedness and Response for a Nuclear or Radiological Emergency Involving the Transport of Radioactive Material, Safety Guide No SSG-65, IAEA, Vienna (2022)
52. INTERNATIONAL ATOMIC ENERGY AGENCY - Radiation Protection Programmes for the Transport of Radioactive Material, Safety Guide No TS-G-1.3, IAEA, Vienna, (2007)
53. INTERNATIONAL ATOMIC ENERGY AGENCY - The Management System for the Safe Transport of Radioactive Material Safety Guide No TS-G-1.4, IAEA, Vienna (2008)
54. INTERNATIONAL ATOMIC ENERGY AGENCY - Compliance Assurance for the Safe Transport of Radioactive Material, Safety Guide No TS-G-1.5, IAEA, Vienna (2009)
55. INTERNATIONAL ATOMIC ENERGY AGENCY - Schedules of Provisions of the IAEA Regulations for the Safe Transport of Radioactive Material (2018 Edition), Specific Safety Guide No SSG-33 (Rev.1) IAEA, Vienna (2021)
56. INTERNATIONAL ATOMIC ENERGY AGENCY - Storage of Radioactive Waste, Safety Guide No WS-G-6.1, IAEA, Vienna (2006)
57. INTERNATIONAL ATOMIC ENERGY AGENCY - Safety Assessment for the Decommissioning of Facilities Using Radioactive Material, Safety Guide NoWS-G-5.2, IAEA, Vienna (2009)
58. INTERNATIONAL ATOMIC ENERGY AGENCY - Storage of Radioactive Waste, Safety Guide No WS-G-6.1, IAEA, Vienna (2006)

APPENDIX VIII – ORGANIZATIONAL CHART