AUSTRIAN APPROACH ON RADIOACTIVE WASTE MANAGEMENT AS SMALL INVENTORY MEMBER STATE

Challenges, Strategies, Best Practices

EURAD-2 1st Annual Event

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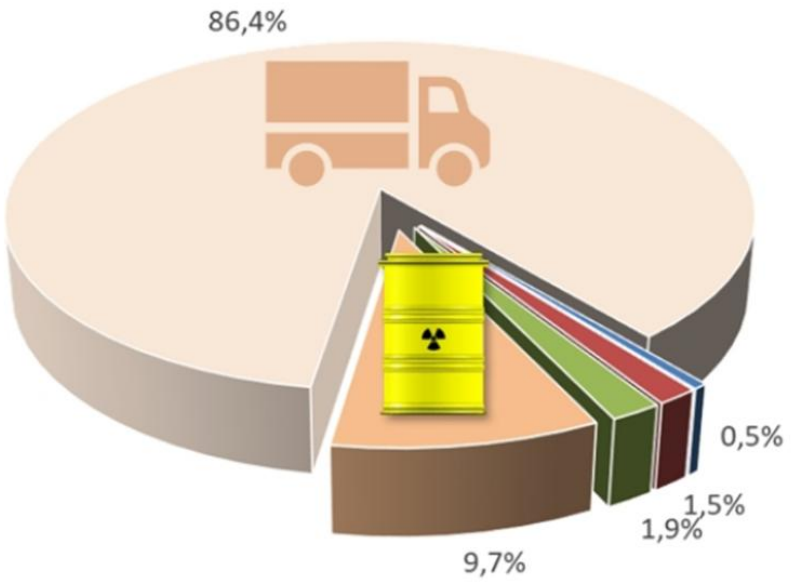
RWM IN AUSTRIA

- Seibersdorf has been a **nuclear research site since 1959**, when a 10 MW pool-type research reactor (**ASTRA**) was built.
- Nuclear research continued up to the 1990s. A **change in politics and public opinion** lead to a stop of nuclear research topics.
- **NES was established in 2003** and is the **Austrian organization for RWM and responsible for handling all radioactive waste arising in Austria (collection, treatment, conditioning and interim storage).** NES is a non-profit organization with two main tasks:
  - central Austrian organization managing all RW arising in Austria,
  - decommissioning of nuclear (research) installations, treatment of historic waste in Austria.
- **Polluter-pays principle** applies ("Processing Fee" and "Pre-Payment Fee"); large investments for waste treatment facilities are financed by the Republic of Austria.

AUSTRIA'S INVENTORY

Raw Waste per Year (2015-2024)

in total ca. 580 t/a

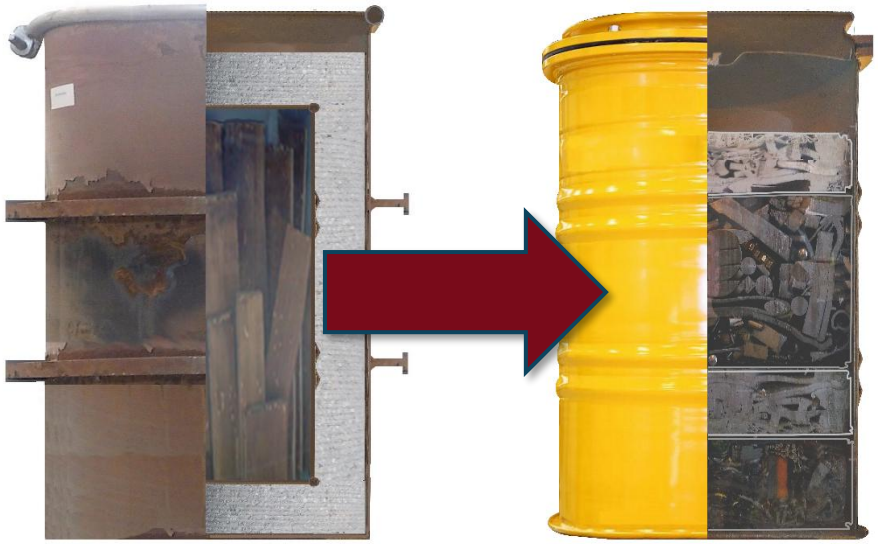


- Decontamination & decommissioning
- Decontamination & decommissioning – cleared waste
- Medical
- Industrial
- R&D

- Waste generates from **medical, industrial and research** sectors, as well as from **decommissioning** (1 RR still in operation), no NPP or other major nuclear installations → no SF or other HLW
- **~12.500 drums (**typically **200l)** of **LILW** conditioned and in interim storage: **2.500m³ SL (3.40·10¹⁵ Bq) + 60m³ LL (5.76·10¹² Bq)**

WASTE CONDITIONING

- **General Goal**: Conversion of waste into a chemical and physical stable form, safe enclosure into a container (normally a 200l drum) to ensure State-of-the-Art Conditioning , and for historic waste, updating all material and chemical information.
- In 2009 it was decided that historic waste drums should undergo **reconditioning** for
  - safety reasons (e.g. lack of waste inventory, degradation of waste packages),
  - technical and financial reasons (mainly reduction of waste volume, lack of well-defined WAC) and
  - legislative reasons (safety regulations, extension of interim storage period, release of waste).
- A total of **10.000 drums** are being reconditioned.



CHARACTERIZATION DIFFICULTIES

- Examples of Historic Waste

inhomogeneous waste drums

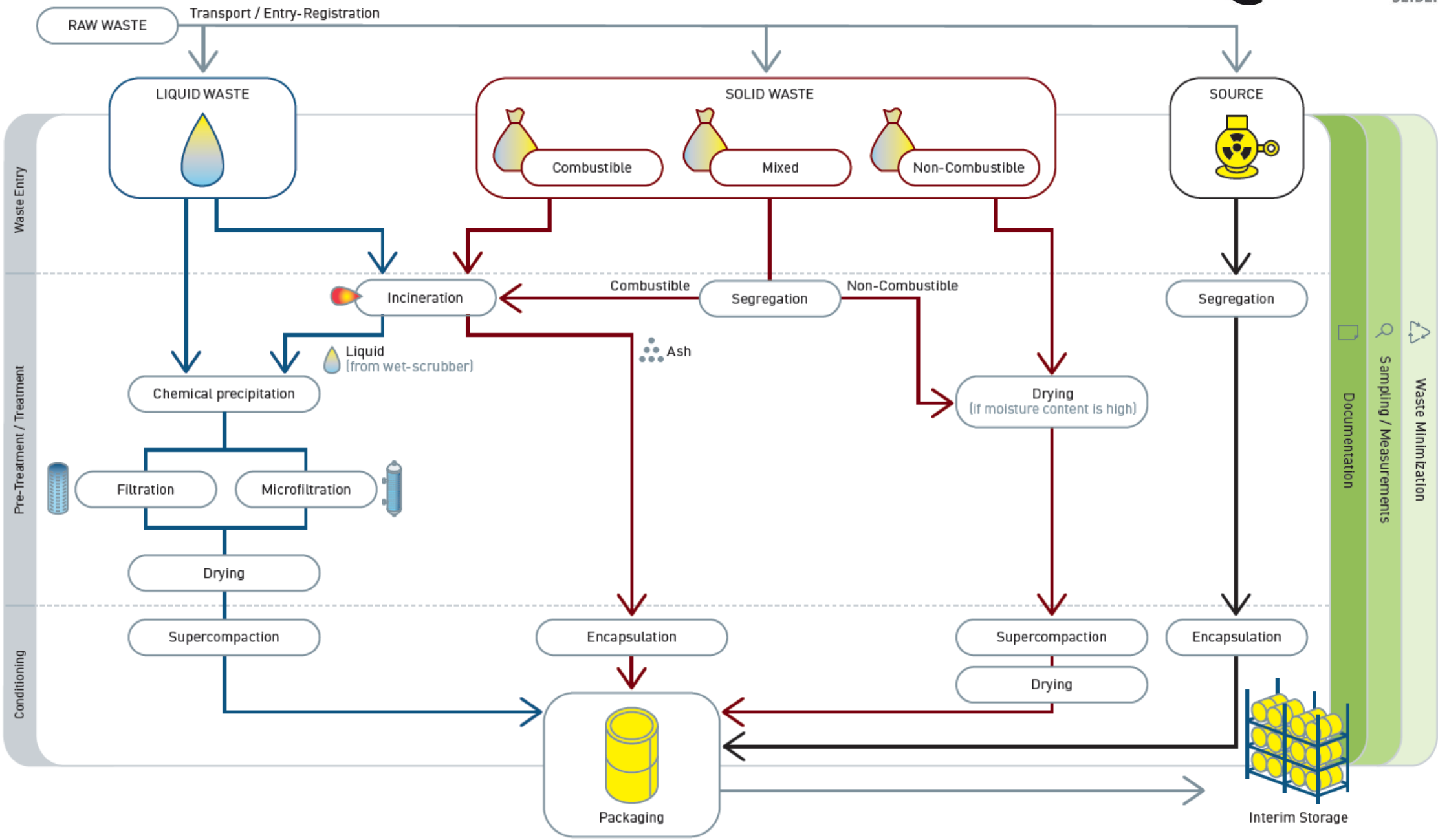
homogeneous waste drum

CHARACTERIZATION DIFFICULTIES

- Example of an inhomogeneous waste sample to explain the difficulty in sampling

- For more information about characterization see also page 13 in:
  - https://www.iaea.org/publications/15478/radioactive-waste-management

NUCLEAR ENGINEERING SEIBERSDORF



INFRASTRUCTURE – MODERNISATION PROJECT

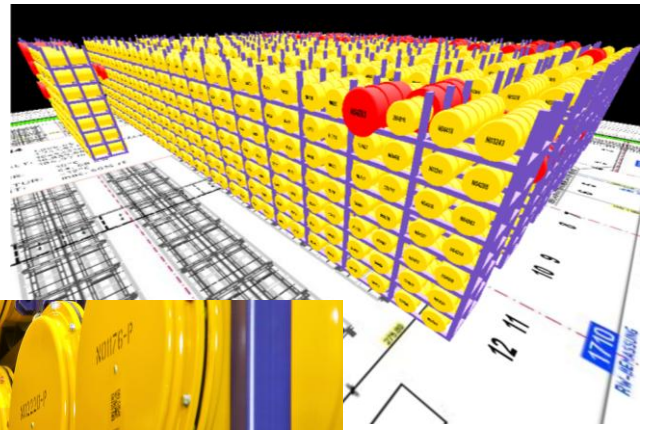
- Reconditioning Machine
- Soil Sorting Facility
- Incineration and Water Treatment Plant
- Vertical Supercompactor
- Sealed Sources Manipulation Centre
- 1- and 32-Drum Drying Facility
- Chemical Laboratory
- Gamma Drum Scanner
- Storage Facilities

INFRASTRUCTURE

- Often for SIMS, there's a lack of advanced facilities for processing or conditioning waste locally. While this is not really the case in Austria, the **long-term safety for the interim storage** is more critical factor.
- Currently, **interim storage** is only permitted **until end of 2045** but there has not yet been a decision on the type of disposal.
- The duration of the interim storage has been prolonged in the past, and this happening is very likely for the future.
- **Corrosion** of the drums is a critical factor for long-term storage. Even though waste containing drums are dried before entering storage facilities, NES has to make sure that container corrosion is prevented.

INTERIM STORAGE

- The new storage halls are **climate controlled** (>10°C, <60% humidity) and each drum is **inspectable**.



documentation of interim storage

old interim storage

new interim storage

DOCUMENTATION

- **DOKURAD** (DOKumentation of RADioactive waste) is an electronic database for complete documentation of all the radioactive waste at NES.
- It contains information about
  - Basic data of every waste item (e.g., origin, waste type,…)
  - Waste characterization data
  - Current storage location of waste (or link to successor)
  - Waste processing data
  - Relevant documents and photos
  - All reconditioning steps and decisions undertaken.
- QR-Code based System

buffer storage

inspections of drums in interim storage

AUSTRIAN BOARD FOR RWM

- Advisory Board was established in 2021 (until end of 2025)
- Members are **experts and stakeholders, representatives** from the federal and state governments and civil society
- Tasks are:
  - to compile a detailed inventory of the current and future radioactive waste,
  - to evaluate possible options for the final repository of Austrian radioactive waste (including requirements, strengths, weaknesses, opportunities and risks as well as associated costs)
  - to compile a participation concept with recommendations on how the population may be informed, involved and included in any decisions
  - to outline a timetable and milestones for the disposal of the radioactive waste produced in Austria.
- **First Recommendations** were officially handed over to the ministry in **October 2024**.

PUBLIC AWARENESS AND ACCEPTANCE

- Austrian Advisory Board has prepared a **participation concept** with recommendations on how to inform the public and how to involve them in discussions and decision making.
- Key aspects are:
  - Organisation of the Participation Format
  - Legal Framework for Transparency and Participation
  - Establishment of an Information Centre
  - Accompanying Committee
- Every second year, presentations on Austrian RWM are given to the public (Long Night of Research).
- Every year, the local municipality is invited to visit NES' facilities.
- NES and the responsible ministry have developed a brochure on Radioactive Waste in Austria.
- Information is available on the internet from NES and The Austrian Advisory Board on RWM.

INTERNATIONAL COOPERATION

- Austria is following the **Dual Track** approach, therefore, wants to take part in **ERDO** to support research on multinational strategies.
- Austrian organisations (NES as WMO, AGES as TSO, CS) participate in **EURAD, EC SIMS** and **IAEA** activities.
- Need of international frameworks and guidance (IAEA Safety Standards, JC)
- Willingness to treat foreign RW at NES facilities (soil sorting facility)
  - In the past, NES incinerated foreign RW (ash was sent back to the country of waste origin).
- Bilateral cooperations

HOW CAN EURAD-2 HELP?

- We are **lacking capacities** (personnel shortages and financially limited) whilst facing **challenges such as WAC development or waste characterization**.
- EURAD-2 offers an excellent **platform for international cooperation**, knowledge sharing and knowledge transfer between LIMS and SIMS, advanced and less-advanced countries.
- We get more ideas on **RD&D** needs and how to develop/implement a national RD&D plan.
- We benefit from international exchange; **current and relevant topics** are covered. There is interest in guidance on characterization, documentation, safety analysis, long-lived radionuclides, etc.
- We benefit from **Deliverables** (especially ROUTES), **training activities** and the exchange of **Lessons Learned**. Training activities are **needs-driven** (feedback from partners and end-users).

HOW CAN EURAD-2 HELP?

- **Webinars** (Lunch&Learn) are offered with broad and specific topics, held by experts.
- Building a **community**, especially for young generations/newcomers.
- **Improving national RWM strategy**, especially disposal solutions.
- Outcomes of EURAD WPs can help **decision making** for safe and efficient RWM (disposal options, site selection, WAC, …).
- Interest in WPs: ASTRA, ICARUS, STREAM, CLIMATE, SUDOKU; for the future: Graphite, Sustainability, Toxic / chemical substances, …

CONCLUSION

- **Challenges**
  - No disposal type chosen
  - No safety assessment available
  - Only interim-storage WAC available
  - Conditioning without knowing the final waste container
  - Characterization difficulties
  - Some very low amounts of waste
  - Conditioned waste volume is derived from the number of drums on site (considering inactive volume and cavities)
  - Lack in capacity building
  - Missing decision makers
- **Strategies**
  - Participation in international partnerships (EURAD, IAEA, ERDO, …)
  - Study international best practices and lessons learned
  - Investigations on long-term storage (corrosion, behaviour of waste components)
  - Reconditioning: gain additional information on waste
  - Knowledge sharing
  - Increase public awareness and acceptance
  - Shared solutions (pre-disposal)
- **Best Practices**
  - Reconditioning of historic waste
  - Gather additional characterization data
  - Waste minimization by sorting and pre-disposal facilities
  - Documentation of the waste and conditioning steps
  - Development of treatment facilities (sorting/measurement facility, ultrafiltration, reconditioning facility)
  - Facilities and conditioning methods are State-Of-The-Art

THANK YOU FOR YOUR ATTENTION!

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