

NEWSLETTER N°5

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We are out there

BREAKING NEWS



Second wave on the move!

After more than a year of work, we are proud to welcome 3 new RD&D workpackages and to extend the scope of the 2 existing Strategic Studies.

More information on each new work packages can be found in this issue's Digest.



New discussion forum !

As of today, WP13 launched a discussion forum which can be accessed via [the School of RWM's website](#). This forum can be used to foster discussions, ask questions and networking between all EURAD partners. It contains subforums to support discussions concerning the School of RWM and the EURAD Roadmap.



Mobility Programme

Are you planning a visit or an internship at one of the EURAD partner institutes in the near future? Are you a EURAD PhD student or a young professional active in RWM? If you answered 'yes' to both questions, the EURAD Mobility Programme can provide financial support your visit/internship! Submit your application

For more information, check [the EURAD School of RWM website](#).

A LOOK BACK

States-of-the-Art (SotA) – CORI and FUTURE



WP CORI (Cement-Organics-Radionuclide-Interactions) is proud to present the SotA submitted as [Deliverable D3.1](#). This document is organized according to the three RD&D Tasks defined in CORI and includes an additional chapter on fundamental cement chemistry of interest for the interested general reader. An introductory chapter is introducing the topics addressed in CORI, also giving information on relevance and the expected impact. All Task leaders contributed to the writing of the SotA documents. It is written as a consistent document covering the main aspects addressed in CORI and will be updated at the end of CORI to integrate new results. The sub-chapters are also prepared in a way so that they can be read as stand-alone documents on the respective sub-topics. This provides more flexibility in terms of integration into the Roadmap, KM activities or Training Events in EURAD. Each section features an extended list of further literature.

The CORI SotA chapters cover (i) Definition of scope and content of EURAD-CORI, (ii) Organic degradation by hydrolytic and radiolytic processes, (iii) Organic-cement interactions, (iv) Radionuclide-organic-cement interactions, and (v) Fundamental cement chemistry.

[The initial SotA report of the WP5-FUTURE](#) (Fundamental Understanding of Radionuclide Retention) is finalized. The report comprises in a condensed form the current state of the knowledge on radionuclide retention and transport in clay and crystalline rocks. It also provides a gap analysis of the open questions relevant for performance assessment and revises common approaches to the upscaling of data derived in laboratory to a repository scale. This SotA report will be updated at the end of the program in order to integrate the results of EURAD.

Deliverables (ACED and Training)

In preparation of the SotA of the ACED (Assessment of Chemical Evolution of ILW and HLW Disposal Cells) work package, two underlying reports are finished. [The first report \(D2.4\)](#) already available at the end of 2020, gives an overview of the treatment of the chemical evolution in geological disposal concepts in different European countries with detailed descriptions for Belgium, Czech Republic, Finland, France, Germany, Lithuania, Netherlands, Spain and Switzerland. Two chapters summarize commonalities and differences between disposal cells for high-level and intermediate level waste, respectively. [The second report \(D2.5\)](#) provides a state-of-the-art about processes at different interfaces in these disposal cells (glass-steel, cement/mortar-granite, cement/mortar-clay, steel/iron-bentonite, steel/iron-cement/concrete, steel/iron-granite) including an overview of evidence from experimental studies or analogues and different conceptual and mathematical modelling approaches. The wealth of information in these reports forms the basis for further numerical studies in ACED.

On April 12th 2021, [deliverable D13.1](#) was submitted on the EC portal. In this deliverable, WP13 summarized the results of the 'Survey on training initiatives', which was conducted in 2020. The five highest priority topics are: '7.1 Safety Strategy', '7.2.1 Safety case production', '7.3.1 Treatment of uncertainty', '2.2.2 Waste Acceptance Criteria' and 'Source term understanding for disposal'. The results will be linked to the Goal Breakdown Structure (GBS) of the EURAD Roadmap. This way, the Roadmap can serve as an easily accessible tool to check which training needs there are and need to be addressed. In the end, the Roadmap, together with this report, provide an easily accessible overview of identified training gaps for end-users.

SPOTLIGHT ON ROUTES WP

There is no universal solution for radioactive waste management applicable to all countries and stages of the waste life-cycle. An effective management route always requires to find the optimal solution between various country-specific technical and non-technical factors including public acceptance. Sharing experiences, comparing approaches and identifying the best practices and lessons learnt among the different countries about the management of challenging waste is the baseline to move a step towards the vision at EC level of harmonized practices, and to identify gaps in research and needs. These are the main objective of the EURAD ROUTES WP (Reports already produced under ROUTES are available on the [EURAD Website](#))

Having a holistic view also means developing a common and shared approach among the various EC Projects and International initiatives. Consequently, EURAD-ROUTES has devoted considerable effort this year to ensuring that it delivers complementary outputs with respect to other ongoing Projects and R&D work related to waste management and contributes to the progress in the field.

Examples of recent collaborations include:

- The presentation of ROUTES's Work in SHARE and PREDIS EC Projects;
- Two workshops about Waste Acceptance Criteria were jointly organized by EC-PREDIS, EURAD-ROUTES and ERDO with the participation of IAEA, EC and NEA representatives;
- A common ROUTES/CORI/FUTURE/KM session at the EURAD 1st Annual Event with the participation of PREDIS and THERAMIN and IAEA Representatives;
- IAEA and NEA representatives attended ROUTES' internal workshops.

The EURAD-ROUTES Team is proud to have taken part in all these common initiatives and would like to thank all the Partners and other parties who have made this possible. Our special thanks go to EURAD-CORI, EURAD-FUTURE, EURAD-KM, EURAD Large Civil Society Group, EC PREDIS, SHARE and THERAMIN Projects, IAEA, EC and NEA Representatives and ERDO Partners for having shared with us their expertise and helping us to maximize the value of our work and its dissemination.

Links to the WAC workshops: <https://predis-h2020.eu/wac2-webinar-20-5-2021/> and <https://predis-h2020.eu/wac1-webinar-21-4-2021/>

DID YOU KNOW...?



Explore the Roadmap Webpages

The EURAD Roadmap structure is now easier to explore via the EURAD [Roadmap Webpages](#). Click through the different themes, sub-themes and domains to see where your work fits in and where you can make a contribution. If you want to share your experience and knowledge by supporting population of a roadmap document, get in touch with the Coordinator or WP11 Team.



EURAD Roadmap
Goals Breakdown
Structure

Programme Management
Pre-Disposal
Engineered Barrier Systems
Geoscience
Design & Optimisation
Siting & Licensing
Safety Case

Roadmap Guide Issue 2

A revised Roadmap Guide is available with a new section on 'Pathways through the Roadmap'. It describes how we are collecting the experiences of advanced EU programmes developed over more than 40 years who have adopted different technical and strategic approaches to DGR development. It explains that there is not a unique route through the roadmap – like any roadmap, it can be used to stimulate consideration of alternative options.

UPCOMING EVENTS

June

30th Lunch-and-learn
session
SITEX.Network

September

27th-30th European
Nuclear Young
Generation Forum

29th EURAD General
Assembly n°5

October

05th CHANCE
Webinar Series -
Calorimetry

06th Lunch-and-learn
session with Prof.
Rodney C. Ewing

27th Lunch-and-learn
session – News on
the sitting process in
Italy (ENEA and
SOGIN)

NOW PUBLISHED!

Roadmap Theme 1 Overview on Programme Management



40 min
read

Implementing a deep geological repository is a complex and difficult activity. Getting to an effective solution has to be done within the framework of a broad-based and comprehensive national programme that addresses all aspects of radioactive waste management (RWM) for all of the wastes in the national inventory and all of the RWM facilities that will be needed. This Theme looks at how geological disposal can be implemented within the framework of a national RWM programme.

Learn more [here](#) from Johan Andersson and Neil Chapman who each have more than four decades of experience in building geological disposal programmes worldwide.

Roadmap Theme 4 Overview on Geoscience

There are four common goals in Geoscience pursued by national RWM programmes:



25 min
read

- Provide a description of the natural barrier and how it contributes to high level safety objectives
- Characterise the potential impact of disposal facility construction, operation and closure on the natural geological barrier
- Provide a description of the expected evolution of the geosphere (including the repository) in response to natural processes and future human actions
- Provide a geoscientific synthesis

Learn more [here](#) from Andreas Gautchi who was the drillsite geologist responsible for Nagra's first deep borehole in 1982 and has since then supported geotechnical programmes worldwide.

Roadmap Theme 7 Overview on Safety Case



20 min
read

The safety case is a critical tool for guiding programme development, integrating and synthesising information to build understanding to inform decisions at each stage of the repository development programme and to guide and prioritise R&D activities.

Learn more [here](#) from Lucy Bailey at RWM and current Chair of the NEA Integration Group for the Safety Case (IGSC).

DIGEST

Second wave

[WP ConCorD](#) (Container Corrosion under Disposal Conditions) is officially kicked-off in early June. The main aim of this WP is to optimise and evaluate the behaviour of materials for disposal containers in view of their long-term barrier performance. ConCorD will:

- explore the potential of novel container materials and processes for optimisation of container performance within the engineered barrier system,
- deepen the understanding of coupled interfacial processes influencing container performance under repository relevant conditions, with a focus on irradiation-accelerated corrosion, microbial activity and degradation during nearfield transients
- demonstrate the obtained mechanistic process understanding and develop predictive models leading to more focused performance assessments for addressing identified safety needs.

Seven individual kick-off meetings have been planned, to cover the 6 Tasks of ConCorD and the Expert Review Group input. The meetings will consist of information session by the WP and Task leaders, presentations of planned activities by the participants, coordination of future actions and feedback from the ERG.



20 partners



6 Tasks



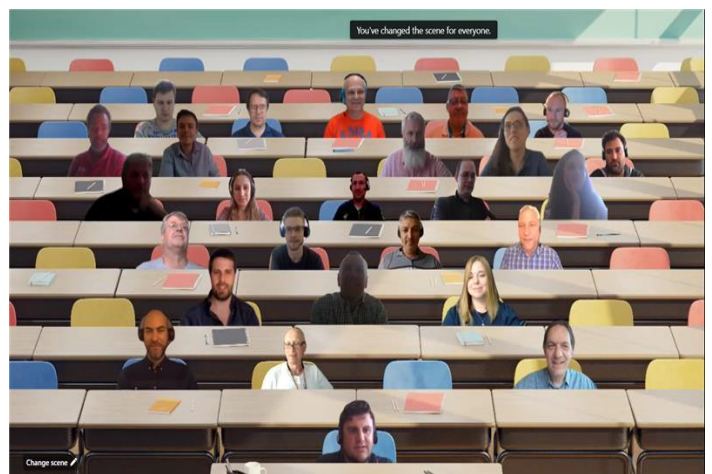
20 partners

Monitoring can underpin a repository safety strategy; it can contribute to verification of the performance of the disposal system and can contribute to demonstration of compliance with regulatory requirements. It can provide better understanding of components evolution and thus allow to appreciate the optimization possibilities. It can contribute to public and stakeholder understanding of processes occurring in the repository, and hence, it can respond to public concerns and potentially be used to build confidence in geological disposal. Monitoring can, therefore, play an important role in enabling waste management organisations to work towards the safe and accepted implementation of geological disposal.



4 Tasks

The ambition of [the MODATS WP](#) (Monitoring equipment and Data Treatment for Safe repository operation and staged closure) is to consolidate the implementation strategy for monitoring systems by developing methods through which confidence can be demonstrated in the data acquired and benefits derived for repository implementation. To develop this ambition, the WP will undertake R&D into data acquisition, data management and presentation, and use of data in system understanding.





25 partners

[The MAGIC WP](#) (Chemo-Mechanical Aging of Cementitious materials) aims at obtaining an improved understanding of chemo-mechanical ageing of cementitious materials exposed to various representative chemical disturbances (including microbial impacts) coming from the disposal environment. In order to develop chemo-mechanical multiscale modelling (from the microscale to the safety structures), the project will assess the impact of several simultaneous chemical processes (hydrolysis, multi-ionic attack (i.e. sulfate and magnesium), carbonation) on the mechanical properties of cementitious materials and their evolution.



4 Tasks

MAGIC's added-value: the IDPC - ensuring shared knowledge development

The Task 1 contributors with the end-users group will animate and articulate the knowledge development all along the WP duration. The objective will be to maintain a constant effort of interaction between modellers and experimenters, but also between the different specialties (mechanic, chemistry, microbiology). The Interactive Data Platform on Cement IDPC, will be the key tool to build a robust and safe relation between partners. It will ensure a transparent transfer of data and new results.

The ROUTES Extension is a new task (Task 8) added to the WP ROUTES. The goal of this new task is to assess the results of other tasks of WP ROUTES. The team will interact closely with all KM WPs with the aim to share new findings and experiences issued from Task 8 work. Task 8 essentially continues the work from ROUTES Task 5 and expands it with the findings from the other ROUTES tasks in order to analyze these findings and to provide guidance to the Member States in choosing the right RWM strategy. A common work is carried out in Task 8 by SIMS (Small Inventory Member States) and LIMS (Large Inventory MS) together so that SIMS have the whole picture of the existing solutions and practices for RWM in LIMS.

ROUTES Extension's added-value: ensuring knowledge transfer between SIMS and LIMS (by considering each SIMS specificities and by relying on the common work of SIMS/LIMS)

It provides knowledge transfer between SIMS at different development stages of their RWM program. To this end, a specific work is carried out in Task 8 based on two selected case studies (Development of model RWM strategies for two specific waste types). The outputs of Task 8 work can assist SIMS in developing a methodology for establishing, implementation and/or improvement of their waste management strategies. This will help SIMS to move forward in their national RWM program.



38 partners



8 Tasks

UMAN extends its activities to uncertainties related to near-field evolution



35 partners

The extension of the UMAN Strategic Study WP to key uncertainties associated with the near-field of disposal systems has just started. These new activities will focus on the geological disposal of high-level wastes and spent nuclear fuel in clay and crystalline rocks and fill the gap between source term and geosphere-related uncertainties. The same approach as the one followed for the topics addressed during the 1st wave of activities is adopted. In practice, this implies the creation of a new Subtask 3.6 as well as of new activities within existing Subtasks 4.2, 4.3, 5.1 & 5.2. The first important milestone of this extension is the development of a preliminary list of potentially safety-relevant uncertainties. This list will lead to the elaboration of a questionnaire and a workshop aiming at collecting the views of different actors (WMOs, TSOs and REs) on the characterization and significance of uncertainties related to near-field evolution.



5 Tasks

FOCUS

New partners



EURAD is proud to welcome 8 additional Linked Third Parties and 3 International Partners.



The International Partners will all be involved in ConCorD Experts Review Group and in some subtasks. NWMO and CSIRO will also be involved for the preparation of the State-of-the-Art reports.

Those organisations are participating to EURAD Programme at their own costs as they do not receive any funding from the EC.

The Nuclear Waste Management Organization (NWMO) was established in 2002 in accordance with the Nuclear Fuel Waste Act to assume responsibility for long-term management of Canada's used nuclear fuel. The NWMO is implementing Adaptive Phased Management (APM), the approach selected by the Government of Canada in 2007 for long-term management of used nuclear fuel. The goal of APM is long-term containment and isolation of used nuclear fuel in a Deep Geological Repository (DGR) constructed in a suitable rock formation in either sedimentary or crystalline rock at a depth of approximately 500 m. In support of APM, NWMO has an active Research and Development (R&D) Program that is refining engineering designs, conducting safety assessments, and is developing plans and methods to assess the suitability of communities engaged in the site selection process.



As Australia's national science agency, CSIRO solves the greatest challenges through innovative science and technology. With over 5,000 experts, state-of-the-art facilities, and a global collaborative research network we bring together the best and brightest minds to drive strategic growth and overcome unique business challenges. Our collaborative research turns science into solutions for food security and quality; clean energy and resources; health and wellbeing; resilient and valuable environments; innovative industries; and a secure Australia and region.

Japan's Nuclear Waste Management Organization (NUMO) was established in October 2000 in accordance with the Designated Radioactive Waste Final Disposal Act, authorized by the Ministry of Economy, Trade and Industry (METI). NUMO is tasked with implementing final geological disposal of high-level radioactive waste (HLW) and low-level radioactive waste containing long-lived nuclides (TRU waste) from Japanese nuclear fuel cycle. NUMO has begun the initial stage of assessing two municipalities in Hokkaido Prefecture for their suitability to host a final disposal facility for high-level radioactive waste.



WE ARE OUT THERE



eurad

 NTW
@NTWeurope

...

In the frame of [@EJP_EURAD](#), NTW organised an interaction with [#civilsociety](#) co-evaluation meeting. It was the opportunity to come back on the interviews of the EURAD participants on the topic & to think collectively about how to enhance fruitful interactions.

[#nuclear](#)

[Traduire le Tweet](#)



Editorial board: EURAD PMO, ACED, CORI, FUTURE, UMAN, ROUTES, KM, ConCorD, MAGIC and MODATS WPs,