



Characterization of Conditioned Nuclear Waste  
for its Safe Disposal in Europe

## Role of End-Users in WP2 Task 1 “End-Users requirements & Methodology for conditioned waste characterization”

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on behalf of the WP 2 and WP 6 partners



### To identify:

- key parameters that need characterization;
- technologies/methods commonly used for characterization of conditioned waste;
- waste acceptance criteria applied and the possibilities of their harmonization in Europe
- specific problematic issues for the characterization of conditioned radioactive waste;
- R&D needs and potential on-going R&D programme on the topic of conditioned radioactive waste characterization;
- potential applications of R&D actions to be included in CHANCE;
- socio-technical and ethical issues associated with the waste characterization process.

**Q1.** What types of radioactive waste, including spent fuel, are managed by your organization?

| Waste type*              | Yes/N<br>o | Main origin | Comment |
|--------------------------|------------|-------------|---------|
| Very low level waste     |            |             |         |
| Low level Waste          |            |             |         |
| Intermediate level waste |            |             |         |
| High level waste         |            |             |         |
| Spent fuel               |            |             |         |
| Other (eq. liquid waste) |            |             |         |

\*according to the IAEA General Safety Guide N° GSG-1

You can **adapt it**, depending on the clasification scheme applied in your organization/ country

**Q2.** What is the option for storage/disposal of radioactive waste and spent fuel in your country?

| Waste type *             | storage / disposal option | Existing/ Project |
|--------------------------|---------------------------|-------------------|
| Very low level waste     |                           |                   |
| Low level Waste          |                           |                   |
| Intermediate level waste |                           |                   |
| High level waste         |                           |                   |
| Spent fuel               |                           |                   |
| Other                    |                           |                   |

- please specify the **storage / disposal option** for each waste category identified in Q1
- please specify the **existing or planned facilities** for radioactive waste storage and disposal in your country

**Q3.** What are the waste acceptance criteria (WAC) for the storage / disposal facilities identified above in Q2 (operational and foreseen to be commenced in the future)?

- for each storage / disposal option please include **the main parameters that have to be characterized**
  - **Radiological parameters**
  - **Chemical parameters**
  - **Mechanical parameters**
  - **Other type of parameters** (homogeneity, types of conditioning matrices, specifications for the container, waste accepted with restriction, forbidden waste, etc.)
  
- if possible, please **justify why you need to characterize** these parameters

**Q4.** Should WAC be harmonized across Europe? If so, how?

*please express your personal point of view*

**Q5.** How do you deal with the fact that the WAC as well as the final disposal concepts are in constant evolution (techno-scientific progress, experiences, stricter attitudes ...)?

- how do you deal with the historical waste
- do you have to characterize more (as required by the current WAC)

### Q6. What methods are you applying in characterisation of conditioned radioactive waste?

- please specify and give as much details as possible on the **methods applied in your organization for radioactive waste characterisation** (including characterisation of waste before its conditioning) or provide the corresponding reference documents (if any)
- please specify how you **correlate** the so-called **hard to measure radionuclides** with **easy to measure nuclides**
- if you are complementing the measurement data with **modeling/calculations**, please specify and describe them specifying, if any, potential **needs of codes' validation by National Control Authority**
- please specify if you correlate the chemo-toxicity with radio-toxicity of the waste



**Q7.** What are the uncertainties associated to the methods you are currently using in radioactive waste characterisation?

- please specify the **levels of uncertainties** for each method used in your radioactive waste characterisation
- please specify the **target level** of uncertainties
- what is the **source** of the uncertainty?
- please specify your **action(s)** (if any) to decrease the uncertainty level in characterisation of conditioned radioactive waste

**Q8.** Which other uncertainties (e.g. technical, conceptual, social, political, ethical) do you anticipate with regard to waste characterisation for safe disposal?

Uncertainties may relate to **changes in the final disposal concept, regulation and/or policy, divisions of responsibilities, limits of knowledge, amounts of waste, societal incentives or pressures, financial constraints, safety/security protocols** ....

- Please list the **three, in your opinion, most important ones** and specify:
- what is the **impact** of each of these uncertainties on waste characterization (e.g. on the relationship between actors, operational safety, costs, ...)
  - whether and **how these uncertainties are dealt with** at present (e.g. through various procedures, leaving the option of re-characterization, storing the waste in a certain manner, ...)
  - any **suggestions** you may have on whether and **how these uncertainties could be managed** (e.g. new equipment, a political decision, involving other disciplines, reconditioning, flexible tariffs, ...)

**Q9.** Do you have in your organization waste categories and/or waste forms that do not have a dedicated option for disposal? If yes, are you characterize these waste?

if yes, please :

- specify **what are** these waste categories
- identify what are the **potential limits for the acceptance** of these waste categories in the existing or future disposal facilities
- specify what are the **plans for managing these waste** categories
- specify if you are doing characterization for these waste
- If you characterize these waste, lease specify what kind of measurements are you performing

**Q10.** What are the major technical difficulties you encounter in characterising your conditioned radioactive waste?

- please specify what are the conditioning methodologies and/or matrices used in your organisation
  
- please specify any technical problems you face in the characterization process

**Q11.** What are the R&D needs that could solve the difficulties identified in Q10?

- please identify what techniques/methods could complement the ones already used in your institution/country to improve the level of radioactive waste characterisation

**Q12.** Do you have an active R&D programme on radioactive waste characterisation?

- if yes, please specify what are the **main topics addressed**
- please specify if you are **interested to be involved in R&D projects** related to radioactive waste characterisation

The CHANCE project will address and develop some specific techniques: Calorimetry, Muon Tomography and Cavity Ring-Down Spectroscopy (for details see [www.chance-h2020.eu](http://www.chance-h2020.eu)).

**Q13.** Do you foresee an application of one of the techniques developed in CHANCE in your radioactive waste characterisation?

- if yes, please specify:
  - for what **type of waste** you could use these methods
  - how these methods **improve** the characterisation of your conditioned radioactive waste or decrease the uncertainty level

**Q14.** In your country, who is in charge of characterization and who is in charge of control? How the characterisation and control processes are structured?

- what organisation(s) is **responsible** for radioactive waste characterisation
- what organization is **in charge with control**
- please specify if the same techniques are used both in characterization and in control processes



## Q15. What is the role of host communities in these processes?

- Do** host communities (i.e. the local community where the waste is stored / (will be) disposed) **have a role in waste characterization** and/or **control** in your country?
- Should** these communities **have a role in waste characterization** and/or **control** in your opinion and if so which one?
- How do you deal** with the **concerns of local communities**, e.g. concerns about the content of the disposal facility?
- Do you think that continuous **improvement of waste characterization** by innovative methods can **improve the perception of risk associated** with waste disposal?

**Q16.** Which disciplines / fields of expertise / actors are involved in the characterization of conditioned waste in your country? Are there any missing in your opinion?

- please specify:
  - disciplines / fields of expertise / actors involved in characterization
  - mission ones, if any

**Q17.** In your opinion, why is waste characterization important for your organisation?

| Please rate the importance                             | Very high | High | Low | Very low |
|--|-----------|------|-----|----------|
| Verification of the declared inventory                 |           |      |     |          |
| Improvement of characterization methods and techniques |           |      |     |          |
| Operational safety                                     |           |      |     |          |
| Long term safety                                       |           |      |     |          |
| Economics (cost determination)                         |           |      |     |          |
| Waste classification in view of disposal choices       |           |      |     |          |
| Optimisation of disposal concepts                      |           |      |     |          |
| Stakeholder involvement                                |           |      |     |          |
| Regulatory requirements                                |           |      |     |          |
| Long term monitoring                                   |           |      |     |          |
| Retrievability   |           |      |     |          |
| Communication  |           |      |     |          |
| Documentation  |           |      |     |          |
| QM & incident management                               |           |      |     |          |
| Other:   |           |      |     |          |

**Q18.** In your opinion, what lessons can be drawn from the waste characterization processes in your country?

- lessons can be either positive or negative
- you can compare with other countries, but this is not necessary.

# **CHANGE**

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# Thank you for your attention