

Kingdom of Morocco



**National Centre for Nuclear
Energy, Science and Technology**

‘CNESTEN’



**Moroccan Agency for Nuclear and
Radiological**

Safety & Security

‘AMSSNuR’



**NATIONAL RADIOACTIVE WASTE
AND SPENT NUCLEAR FUEL MANAGEMENT
STRATEGY**

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A INTRODUCTION

This document presents the strategy by which the *National Policy on Radioactive Waste and Spent Fuel Management* will be implemented. This *strategy* presents a framework that complies with the principles and requirements of sustainable development and nuclear and radiological safety and security, and is informed by national legislation, national regulations, and international standards.

In the process of developing this *Strategy*, the following considerations were taken into account:

- The national situation in the Kingdom of Morocco, including existing spent nuclear fuel;
- The radioactive waste generated by medical, industrial, agricultural, research, and educational activities;
- Anticipation of the radioactive waste to be generated by a future nuclear power program, which, at the time of preparing this strategy, remains an open option for the national energy mix; and
- The existing infrastructure dealing with radioactive waste management (RWM) (i.e., the Nuclear Research Centre (CNEM) operated by the National Centre for Nuclear Energy, Science and Technology (CNESTEN)).

B PURPOSE OF THIS STRATEGY

This *Strategy* is intended to:

1. Clarify the roles and responsibilities of the Waste Management Organization (WMO).
2. Define the means by which the goals and requirements set out in the *National Policy on Radioactive Waste and Spent Fuel Management* will be achieved.
3. Develop and implement a coherent, integrated, optimized, and sustainable management model that includes generic waste acceptance criteria for all radioactive wastes types generated in the Country.

This strategy follows a cradle-to-grave approach to managing radioactive waste types, including:

- Radioactive waste generated by nuclear applications, including the operation of research reactors;
- Radiologically contaminated material from the scrap industry;
- Contaminated material from nuclear or radiological incidents or accidents;
- Disused sealed radioactive sources; and
- Spent nuclear fuel, when spent fuel is considered as waste.

This *strategy* aligns with all relevant provisions from the international conventions with which the Kingdom of Morocco has agreed. It also aligns with *Law 142 12* and associated regulations, and the legislation and regulations that pertain to environmental protection and sustainable development.

C STRATEGY IMPLEMENTATION

C1 National Decision-Making Process

The process for making decisions related to RWM (e.g. storage or disposal):

- Is open and transparent;
- Involves consultation with stakeholders and with the public;
- Is deliberate and accessible;
- Relies on peer review of the technical basis; and
- Provides adequate time for the resolution of issues.

C2 Waste Management Organization

In order to be in a position to carry out the responsibilities set out for the WMO in the *National Policy on Radioactive Waste and Spent Fuel Management*, the WMO will:

- Identify the interdependencies among the steps in predisposal management of radioactive waste, as well as the impact of the anticipated disposal option(s);
- Establish a management system that integrates all steps of the predisposal management of radioactive waste and spent nuclear fuel, and all phases of the lifecycle of the facility and activity, based on periodic review of the expected national inventory;
- Develop a research and development program;
- Identify resource requirements (human, financial, and technical);
- Establish a protocol for transfer of waste ownership that addresses all issues pertaining to ownership, liability and safety;
- Clearly communicate the waste management streams and associated end-points identified in the *National Waste Management Inventory* (i.e., “dilute and disperse,” “concentrate and contain,” and “delay and decay”);
- Define the mechanisms and rules by which characterized waste is received by the WMO, particularly in cases where the characterization is not performed by WMO.

C3 Funding Mechanism

Based on *Article 92 of Law 142 12*, the government will establish a funding mechanism to ensure:

- Establishment of a WMO, including human, financial, and technical resources;
- Establishment of a WMO facility;
- Establishment of an RWM research and development program;
- Long-term sustainability and liability related to RWM and spent nuclear fuel.

C4 Waste Management Optimization

Radioactive waste producers, AMSSNuR, and CNESTEN shall investigate the possibility of:

- Avoidance of waste production where possible;
- Reduction and optimization of amount of waste by using best available technology economically achievable (BATEA), and revaluation of the current processes;
- Reuse and recycling of items and materials where possible before declaring them as final radioactive waste;
- Reuse of sealed radioactive sources;
- Consideration of different storage options such as temporary, mid-term and long-term storage.

In addition, the waste producers, AMSSNuR and CNESTEN shall investigate the optimization of treatment, conditioning and predisposal for the different waste streams.

C5 Graded Approach

At the national level, AMSSNuR and CNESTEN will ensure that different radioactive waste streams will be managed according to a graded approach, by which appropriate resources will be deployed based on the following considerations:

- The significance and complexity of each RWM stream, including spent nuclear fuel and associated activities;
- The hazards and magnitude of potential impact (risk) associated with safety, health, the environment, security, quality, and economic elements associated with each RWM stream;
- The interdependencies within a specific RWM stream, and the possible consequences associated with an activity being carried out incorrectly, or not being properly addressed within that stream.

C6 Interdependency and Waste Acceptance Criteria

Waste producers, the AMSSNuR, and CNESTEN will refer to the *National Waste Inventory* to identify the applicable waste management streams (“dilute and disperse,” “concentrate and contain,” and “delay and decay”), based on the following criteria:

- Waste characteristics including spent nuclear fuel;
- Graded approach;
- Compatibility with existing storage capacity, current infrastructures, and future final end-points; and
- When, where, and under what conditions the transfer of ownership of waste and spent nuclear fuel can take place.

For each waste stream, CNESTEN will propose a set of generic waste acceptances criteria to the AMSSNuR that addresses at least the following considerations:

- Solid form;
- Conditioned waste package;
- Avoiding biological hazard; and
- Reducing the chemical hazard.

C7 Spent Fuel Management

The government will initiate an action to find a solution for the management of the spent fuel elements of the TRIGGA research reactor, including consideration of the possibility of non-repatriation of these spent fuel elements to the original supplier.

C8 Integrated Management System

Waste producers, CNESTEN, AMSSNuR, and the WMO will develop and implement an integrated management system.

The RWM management system shall include provision for the establishment of competencies and a knowledge management program for RWM, including record management and record keeping.

As stipulated by *Law 142-12*, waste producers, CNESTEN, AMSSNuR and the WMO must maintain sufficient qualified staff to conduct activities related to safety and security of a nuclear and radiological facility or activity.

Final disposal is considered to be the ultimate and sustainable solution for RWM. Long-term storage of certain types of waste (e.g., HLW, LLW) and disused sources are considered as one of the steps in the waste management process, pending final disposal. Final disposal will be addressed in a future revision of this strategy.

D NATIONAL MODEL FOR RADIOACTIVE WASTE MANAGEMENT

The national model for RWM consists of waste management processes from waste generation up to waste management end-points and institutional controls. All steps may not apply to all waste management streams.

D1 Waste Generation

Radioactive waste, spent nuclear fuel, and materials that are potential radioactive waste, are continuously generated during normal operations. Radioactive waste may also exist due to previous activities and/or historic processing of radioactive material (legacy).

D2 Predisposal Management Steps

Predisposal management of radioactive waste covers all the steps in the management of radioactive waste and spent nuclear fuel from its generation up to disposal, including processing (pre-treatment, treatment, and conditioning), storage, and transport.

Sound predisposal management of radioactive waste and spent nuclear fuel ensures that the waste streams in the national inventory are effectively managed and monitored.

Predisposal management will be performed according to identified RWM streams and their associated end-points, considering a set of generic waste acceptances criteria.

The following principles will be applied in the predisposal management of radioactive waste:

- Preventing and minimizing waste;
- Reducing the biological, chemical and radiological risks associated with waste;
- Ensuring compatibility with all the steps of predisposal management; and
- Using waste characterization data and records for verification and quality assurance.

Storage of radioactive waste is an important step of the RWM process. The storage may need to allow for decay of radionuclides with short half-lives, or to allow for heat dissipation if required, providing an opportunity for radioactive waste to be processed efficiently (if the necessary equipment or technologies are not available), or as an interim storage measure prior to the establishment of suitable facilities for final disposal.

Stored radioactive waste should be retrievable, easily monitored, regularly inspected, and kept in compliance with relevant safety and security requirements.

D3 Management of Sealed Radioactive Sources

Sealed radioactive sources (SRSs) shall be managed in safe and secure manner. AMSSNuR will maintain the national SRS registry. In addition, to ensure the safety and the security of SRS, AMSSNuR will include the following provision in the future regulations:

- Every licensee who possesses or uses a sealed radioactive source shall notify AMSSNuR immediately if:
 - the sealed source or the radiation device is lost or stolen,
 - the radiation device is damaged to an extent that could impair its normal use,
 - the sealed source is separated from the radiation device when the latter is not being serviced,
 - the sealed source fails to return to the shielded position inside the radiation device, or
 - The sealed source is moved to a new location, or there is a change in its ownership;
- If the activity and physical condition of the SRS allows for further use, or transfer of ownership to another user, then a new licence for this specific purpose must first be issued by AMSSNuR;
- Disused sealed radioactive sources (DSRSs) are sources that cannot be reused or otherwise recycled for technical or economical reasons. DSRSs shall be managed in a safe and secure manner.
- DSRSs may be returned to the supplier or transferred to the WMO for storage pending eventual disposal.

Options for the disposal of DSRs may vary depending on the associated radionuclides and activities. DSRs may be disposed using an engineered near-surface disposal facility, provided that the waste acceptance criteria of the facility are met. Geological disposal offers the highest level of safety and security for DSRs.

E STRATEGIC ELEMENTS AND TECHNICAL OPTIONS

According to International Atomic Energy Agency (IAEA) methodology, described in the IAEA publication entitled *Nuclear Energy Series No. NW-G-1.1*, the strategic elements and associated technical options for effective RWM include:

- Inventory of radioactive sources, materials, and waste;
- Classification of radioactive waste;
- Characteristics of radioactive waste:
 - Spent nuclear fuel;
 - Disused sealed radioactive sources;
 - Current situation of radioactive waste and spent nuclear fuel;
 - Radioactive waste currently generated in the Kingdom of Morocco;
 - Existing radioactive waste management facilities; and
 - Commitment to public information.

E1 Inventory

E1.1 Inventory of radioactive sources

In accordance with *Article 114 of Law 142-12*, AMSSNuR maintains a national registry of radioactive sources that includes the appropriate level of information detail as taken from licensee inventories.

For each source, the national registry description includes location, category, radiological characteristics, the validity of the authorization, and the owner. AMSSNuR must receive this information in timely manner in order to ensure that the national registry is up-to-date. With the assistance of source owners/users, AMSSNuR also maintains an inventory of current and potential disused sealed sources.

As set out in *Article 22 of Law 142-12*, accounting records are periodically monitored by duly authorized AMSSNuR staff.

E1.2 Inventory of radioactive materials and waste

Law 142-12 sets out the following requirements with respect to inventory of radioactive materials and waste:

- Each licensee must take appropriate measures to maintain an up-to-date record of all radioactive materials under their responsibility. Accounting records will be periodically monitored by duly authorized AMSSNuR staff (*Article 22*);
- Licensees generating or managing radioactive material or waste shall maintain an up-to-date inventory of that material or waste, and submit at least an annual inventory report to the AMSSNuR (*Article 90*);

- Records of all waste generation and management operations are duly archived according to the regulations in force (*Article 91*).

To assess future needs and timescales for radioactive waste management infrastructure development, CNESTEN is responsible for preparing a national estimate of the expected amount of radioactive waste to be generated (including the technical properties of that waste, such as origin, type, form, quantity, general characteristics, etc.). This estimation shall be performed in consultation with all waste generators and under the oversight of the AMSSNuR.

E2 Classification of Radioactive Waste

Morocco generally follows the guidelines set out in IAEA *Safety Guide GSG-1* regarding the classification of radioactive waste, expressed as follows:

1. **Exempt waste (EW)**: Waste that meets the criteria for clearance established by AMSSNuR.
2. **Very short-lived waste (VSLW)**: Waste that can be stored for decay for up to a few years, and subsequently cleared from regulatory control according to arrangements approved by AMSSNuR for uncontrolled disposal, use, or discharge.
3. **Very low-level waste (VLLW)**: Waste that does not necessarily meet the criteria of EW, but that does not need a high level of containment and isolation. Concentrations of longer lived radionuclides in VLLW are generally very limited. Suitable for disposal in near surface landfill type facilities with limited regulatory control.
4. **Low-level waste (LLW)**: Waste that is above clearance levels, but that contains limited amounts of long lived radionuclides. LLW covers a very broad range of waste, and may include short lived radionuclides at higher levels of activity concentration, and long-lived radionuclides at relatively low levels of activity concentration. Requires robust isolation and containment for periods of up to a few hundred years, and is suitable for disposal in engineered near-surface facilities.
5. **Intermediate level waste (ILW)**: Waste with content (particularly long lived radionuclides) that requires a greater degree of containment and isolation than that provided by near surface disposal. ILW needs little or no provision for heat dissipation, and therefore requires disposal at greater depths of the order of tens of metres to a few hundred metres.
6. **High level waste (HLW)**: Waste with levels of activity concentration high enough that the radioactive decay process can be expected to generate significant quantities of heat dissipation, or waste with large quantities of long lived radionuclides that need to be considered in the design of a disposal facility for such waste. Disposal in deep, stable geological formations, usually several hundred metres or more below the surface, is the generally recognized option for disposal of HLW.

Waste management solutions shall be consistent with these waste classifications.

In accordance with *Law 142-12*, the AMSSNuR will prepare and propose to the Government appropriate regulations consistent with:

1. The classifications as indicated above;
2. Exemption and clearance levels as indicated in the IAEA publication, *Basic Safety Standards GSR Part 3 (interim)*.

E3 Characterization of Radioactive Waste

According to the *Joint Convention on the Safety of the Management of Spent Fuel and the Safety of the Management of Radioactive Waste*, and *Article 86 of Law 142-12*, waste shall be characterized to determine its radiological, chemical, and physical, properties in order to determine whether there is a need for further adjustment, treatment, or conditioning, or if it is suitable for further handling, processing, storage, or disposal.

The results of waste characterization shall be recorded and kept by the waste producers, and remain available to the AMSSuR upon request.

The following methods are used to characterize radioactive waste:

- Radiological characterization
 - Non-destructive measurements, such as alpha, beta and gamma spectrometry,
 - Dose rate,
 - Determination of the different radioelements,
 - Total activity, and
 - Other relevant radiological information;
- Chemical characterization
 - (ICP) analysis,
 - (IR) spectrometry,
 - Elementary analysis,
 - Corrosion,
 - Reactivity,
 - Presence of organic matter,
 - Chemical Oxygen Demand (COD),
 - Biological Oxygen Demand (BOD),
 - Presence of detergent and suspended material, and
 - Other chemical information;
- Physical characterization
 - Weight,
 - Appearance,
 - Conductivity, and
 - Other physical information.

E4 Spent Nuclear Fuel

The predisposal management model for spent nuclear fuel will be developed based on the conclusion of the government vision concerning the spent nuclear fuel of TRIGGA research reactor.

E5 Disused Sealed Radioactive Sources

In accordance with *Law 17-86*, CNESTEN is responsible for collecting and transporting all disused sealed radioactive sources (DSRSs) that cannot be returned to the suppliers, and storing them at the CNEM storage facility.

In accordance with *Law 142-12*, responsibility for radioactive waste, including DSRSs, transfers from the waste generator to CNESTEN when CNESTEN receives and accepts the DSRSs.

Therefore, the optimal solutions are:

1. **For high-activity DSRSs:** to repatriate them to the country of origin;
2. **For very short-lived sources:** to keep them at the user's premises, and to release them from regulatory control at the end of the appropriate decay storage period.

However, if these options are unavailable, then the DSRSs shall be transferred to an interim storage facility pending determination of an appropriate disposal solution.

The present strategy recommends disposal in adequate facility, such as near surface disposal facility or borehole, as a final alternate solution .

E6 Current Situation of Radioactive Waste and Spent Nuclear Fuel

Radioactive waste must be managed safely and securely in accordance with the applicable laws, regulations, and standards, and the domestic and international agreements to which the Kingdom of Morocco has agreed.

Currently, only low and intermediate level (LILW), short lived, and very short lived radioactive wastes are generated in Morocco, from programs for nuclear applications in medicine, industry, agriculture, and research. Morocco does not generate any high-level radioactive waste nor long-lived radiologically contaminated wastes.

The scrap metal industry and the main harbors are equipped with fixed portal radiation monitoring systems to detect the presence of contaminated metals or radioactive orphan sources in shipments. The strategy requires that any suspicious radioactive material detected be taken care of by all relevant ministries and agencies, in particular the AMSSNuR, through the reestablishment of a regulatory control. CNESTEN shall be involved to ensure an eventual transfer and application of the steps needed for appropriate RWM.

Note: The scope, scale, and timing of the national radioactive waste disposal program may be significantly influenced by a Government decision about a future nuclear power program.

E7 Radioactive Waste Currently Generated in the Kingdom of Morocco

The following types of waste are currently being generated in the Kingdom of Morocco:

- **Very short-lived waste (VSLW):** After approval by AMSSuR, a “delay and decay” strategy is adopted for the solid form and the “dilute and disperse” strategy is adopted for the liquid and gaseous forms;
- **Very low-level waste (VLLW):** Waste with activity concentrations below regulatory concern, or within discharge limits, are released to the atmosphere or landfill;
- **Low-level waste (LLW) & Intermediate level waste (ILW):** For low-level waste, the “concentrate and contain” strategy is adopted. The current RWM infrastructure takes care of all LILW currently generated in Morocco and covers all the management steps, from generation to storage through transportation and processing. Radioactive waste collected by CNESTEN at the generators’ sites are transported to CENM in order to be processed and then stored. Aqueous radioactive effluents are treated by evaporation, while solid wastes are segregated into compactable and non-compactable waste. An in-drum compactor is used for compactable waste placed in 100-litre drums. Organic wastes are solidified and conditioned in 100-litre drums. Cement mortar mix is used as immobilization matrix.

The suitability of disposal modes will be confirmed based on a safety case and supporting safety assessment developed by the license’s applicant responsible for the development and/or operation of the disposal facility and approved by AMSSNuR.

E8 Existing Radioactive Waste Management Facilities

Radioactive waste DSRs are collected, transported, and safely and securely stored at the Waste Management Centre operated by CNESTEN and located at the CENM. To the extent practicable, radioactive waste and DSRs storage in Morocco is centralized. However, a few DSRs are duly authorized by the AMSSNuR to be temporarily stored at users’ premises. After decay storage, some DSRs are released from regulatory control. Remaining DSRs are collected and transported to the CNESTEN Waste Management Centre.

The waste management centre operated by CNESTEN at the CENM consists of two buildings:

1. The treatment building (DT) which houses:
 - storage tanks at the underground level, and
 - the evaporation system, compacting unit, and radiochemical laboratory on the ground floor.
2. The long-term storage building (DE), which consists of four concrete vaults used for storage of LIL radioactive waste and DSRs.

The total existing capacity of the storage building is 295 m³ of waste conditioned in 120-liter drums while the average annual production of RW over the first four years of operation is 1 m³. The storage capacity is continuously monitored. CNESTEN will anticipate when required the need to extend the storage capacity and will inform AMSSuR in timely manner to obtain the required authorization.

E9 Commitment to Public Information

The public will be informed about the following elements of the waste management strategy through the appropriate official channels:

1. National decision-making process.
2. Establishment of a WMO.
3. Options considered for nuclear spent fuel management.
4. The mid-term and long-term funding mechanisms that will be elaborated.

F ACTION PLAN

F1 Elaboration of the Action Plan

The *Action Plan* for the management of radioactive materials, waste, and spent nuclear fuel will be elaborated under the responsibility of the main operator, CNESTEN, in consultation with all organizations involved in radioactive waste management activities in Morocco. These include Direction Générale de la Sécurité Nationale (DGSN), Direction Générale de la Protection Civile relevant du Ministère de l'Intérieur (DGPC), Centre National de Radioprotection relevant du Ministère de la Santé (CNRP)/Health Ministry, the Ministry of Foreign Affairs and International Cooperation, the Ministry of Energy Mines and Sustainable Development, the Office National de l'Electricité et de l'Eau potable (ONEE), and any other departments as needed.

CNESTEN will submit the draft *Action Plan* to AMSSNuR for examination, and to verify compliance with the national policy objectives, regulations, and international obligations applicable to radioactive waste management.

The approved *Action Plan* will be annexed to the *National Radioactive Waste and Spent Fuel Strategy*.

F2 Approval and Promulgation of the Action Plan

As part of the *National Radioactive Waste and Spent Fuel Strategy*, the *Action Plan* should be deemed approved when the strategy is approved.

AMSSNuR is responsible for monitoring and reporting the progress to the Government.

G Strategy Approval, Review, and Update

AMSSNuR will submit the *National Radioactive Waste and Spent Fuel Strategy*, including the annexed *Action Plan*, for Government approval.

The *Strategy* and the annexed *Action Plan* will be reviewed and every five years and updated as necessary. AMSSNuR will lead the review in collaboration with relevant inter-ministerial departments, including CNESTEN, DGSN, DGPC, CNRP/Health Ministry, Ministry of Foreign Affairs and International Cooperation, Ministry of Energy Mines and Sustainable Development, ONEE, and other departments as needed. The review will include an estimation of the budget needed to implement the updated *Action Plan*.

If there is any update to the *National Policy on Radioactive Waste and Spent Fuel Management*, then the *Strategy* will be reviewed to determine whether it needs to be updated to align with the *Policy* changes and, if so, then the *Strategy* will be submitted as an annex to the *Policy* for approval.

The approval of the *Policy* is considered approval of this strategy confirming the roles and responsibilities of all parties involved in its implementation.

Subsequent updates to this *Strategy* must be approved by the Government.

H ANNEXES**H1 Action Plan for Policy and Strategy Implementation**

Réf in draft P&S	Item	measures	Responsibility for implementation	Responsibility for the follow up	timescale
Policy for radioactive waste management					
1	<u>“National waste and spent fuel management policy”</u>	Approval of the policy document	Government	AMSSuR	To be defined
2	<u>“National waste and spent fuel management strategy”</u>	Approval of the strategy document The date of the approval will defined the “ T0 ” date	To be defined	AMSSuR	To be defined
3	<u>National decision making process</u>	The elements for the national decision making process related to RWM (e.g. storage or disposal) shall be based on the following: <ul style="list-style-type: none"> ✓ Openness and transparency; ✓ Involvement of stakeholders and public consultation; ✓ A deliberative and accessible process; ✓ Commitment to peer review of the technical basis; and ✓ Provision of adequate time for the resolution of issues. 	AMSSuR	AMSSSuR	Before T0 + 5 years

Réf in draft P&S	Item	measures	Responsibility for implementation	Responsibility for the follow up	timescale
4	<u>Waste Management Organization (WMO)</u>	Clarify the roles and the responsibilities of WMO, the following elements shall be considered: <ul style="list-style-type: none"> ✓ Interdependency; ✓ Management system covering all phases of the lifecycle of the facility and activity; ✓ Research and development programme; ✓ Needed resources (funding, human); ✓ Transfer of wastes ownership ensuring that all issues pertaining to ownership and liability and safety are addressed; ✓ Identification of the stream of radioactive waste management options to be used for the type of waste (e.g. dilute and disperse, concentrate and contain and delay and decay. ✓ Mechanism of reception of characterized wastes if this characterization is nor performed by WMO). 	Ministère de l’Energie, mines et du développement durable	Ministère de l’Energie, mines et du développement durable	Before T0 + 5 years
5	<u>Funding mechanism</u>	Based on the art 92 of the law 142 12, the government will establish the funding mechanism to ensure: <ul style="list-style-type: none"> ✓ the establishment of WMO including human and technical resources; ✓ the establishment of WMO facility; ✓ the establishment of research and development programme related to RWM; ✓ the long-term sustainability and liability 	The Government	To be defined	Before T0 + 5 years

Réf in draft P&S	Item	measures	Responsibility for implementation	Responsibility for the follow up	timescale
		related to RWM.			
Radioactive waste management					
6	<u>Waste Management Optimization</u>	<p>The waste producers, AMSSNuR and CNESTEN shall investigate the possibility of:</p> <ul style="list-style-type: none"> ✓ avoidance of waste production where possible; ✓ reduction and optimization of amount of waste by using best available technology economically achievable (BATEA) and revaluation of the current processes; ✓ reuse and recycling of items and materials where possible before its declared as the final radioactive waste; ✓ reuse of Sealed Radioactive Sources different storage options such as temporary, mid and long-term storage. <p>In addition, the waste producers, AMSSNuR and CNESTEN shall investigate the optimization of the treatment, conditioning and predisposal for the different waste streams.</p>	AMSSuR & CNESTEN	AMSSuR & CNESTEN	Before T0 + 5 years

Réf in draft P&S	Item	measures	Responsibility for implementation	Responsibility for the follow up	timescale
7	<u>Graded Approach</u>	<p>AMSSNuR and CNESTEN shall ensure at a national level that different radioactive waste streams will be managed according to a graded approach. This implies that appropriate resources will be deployed taking into account the following:</p> <ul style="list-style-type: none"> ✓ The significance and complexity of each radioactive waste management stream and associated activities; ✓ The hazards and the magnitude of the potential impact (risks) associated with the safety, health, environmental, security, quality and economic elements of each radioactive waste management stream and associated activities; ✓ The possible consequences if within a specific waste management stream, an activity is carried out incorrectly or the interdependency within a specific waste management stream is not properly addressed. 	AMSSNuR & CNESTEN	AMSSNuR & CNESTEN	Before T0 + 5 years
8	<u>Interdependency and Waste Acceptance Criteria</u>	Based on the national waste inventory, the waste producers, AMSSNuR and CNESTEN shall investigate and identify the possible different waste	AMSSuR & CNESTEN	CNESTEN	Before T0 + 5 years

Réf in draft P&S	Item	measures	Responsibility for implementation	Responsibility for the follow up	timescale
		<p>management streams according to:</p> <ul style="list-style-type: none"> ✓ Waste characteristics; ✓ Graded approach; ✓ Compatibility with exiting storage capacity, current infrastructures and the future final end-points; ✓ And considering when, where and at which conditions the transfer of ownership of the waste could take place. <p>Based on these radioactive waste management streams, CNESTEN shall propose to AMSSNuR a set of generic wastes acceptances criteria. As a minimum, the following requirements should be met:</p> <ul style="list-style-type: none"> ✓ Solid form; ✓ Conditioned waste package; ✓ Avoiding biological hazard; ✓ Reducing the chemical hazard. 			
9	<u>Spent fuel management</u>	The government shall initiate an action to find solution for the management of the spent fuel elements of TRIGGA research reactor taking into account the possibility of non-repatriation of these spent fuel elements to the original supplier.	Ministère de l'Énergie, mines et du développement durable	CNESTEN	Before T0 + 5 years
10	<u>Integrated Management System</u>	Wastes producers, CNESTEN as well as at AMSSNuR and the future WMO AMSSNuR shall develop and implement an integrated management system. The management system shall include provision for the development of competences and	AMSSuR	AMSSuR	Before T0 + 5 years

Réf in draft P&S	Item	measures	Responsibility for implementation	Responsibility for the follow up	timescale
		<p>knowledge management program including record management and record keeping.</p> <p>As stipulated by the law n° 142-12, adequate and sufficient number of qualified staff should be available for activities related to safety and security of a nuclear and radiological facility and activities at the wastes producers, CNESTEN as well as at AMSSNuR and the future WMO.</p>			
11	<u>Notification in the licence condition of SRS</u>	<p>Every licensee who possesses or uses a sealed radioactive source shall notify AMSSNuR immediately if:</p> <ul style="list-style-type: none"> ✓ the sealed source or the radiation device is lost or stolen; ✓ the radiation device is damaged to an extent that could impair its normal use; ✓ the sealed source is separated from the radiation device when the latter is not being serviced; ✓ the sealed source fails to return to the shielded position inside the radiation device; ✓ the transfer of the SRS to a new location or the change in the ownership. 	AMSSuR	AMSSuR	Before T0 + 5 years
Public information and Stakeholder Participation					
12	Public information	<p>Trough the official channel, the public will be informed about the following elements of the waste management strategy.</p> <ul style="list-style-type: none"> ✓ National Decision-making process; 	Official channel	To be defined	

Réf in draft P&S	Item	measures	Responsibility for implementation	Responsibility for the follow up	timescale
		<ul style="list-style-type: none"> ✓ Establishment of a Waste Management Organization; ✓ Options considered for the nuclear spent fuel management; ✓ And the funding mechanisms that will be elaborated. 			

H2 ABBREVIATIONS

AMSSNuR	Agence Marocaine de Sécurité et Sûreté Nucléaires et Radiologiques
CENM	Centre d'Etudes Nucléaires de la Maâmora (Centre of Nuclear Study of Maamora)
CNEM	Nuclear Research Centre
CNESTEN	Centre National de l'Energie, des Sciences et des Techniques Nucléaires
CPPNM	Convention on the Physical Protection of Nuclear Material
DSRS	Disused Sealed Radioactive Sources Disused Sealed Radioactive Sources (DSRS) are sources that cannot be reused or otherwise recycled due to technical or economical reason
EW	Exempt waste
VSLW	Very short-lived waste
VLLW	Very low-lived waste
LLW	Low level waste
ILW	Intermediate level waste
HLW	High level waste
MEMDD	Ministry of Energy, Mines and Sustainable Development
NORM	Naturally Occurring Radioactive Material
NPP	nuclear power plant
TENORM	Technologically-Enhanced Naturally Occurring Radioactive Material
SNF	Spent Nuclear Fuel
RW	Radioactive waste
RWM	Radioactive Waste Management