

# The safe management of spent fuel and radioactive waste in the Small Inventory Member States

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## Implementing a national policy and strategy on radioactive waste management in Cyprus: efforts, needs, challenges and opportunities

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# Basic information on national activities - Applications

- Cyprus does not operate
  - NPPs or other nuclear installations
  - U or Th mines
  - Spent fuel / radioactive waste management facilities
- Management of spent fuel in the country is prohibited by law
- Nuclear energy is not considered in the country's foreseeable energy mixture
- Main uses of ionising radiation
  - Medical purposes (diagnostic; therapeutic); Industry and construction; Research and education
- Main origins of RW in Cyprus are from activities in the field of medicine and research.
  - Mainly by laboratories applying NM techniques; Small quantities; Liquid or solid form.
- Neighbouring countries are embarking to a nuclear power programme
- Military nuclear vessels or vessels shipping nuclear materials in the surrounding sea
- Transport of radioactive materials (by road, sea, air)



# Basic information on national activities - Applications

- Radioisotopes in this waste stream have short half-lives and are kept by the licensees until their radioactivity levels decrease below the levels of release from regulatory control.
  - They are then disposed as usual (non-radioactive) waste.
- Very small quantities of RW from research applications (universities, laboratories, etc.) also kept by the licensees.
- All practices where radioactive materials are used, including practices with RW, need to be licensed.
- For sealed sources, a condition is imposed to the license holders to return back to the supplier/manufacturer any spent or disused source
  - Agreement with a supplier / manufacturer in advance; submitted with the application.
- Scrap metals exported/shipped for processing/recycling need to be monitored for radioactivity prior to shipment.
- NORM produced in the past due to the activities of a decommissioned fertiliser plant at Vasilikos area are kept at the site of the plant, properly stabilised and covered with plastic synthetic liner and soil.
- For the shipment of RW from Cyprus to other EU Member States, the consent of the regulatory body of the destination Member State is required prior to the shipment.

# Basic information on national activities - Applications

- The Council of Ministers decided in 2020 that the storage facility at the Nicosia General Hospital, State Health Service Organization, to be used a centralized storage facility for DSRS in the country.
- Four Category-2 Cobalt-60 teletherapy units (3 radiotherapy units; 1 insect sterilizer unit) have been sent abroad in December 2020, in cooperation with IAEA.
- Export of 3 Cesium-137 blood irradiators, initiated in 2024.
- A number of Category 4 and 5 disused sources, such as small sources from medical applications, lightning rods, smoke detectors, sources used in the past for education purposes in higher schools etc. have been collected in the national storage facility, pending disposal according to the national programme.
- New project for RLC collection and management – Involves building contractors and lightning conductor installers
  - Inventory updating – Activities on verification, measurements, removal, transport, disassembly, storage in the national storage facility – Decision on disposal



# National framework

- **Relevant (main) national legislative framework**
  - The 'Nuclear Safety and Radiation Protection' Law
  - The 'Joint Convention' ratification Law
  - The 'Safe and responsible management of spent fuel and radioactive waste Regulations of 2014' (transposing the RWM Directive)
  - The 'Shipment of radioactive waste and spent fuel Regulations of 2009' (transposing the Shipments Directive)
- A **policy and strategy (national programme)** on the safe and responsible radioactive waste and disused sealed radioactive sources management has been adopted in 2015
  - serves as the national commitment to address the country's waste issues in a coordinated, cooperative and sustainable manner, in line with the country's EU and other international obligations
  - Currently under revision
- **Reporting under the RWM Directive**
  - 2015; 2018; 2021; 2024
- **Self-assessments and peer reviews**

# Experience / lessons learned from the implementation of the national programme

- National policy has to be adopted at the **highest governmental level**
  - As a clear expression of the Government's intent and commitment for safe management of RW, now and in future
- **National stakeholders** should be explicitly identified and responsibilities should be clearly allocated – stakeholders have to accept and understand their **roles & responsibilities** – their **involvement** needed at early stage
- Identify, at an early stage, the **education and training** and **infrastructure needs** based on the competence and responsibilities of each stakeholder
- **Assumptions to provide future waste estimations** cannot be avoided – it is understood that there will always be uncertainty to an extent – **a challenge**
- Inclusion of **anticipated waste** in the inventory (e.g. from decommissioning? in the aftermath of emergencies? orphan sources? sources whose owner went bankruptcy? Illicit trafficking?) – **a challenge**
- Difficult to always conclude on the **potential waste streams** and **define associated end points** if disposal solutions are not available in the country – **a challenge**
- Define significant **milestones, key performance indicators (progress monitoring) and relevant timeframes** – **in progress**
- **Assessing the costs** – **Defining financing schemes, needs and estimates**, e.g. defining fees for operating the national storage facility when a disposal solution and the associated cost is not yet known – **a challenge**
- **Research and development** plans and activities to address the country's specific needs – **a challenge**

# Revision of the national programme on radioactive waste management

- **National programme on radioactive waste management:**

- Currently under revision (original text from 2015)
  - to accommodate recent developments, political and regulatory decisions and ARTEMIS findings.
- To accommodate in one single document what now exist as a strategy and a programme.
- To consider provisions from the IAEA's Guidance on the Management of Disused Sources (2018).
- To address disposal options of the legacy disused sources collected or to be collected in future, for instance sources arising after the completion of the national campaign, in terms of providing a long-term, sustainable and final solution for the management of these sources.
- Options identified by an IAEA expert mission in 2017 to be considered (for instance, assess the options of further repatriation; combinations of long-term storage for a certain amount of time to be defined plus identification of a feasible local disposal solution e.g. BOSS or perhaps a regional solution if available).
- To put in place efforts to further reduce the volumes of DSRS, e.g. through provisions on the use of clearance, reuse and recycling, in an effort to optimise the implementation of the national programme.
- To address the need for adequate capacity building.
- To give consideration to waste from potential accident situations, in conjunction with contingency arrangements provided through emergency planning system.
- To define more specific and updated timeframes and progress indicators (key performance indicators) to facilitate future progress monitoring in the implementation of the programme.
- To undergo public consultation, as provided in the national regulations.
- To be approved at the Council of Ministers level, to ensure Governmental commitment and commitment of all relevant interested parties.

# Response to JC/ARTEMIS challenges: Disposal of historical DSRS

- Options considered for management of the legacy disused sealed radioactive sources
  - Partial export of Cat II sources and keep current facility in operation as a centralised storage facility under NGH
  - Licensing an operator (waste management organisation)
  - Exploration of shipment options for proper management of DSRS abroad
  - Assessment on the application of the BOSS (Borehole Disposal of Sealed Radioactive Sources) method
- Cost assessment of the various options has been carried out in 2017
  - Perhaps there is a need for re-evaluation
- Closely working with IAEA
  - IAEA mission in Cyprus to support this effort (November 2017)
  - DSRS storage facility is authorized and is being inspected
  - Technical assistance in exporting Cat II DSRS – IAEA procurement procedure
  - Building capacity on preconditioning / conditioning DSRS



# Response to JC/ARTEMIS challenges: Disposal of historical DSRS



- A collection campaign for lightning conductors / americium smoke detectors to be conducted in the forthcoming period through an IAEA TC national project
  - Motivation for owners
  - Interface between safety and security
  - Fees to cover the cost of intervention and future disposal
  - Currently contacting the involved parties (building contractors, lightning conductor installers etc.) – Inventory updating
  - Activities on verification, measurements, removal, transport, disassembly, storage in the National Storage Facility

- Export of three Caesium-137 blood irradiators, starting in 2024



*FIG. Example of a deteriorated structure with an RLC. Courtesy of the Department of Labour Inspection, Cyprus.*

IAEA nuclear energy series no. NW-T-1.15 (2022): Management of disused radioactive lightning conductors and their associated radioactive sources.

# Other challenges

- **To improve competences to license and exercise regulatory control over radioactive waste facilities and activities**
  - Regulatory framework to address existing and anticipated waste streams
  - Predisposal SA and SC development and methodologies for various facilities, including integration of support documentation for licensing
  - Reviewing and assessing SA's - establishing regulatory requirements on authorisation of related facilities and activities
  - Assessing environmental impact assessments and their integration to SA
  - Improving cooperation and communication between RB and implementors
  - Enhancing regulatory control, inspection and enforcement

# Other challenges

- **To improve competence for efficient overall national programme on the management of radioactive waste**
  - Revising and improving national policy and strategy
  - Identifying and planning for current and future needs on staff competences
  - Improving national programme plans, including data management, schedule, financing, cost calculation methodology, R&D planning
  - Enhancing stakeholder engagement, public confidence building, including exercise on preparing for public debate and communication
  - Providing training to waste generators to review best practices in handling institutional waste

# Other challenges

- **To improve competence on technical expertise needed for efficient radioactive waste processing and storage increased for various specific waste streams**
  - Review options and select methods based on waste types and volumes
  - Predisposal management technologies for institutional waste, legacy waste and waste from future decommissioning
  - Lessons learned in operational predisposal management facility handling of institutional waste
  - Storage technologies
  - Implementation of waste hierarchy principles of prevention, minimization, reuse, recycling

# Other challenges

- **To improve awareness and understanding of interdependencies and cross-cutting technological issues in radioactive waste**
  - Maintaining a radioactive waste inventory, both current and future volumes
  - Methods of classification and documentation of national inventory
  - Understand key elements of WAC for all waste streams and all phases of the whole management life-cycle
  - Improving national WAC and storage conditions; demonstrating compliance

# Questions ?

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