

ROUTES SUBTASK 4.2 WORKSHOP

"Sharing experience on waste management with/without WAC available"

14-15th June 2021

THE WEBINAR WILL START AT 9:15 CEST



The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 847593.



WELCOME!

- **On behalf of Chris, myself and the wider Task 4 team: Thank you all for participating**
- **We have a wide-ranging agenda and are looking forward to some interesting discussions covering many aspects of waste acceptance criteria (WAC)**
 - Attend and contribute to any/all sessions of interest or relevance to your national perspective
 - Have allowed significant time for discussion – please participate actively!
- **Virtual meeting necessitated by the ongoing situation**
 - Organised in 2-hour sessions with breaks during and in-between sessions
- **The workshop and memorandum are ROUTES milestones**
 - Secretarial support by partners for each session – key messages will be ‘summed up’ on Tuesday afternoon
- **Workshop discussions will be recorded to aid preparation of the memorandum**
 - The recording will only be available to project partners



INTRODUCTIONS

- **Continuing collaborative exchanges following the success of recent initiatives, including:**
 - Joint CORI/FUTURE/ROUTES/KM session at EURAD conference
 - Two joint PREDIS/ROUTES/ERDO webinars on WAC
- **With that in mind, we are pleased to welcome a wide range of participants:**
 - ROUTES partners (Task 4 and wider)
 - End Users
 - PREDIS
 - ERDO
 - IAEA; NEA
- **Too many participants to go 'around the table'**
- **Also, not all participants are joining every session over the next two days**
- **Therefore, please introduce yourself and your affiliation the first time you speak during each session**



LOGISTICS / TEAMS ETIQUETTE

- **Looking forward to active participation. That being said, there are a lot of us in attendance!**
 - Please respect the thoughts and views of others
 - Please have cameras off during presentations; on during discussions
 - Please mute yourselves except when speaking
 - Use the 'raise hand' function if you wish to comment
 - Welcome to also give comments and questions through the chat function
 - Generally, hold questions to the end of each presentation (unless presenters say otherwise!)
- **Use the same meeting link for all sessions**
 - During short breaks please stay on the video call. At lunch we suggest you leave the meeting and re-join for the afternoon sessions

ROUTES TASK 4 - STRUCTURE, SCOPE & MAIN COMPONENTS

• Subtask 4.1 “Current use of WAC”

- Provide an up-to-date overview per country on the use of WAC at different stages in the waste lifecycle
- Memorandum 1 = Milestone 88
- MS88 report has been shared online at <https://www.ejp-eurad.eu/publications>

• Subtask 4.2 “Sharing experience on waste management with/without WAC available”

- Offer a structured approach to support decision-taking of “no regret” waste management measures
- Gap analysis of different approaches to waste management while maintaining compatibility with the option(s) for disposal
- Workshop 1
- Memorandum 2 (internal)

• Subtask 4.3 “R&D needs and opportunities for collaboration”

- Identify and prioritise common R&D needs related to the management of challenging wastes and identify opportunities for collaboration between Member-States
- Workshop 2
- Memorandum 3 and Summary Report (deliverable)

Information gathering

SOTA regarding WAC

Opportunity for discussion

Share experiences and identify common gaps / areas requiring further R&D

Basis for Subtask 4.3 conclusions & recommendations

eu[rad]

ROUTES TASK 4 - PLANNING

present

| Civil year | 2019 | | | | | | | | | | | | 2020 | | | | | | | | | | | | 2021 | | | | | | | | | | | | 2022 | | | | |
|---------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|--|
| Civil month | jun | jul | aug | sep | oct | nov | dec | jan | feb | mar | apr | mai | jun | jul | aug | sep | oct | nov | dec | jan | feb | mar | apr | mai | jun | jul | aug | sep | oct | nov | dec | jan | feb | mar | apr | mai | jun | jul | aug | sep | |
| Project year | 1 | | | | | | | | | | | | 2 | | | | | | | | | | | | 3 | | | | | | | | | | | | 4 | | | | |
| Project month | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | |
| Subtask 4.1 | | | | | | | | | | | | | | | MS88 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Subtask 4.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Subtask 4.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |



ROUTES SUBTASK 4.2 - BREAKDOWN

- **Step 1: Review/Enquiry**
 - ✓ Review responses to Section 5 of ROUTES questionnaire
 - ✓ (on cases of waste management without WAC / disposal solution / technical facilities available)
 - ✓ Provide coherence with information/developments external to ROUTES
 - ✓ Draw up 'long-list' of case studies
 - ✓ Collate feedback on cross-cutting topics that would benefit from further discussion
- **Step 2: Development of case studies and topics**
 - ✓ Selection of a limited number of case studies and topics for more detailed study and discussion
 - ✓ Development of these components by involved ROUTES partner(s)
- **Step 3: Workshop**
 - Presentation of selected case studies and discussion
 - Discussion of cross-cutting topics
- **Step 4: Conclusions and write-up**
 - Gap analysis
 - Summary and conclusions in Memorandum n°2

AGENDA DAY 1 (14TH JUNE)

| | |
|-------------|--|
| 09:15-09:30 | Welcome and workshop logistics (Liz Harvey) |
| 09:30-09:40 | Links to wider ROUTES activities (Elisa Leoni) |
| 09:40-10:00 | Reflections from Joint WAC Webinars (Lumír Nachmilner) |
| 10:00-11:00 | Case Study 1: Bituminization of evaporated concentrate at the Rivne NPP in Ukraine: An example of conditioning waste without disposal WAC being available (Iryna Kutina & Soloviov Alexander) |
| 11:00-11:10 | <i>Short break</i> |
| 11:10-12:10 | Case Study 2: Cement solidification of sludges from the liquid waste evaporator in Greece: An example of conditioning prior to availability of a disposal route (Anastasia Savidou) |
| 12:10-14:00 | <i>Lunch break</i> |
| 14:00-15:00 | Case Study 3: Storage and processing of wastes at COVRA's facilities in The Netherlands: An example of conditioning waste prior to availability of a geological repository (Marja Vuorio) |
| 15:00-15:10 | <i>Short break</i> |
| 15:10-16:10 | Cross-cutting Topic 1: Generic WAC and the UK Disposability Assessment Process |
| 16:10-16:15 | Closing remarks for Day 1 (Chris De Bock) |

AGENDA DAY 2 (15TH JUNE)

| | |
|-------------|---|
| 09:15-09:20 | Day 2 Welcome (Liz) |
| 09:20-10:20 | Case Study 4: Graphite management in Spain: An example of treating waste in order to establish a disposal route (Gabriel Piña Lucas) |
| 10:20-10:30 | <i>Short break</i> |
| 10:30-11:30 | Cross-cutting Topic 2: Role of stakeholders in the development and application of WAC |
| 11:30-13:20 | <i>Lunch break</i> |
| 13:20-14:20 | Cross-cutting Topic 3: Managing the potential for non-compliances to arise as WAC are iterated |
| 14:20-14:30 | <i>Short break</i> |
| 14:30-15:25 | Key points from discussion of each case study / topic (session secretaries) |
| 15:25-15:40 | Next steps (Liz) |
| 15:40-15:45 | Conclusion of the workshop (Chris) |



CASE STUDIES

- **Sharing of waste management experiences in the absence of WAC / downstream facilities / disposal routes**
 - Gap analysis facilitated through comparison of cases
- **Basis for selection (reminder):**
 - Cases that are likely to be of most widespread interest and where more detailed information is available
 - Spread across partners involved in Subtask 4.2 → distribute effort and opportunities to contribute different perspectives / experiences (including both LIMS and SIMS)
 - Allow comparison of different degrees of waste management (e.g. treatment, packaging, immobilisation/encapsulation,...) in the absence of WAC/facilities/disposal routes
 - Capture both near-surface and deep geological repositories as end points
- **Short-list of five proposed during March planning meeting; some revisions since then, in discussion with partners**
 - Four case studies will be considered in detail during the workshop (from Ukraine, Greece, Netherlands & Spain)
 - A fifth case study (from Slovenia) is being presented as part of introductory material for one of the cross-cutting topics
 - A further case study (from Germany) will be shared via email in early July; comments/feedback by email are invited, and will be integrated in the memorandum

CASE STUDIES

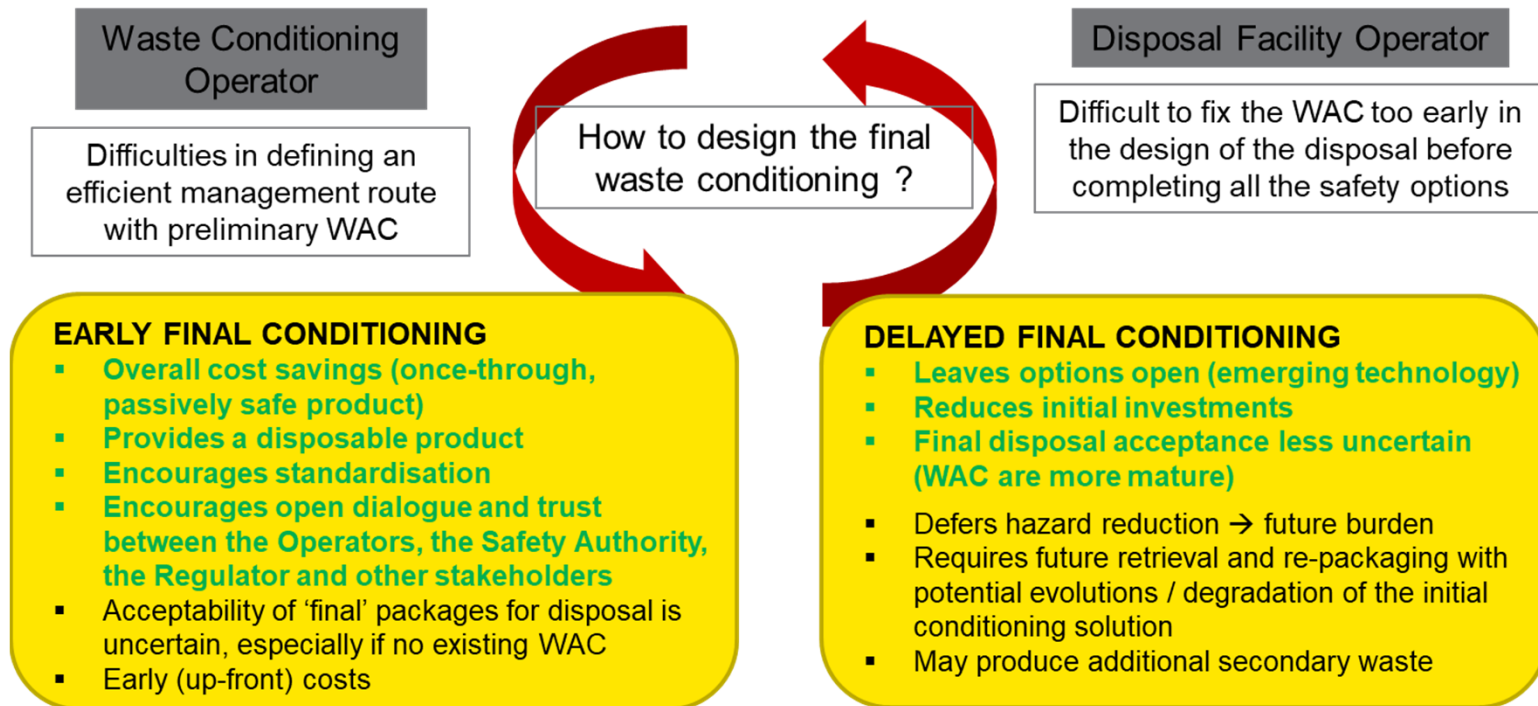
| Q | Case | Example of: | Relevant steps in waste management lifecycle | Disposal | |
|------|---|---|--|----------|------|
| | | | | SURF | GEOL |
| 20 | Ukraine: Production and management of bituminised waste with differing levels of WAC available at different stages | Treatment and conditioning of waste in the absence of disposal WAC | Conditioning for storage – further conditioning for disposal is planned | ✓ | |
| 20 | Greece: Cement solidification of sludges from the liquid waste evaporator (conditioned four decades ago) | Conditioning prior to availability of disposal route | Conditioning for storage – may require reconditioning | ? | ? |
| 19 | Netherlands: Storage and processing of a variety of wastes at COVRA | Conditioning prior to availability of a deep geological repository | Conditioning (immobilisation / encapsulation) ready for disposal | | ✓ |
| (19) | Spain: Management of irradiated reactor graphite to enhance disposability to El Cabril | Treating waste in order to establish a disposal route | Treatment and conditioning for ongoing storage and disposal | ✓ | |
| 21 | Germany: Development of different management solutions for spent ion exchange resins at individual NPP sites | Alternative waste management solutions for a common waste | Variable (e.g. drying, incineration, regeneration, packaging,...) | | ✓ |
| 21 | Slovenia: Methodology for WAC development in the absence of a site and without the facility design/type being known | Methodology for WAC development in the absence of a site and without the facility design/type being known | N/A – case focuses on disposal WAC development | ✓ | |



CASE STUDY TEMPLATE

- **Common types of questions were asked for each case study, via a template:**
 - Context
 - Details of affected waste (origin, location, classification, quantity, characteristics,...)
 - Anticipated final destination for the waste
 - Description of case study
 - Types of management deployed / envisaged
 - Motivation for implementing the waste management initiative (anticipated benefits)
 - Challenges / uncertainties encountered
 - Lessons learned
 - Approaches to manage / resolve issues, challenges or uncertainties encountered (e.g. uncertainties about requirements for disposal or uncertainties about waste acceptance requirements)
 - Will the decisions taken constrain future waste management activities?
 - What experience can be taken forward? Would anything be done different if repeated?

CASE STUDIES CENTRAL THEME = THE DILEMMA OF (FINAL) CONDITIONING



When to implement (final) conditioning in the absence of an established disposal route ?



CROSS-CUTTING TOPICS

- **Various topics of interest identified by ROUTES partners during development of 1st Memorandum**
 - Scope refined through planning discussions with Subtask 4.2 partners
- 1) **Generic WAC and the UK Disposability Assessment Process**
 - Interest expressed in the potential for wider application of generic WAC
 - Interpretations of what 'generic WAC' constitute vary considerably – discussion to explore what aspects would be of most value
- 2) **Involvement of stakeholders in the development and application of WAC**
 - Link between safety assessment and derivation of WAC
 - Other factors influencing the scope of defined WAC
 - The role of checking compliance with WAC in providing reassurance to civil society
- 3) **Managing the potential for non-compliances to arise as WAC are iterated**
 - What happens if more restrictive limits on waste acceptance are imposed based on e.g. development of the safety assessment for a planned disposal facility?
- **For each topic: Introductory presentation(s), followed by group discussion**

SESSION 1

Monday 14th June, morning

| | |
|-------------|--|
| 09:15-09:30 | Welcome and workshop logistics (Liz Harvey) |
| 09:30-09:40 | Links to wider ROUTES activities (Elisa Leoni) |
| 09:40-10:00 | Reflections from Joint WAC Webinars (Lumír Nachmilner) |
| 10:00-11:00 | Case Study 1: Bituminization of evaporated concentrate at the Rivne NPP in Ukraine: An example of conditioning waste without disposal WAC being available (Iryna Kutina & Soloviov Alexander) |
| 11:00-11:10 | <i>Short break</i> |
| 11:10-12:10 | Case Study 2: Cement solidification of sludges from the liquid waste evaporator in Greece: An example of conditioning prior to availability of a disposal route (Anastasia Savidou) |
| 12:10-14:00 | <i>Lunch break</i> |

- Secretarial support from **Mélanie Maitre & Virginie Wasselin**



DISCUSSION QUESTIONS (APPLICABLE TO ALL CASE STUDIES)

1) How do you see the link between current waste management activities and final disposal WAC in your country?

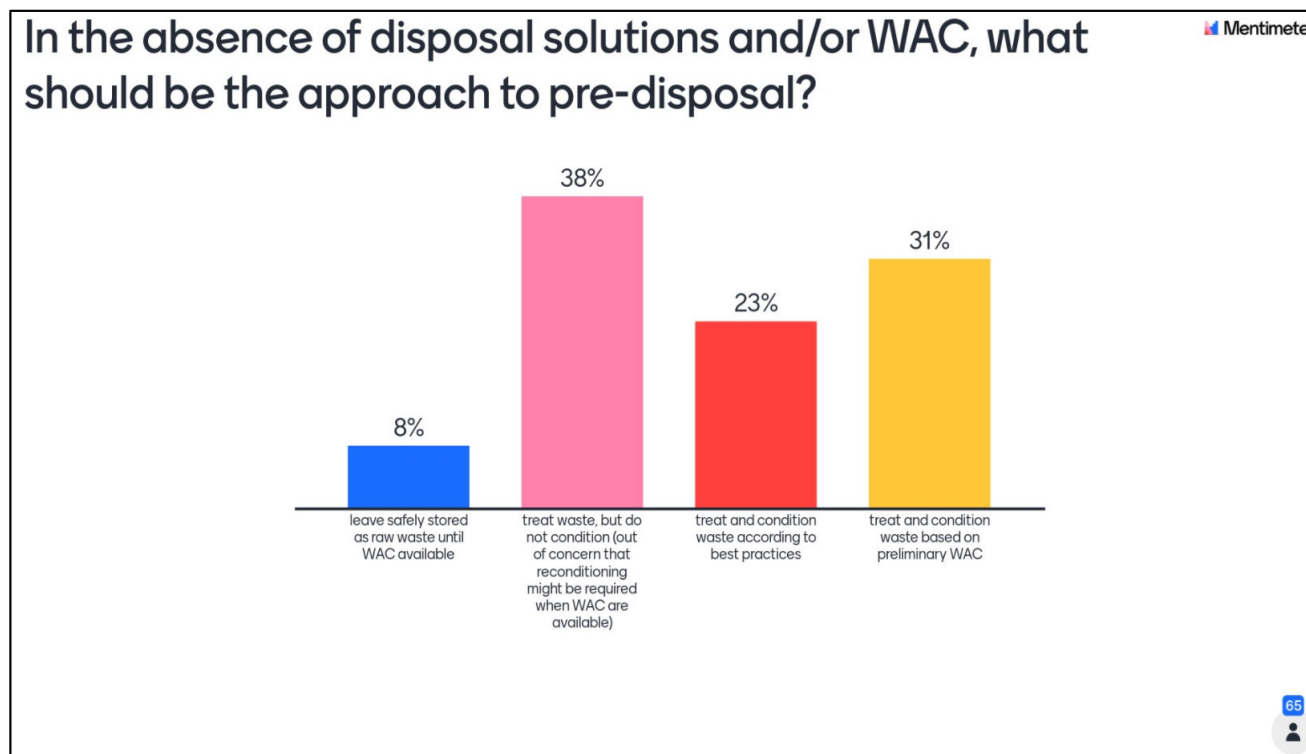
- What gaps persist between current activities and achieving disposal with respect to WAC? How might these be addressed?

2) Where the disposal route and/or WAC are not yet known, how is waste management being implemented to keep options open?

3) What extent of waste processing is appropriate while this is the case?

- What are the most important considerations? E.g.:
 - Early processing to improve passive safety / storage arrangements etc? Combined with monitoring?
 - Flexibility (i.e. deferred processing), combined with ongoing research?
 - Conservatism / stringency of requirements for storage?
 - Provision for reconditioning?

SIMILAR QUESTION ASKED IN POLLING AT FIRST PREDIS/ROUTES/ERDO JOINT WEBINAR:





Coffee / Stretch break

We will restart at 11:10 CEST





Lunch!

We will restart at 14:00 CEST



SESSION 2

Monday 14th June, afternoon

| | |
|-------------|--|
| 14:00-15:00 | Case Study 3: Storage and processing of wastes at COVRA's facilities in The Netherlands: An example of conditioning waste prior to availability of a geological repository (Marja Vuorio) |
| 15:00-15:10 | <i>Short break</i> |
| 15:10-16:10 | Cross-cutting Topic 1: Generic WAC and the UK Disposability Assessment Process |
| 16:10-16:15 | Closing remarks for Day 1 (Chris De Bock) |

- **Secretarial support from**

- Liz Harvey for CS3
- Robin Strange & Callum Slade (RWM) for Topic 1



Coffee / Stretch break

We will restart at 15:10 CEST





TOPIC 1 - GENERIC WAC AND THE UK DISPOSABILITY ASSESSMENT PROCESS

- **Interest expressed in the potential for wider application of generic WAC**
- **Interpretations of what 'generic WAC' constitute vary considerably – discussion to explore what aspects would be of most value. For example:**
 - Precursor to site- or facility-specific WAC – (Slovenia), Ukraine, UK
 - Overarching requirements - France
 - Requirements applicable to all sites - Cyprus
 - Facility specific but applicable to all waste types managed within that facility – The Netherlands, (Spain)
- **Presentation by Andy Harris, Head of Package Assurance, RWM**
 - An example of packaging assessment in the absence of formal WAC and without a disposal route
 - Treatment, conditioning and packaging of UK Higher Activity Waste is controlled via this process



DISCUSSION QUESTIONS (TOPIC 1)

- 1) **How might generic WAC provide a tool to facilitate waste management (conditioning, packaging, storage and/or evaluation of disposability) for wastes where no disposal route is currently available?**
- 2) **Do you see an opportunity / benefit of drawing on generic WAC (or equivalent) in the development of waste management arrangements for countries that do not yet have a disposal facility / WAC? How would you like to see that implemented?**
 - Conversely, are there any risks of applying generic WAC?
- 3) **Interpretations of what 'generic WAC' constitute vary considerably (see previous slide). What interpretations do you consider to be most useful (if any)?**



CLOSING REMARKS – DAY 1

- **Thanks to all our speakers today and to you all for your inputs to discussion!**
- **Start tomorrow at 9:15 (CEST)**

SESSION 3

Tuesday 15th June, morning

| | |
|-------------|---|
| 09:15-09:20 | Day 2 Welcome (Liz) |
| 09:20-10:20 | Case Study 4: Graphite management in Spain: An example of treating waste in order to establish a disposal route (Gabriel Piña Lucas) |
| 10:20-10:30 | <i>Short break</i> |
| 10:30-11:30 | Cross-cutting Topic 2: Role of stakeholders in the development and application of WAC |
| 11:30-13:20 | <i>Lunch break</i> |

- Secretarial support from Elisa Leoni



Coffee / Stretch break

We will restart at 10:30 CEST





TOPIC 2 - ROLE OF STAKEHOLDERS IN THE DEVELOPMENT AND APPLICATION OF WAC

- **Development and scope of WAC is typically strongly linked to safety assessment, particularly for disposal facilities**
- **Regarding their application, some key observations from Subtask 4.1 (MS88 Report) are that:**
 - The roles of different parties in applying WAC and determining compliance vary widely
 - A range of technical approaches are applied to determine compliance
 - Responses in the event of a non-compliance also vary widely
- **Should WAC have a role beyond ensuring that the requirements of the safety case are met?**
- **Does the role of WAC as a demonstration of fulfilling the safety case have implications for who should be involved in checking compliance?**
 - How to ensure independence? Dissemination of results?
- **Presentation by Jan Haverkamp on the role of civil society and other stakeholders in the development and application of WAC**

RESPONSIBILITIES RELATING TO WAC APPLICATION (FROM MS88 REPORT)

- Generally the repository operator / WMO is responsible for WAC development, but sometimes it is the regulator, as in DK, (FR), LT, (SK)
 - See Table 5 from MS88 report for further details

| Country | Responsible for applying WAC | | | Responsible for compliance verification | | | Responsible for reporting to regulator how the WAC are met | | Responsible for qualification of the employed processes | | | |
|---------|------------------------------|--------------------------------------|-----|---|-----|-----------|--|-----|---|--------------------------------------|-----|-----------|
| | Waste package producer | Storage / disposal facility operator | WMO | Storage / disposal facility operator | WMO | Regulator | Storage / disposal facility operator | WMO | Waste package producer | Storage / disposal facility operator | WMO | Regulator |
| AT | | ✓ | | ✓ | | | | ✓ | | | ✓ | ✓ |
| BE | ✓ | ✓ | | | ✓ | | N/A | | | | ✓ | |
| BG | ✓ | ✓ | | ✓ | | | ✓ | | ✓ | ✓ | | |
| CZ | ✓ | ✓ | ✓ | | ✓ | | ✓ | ✓ | | ✓ | ✓ | |
| DK | ✓ | ✓ | ✓ | ✓ | | | not mentioned | | | | | |
| FR | ✓ | | | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| DE | ✓ | | | | ✓ | | | ✓ | ✓ | | | |
| GR | | ✓ | | ✓ | | | ✓ | | | ✓ | | |
| HU | ✓ | | ✓ | | ✓ | | | ✓ | | | ✓ | |
| LT | ✓ | ✓ | | ✓ | | ✓ | | ✓ | ✓ | ✓ | | |
| NL | ✓ | | | ✓ | ✓ | | | ✓ | | | | |
| PL | | | ✓ | | ✓ | | | ✓ | | | | |
| PT | ✓ | | ✓ | | ✓ | ✓ | | ✓ | | | ✓ | ✓ |
| RO | ✓ | | | ✓ | | | ✓ | | ✓ | | | ✓ |
| SK | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| SI | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | |
| ES | ✓ | | ✓ | ✓ | | | ✓ | | | ✓ | ✓ | |
| SE | ✓ | | | | ✓ | | | ✓ | | | | |
| UA | ✓ | | | ✓ | | | ✓ | | ✓ | ✓ | | |
| UK | | ✓ | | ✓ | | | ✓ | | | ✓ | | |



DISCUSSION QUESTIONS (TOPIC 2)

- 1) Should WAC have a role beyond ensuring that the requirements of the safety case are met?**

- 2) Does the role of WAC as a demonstration of fulfilling the safety case have implications for who should be involved in checking compliance?**



Lunch!

We will restart at 13:20 CEST



SESSION 4

Tuesday 15th June, afternoon

| | |
|-------------|---|
| 13:20-14:20 | Cross-cutting Topic 3: Managing the potential for non-compliances to arise as WAC are iterated |
| 14:20-14:30 | <i>Short break</i> |
| 14:30-15:25 | Key points from discussion of each case study / topic (session secretaries) |
| 15:25-15:40 | Next steps (Liz) |
| 15:40-15:45 | Conclusion of the workshop (Chris) |

- Secretarial support from Crina Bucur



TOPIC 3 - MANAGING THE POTENTIAL FOR NON-COMPLIANCES TO ARISE AS WAC ARE ITERATED

- Updates to WAC are an important aspect of their development and to continual improvement of waste management arrangements
- What happens to existing (approved) waste packages if more restrictive limits on waste acceptance are imposed based on e.g. development of the safety assessment for a planned disposal facility?
- **Presentation 1 (Chris De Bock):** managing new criteria and more restrictive limits imposed by the safety report of the planned surface repository in Belgium
 - This presentation is about the proposed modification to the waste acceptance system to allow the acceptance, under certain conditions and for pre-disposal management, of radioactive waste exceeding the new limits on cellulose-containing materials, water-soluble chlorides and/or sulphates
- **Presentation 2 (Nadja Železnik):** experience in Slovenia with operating Central Interim Storage for small producers, initially without WAC, later on with imposition of criteria for storage and for disposal



DISCUSSION QUESTIONS (TOPIC 3)

1) How can the potential for retrospective non-compliances resulting from WAC updates be managed?

- Is early awareness / monitoring key?

2) What experiences are there from elsewhere (not just Slovenia and Belgium)?

- Note the relevant experience presented by Andy Harris (RWM) during his Topic 1 presentation



Coffee / Stretch break

We will restart at 14:30 CEST





SUMMING UP

Key points of discussion for each case study and cross-cutting topic from session secretaries



NEXT STEPS

- **Presentations will be uploaded onto Project Place**
- **Further case study (management of IERs in Germany) will be shared via email in early July**
 - Comments/feedback by email are invited by end August and will be integrated in the memorandum
- **Memorandum will be prepared**
 - Secretaries provide brief notes covering their respective sessions
 - Liz and Chris will assemble other components, including draft gap analysis
 - Circulation of draft for review in early September
- **Subtask 4.3 starts in November 2022**
 - Focus on R&D needs and opportunities for collaboration → as informed by our discussions this week and the gap analysis
 - Consider the possibility of cooperative activities and even joint deliverables with PREDIS project in the next period → ROUTES Task 4 and PREDIS WAC Task 2.3 have similar scope and we should aim to deliver complementary outputs
 - Consider links / interfaces with ROUTES 2nd wave activities (Task 8)
 - Workshop in ~February 2022 - hopefully in person!? Should we postpone by a couple of months?



FINAL CLOSING REMARKS

- **Thanks again to all our speakers**
- **Thanks to secretaries for their feedback today/yesterday, and to come!**



ROUTES TASK 4 - WASTE ACCEPTANCE CRITERIA

Thank You for your attention!