

SOMMAIRE

BREAKING NEWS

Save the date for EURAD final event !



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EURAD Final Event will take place in Bucharest, Romania from 22nd to 25th April 2024.

The final annual event will provide an action-packed 3 days of sharing the latest progresses across all EURAD work packages.

The event will be in person only.

Monday 22nd: final General Assembly (on invitation only)

Tuesday 23rd to Thursday 25th: panel session, breakout sessions, students' event, EURAD WPs results presentations, lively debates.

EURAD Final Event

22nd to 25th April 2024

Bucharest, Romania
Pullman Hotel – 10, Montreal Square
011469 Bucharest

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INTERVIEW WITH SEVERINE LEVASSEUR (GAS WP LEADER)

GAS WP gathers approximately 30 organisations, with different level of expertise, representing countries which have different level of advancement. Can you explain how you managed to keep everyone on board?

Indeed, a broad community is involved in the GAS WP. It brings together a large number of REs, TSOs and WMOs at very different stages of their programmes. While this may at first appear to be a difficulty, it is in fact a great strength for the project. With the support of the board of the WP, we have organized activities within tasks in a series of small clusters, which are groups of teams working on the same objectives, in order to favor collaborative work and mutual support. This gamble we took in setting up this structure has worked, and even better than expected, as today we can count on numbers of active collaborative clusters within the WP who together publish the results of their work in peer-reviewed articles. This was possible thanks to the extraordinary involvement of all the partners in the WP.

You will organize at the end the summer your second training. Who is the primary audience, and can you give us a snapshot of this training?

The 2nd GAS/HITEC training course will be organized from the 28th August to the 1st September 2023 in Liège in Belgium. The objective of the school is to introduce state-of-the-art understanding of concepts and methods related to thermo-hydro-mechanical coupled processes, the physical impacts of thermal loading and the mechanistic understanding of gas migration in geomaterials. Results arising from the GAS and HITEC WPs will be integrated to the training course, and a half day will be dedicated to presentations by early-career researchers. A visit to the HADES Underground Research Laboratory will also be organised on the last day.



Our target audience is first the early-career researchers or members of WMOs and TSOs involved in the GAS or HITEC WP of EURAD. However, as this training will be combined with an ALERT Geomaterials doctoral school, which is a very active network in geomechanics in Europe, we hope to attract a wider community than that involved in EURAD and thus widely promote what has been done in these two WPs thanks to EURAD network.

What are in your opinion the main challenges and opportunities of being a WP leader in EURAD programme?

Being a WP leader in EURAD is a unique opportunity to actively participate in research for safe, sustainable and publicly acceptable solutions for the management of radioactive waste throughout Europe. It gives the occasion to put developments and results of the WP into perspective with the other topics developed in the joint programme, while maintaining the main objective of EURAD, i.e. supporting the implementation of Member States' national programmes. Of course, this is not trivial. EURAD gathers many partners from a broad community. Keeping everyone on track is very challenging, but I have to say that I'm very proud of the GAS WP partners who helped me so greatly to make the GAS WP a

success. Being a GAS WP leader is an extraordinary experience.

As any R&D WP in EURAD you were asked to develop an initial State-of-the-Art and you will produce an updated version of this document by the end of programme. What will be the main differences between those two deliverables?

The initial state of the art of the GAS WP, published in 2021, is a wide overview of scientific knowledge of gas transport in clayey materials. In this document, each mode of gas transport is described in detail on the basis of an extensive literature review. In addition, particular attention is given to highlighting our shared views on the state of knowledge, and

to defining what are the remaining knowledge gaps and uncertainties. In that sense, the target audience is very broad from the early-career researchers to managers of questions related to gas transport in clayey materials in waste management or technology support organisations.

The second state-of-the-art report, which will be published in 2024, has a different objective. It will be a synthetic overview of the key messages on gas transport in clay materials, illustrated by selected results from EURAD, but also from previous or parallel projects, and further underpinned by an in-depth literature review. This time the target audience is mainly programme managers in WMOs and TSOs.

WORK PACKAGE ACED

Alexis Delanoë, a PhD student in ACED (CEA), successfully defended his thesis on multi-scale characterisation of glass-iron-claystone interaction in March 2023. To better understand the reactions at play, the glass was spiked with ^{29}Si and ^{57}Fe . The experiment ran for 6.1 years. He demonstrated that iron adversely impacted glass alteration far beyond the source of iron, due to fast transport of $\text{Fe}(\text{aq})$ dissolved in the solution. As a result, iron phyllosilicates (serpentine) precipitated at the glass surface at the expense of a passivating gel layer usually form in deionised water. Glass then kept dissolving at a quite high rate.

Comparison with a similar 2.5-year long mock-up suggested a change in the nature of the phyllosilicates over time, with a shift from smectites to serpentines. Furthermore, observations indicated that glass alteration was not isovolumetric in the presence of phyllosilicates, suggesting that future experimental protocols should be improved to better assess glass dissolution rate in reactive environments. Finally, in case of direct contact between glass and claystone, cyclic alteration mechanisms seemed to influence the alteration of the glass leading to the formation of a lamellar alteration layer indicating that local pH varied over time.

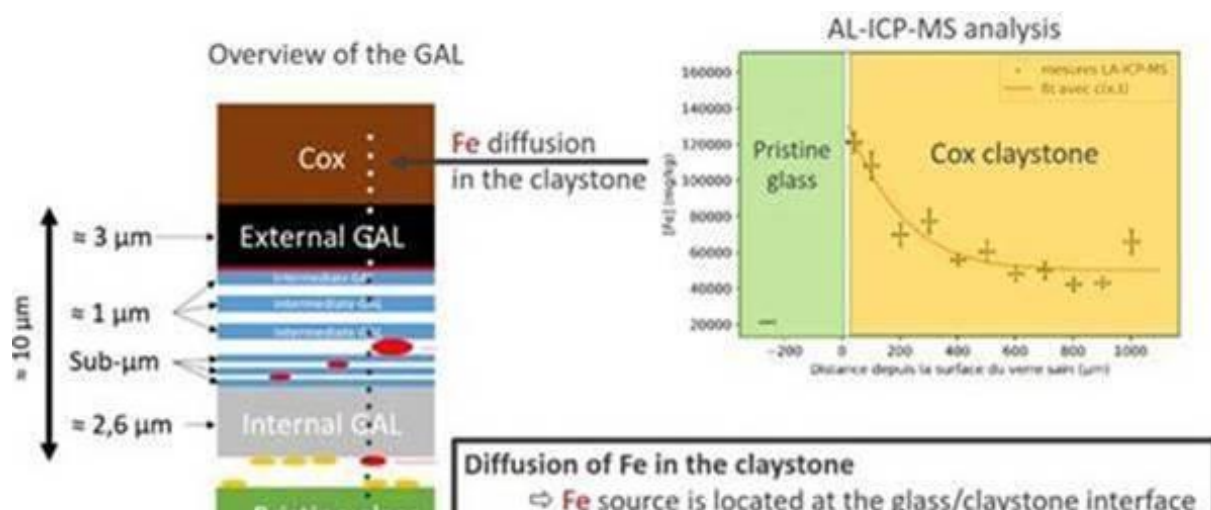


Figure 1 Conceptual model for iron release during glass-claystone interaction, that can explain measured Fe diffusion profiles in claystone (After of Alexis Delanoë). GAL stands for glass alteration layer.

More information can be found in: [Delanoë A., Caractérisations multi-échelles des interactions verre/fer/argilite, PhD thesis, Université de Paris Saclay, 2023.](#)

WORK PACKAGE CORI

The 4th Annual Workshop of the WP CORI in EURAD was held during 9th-11th of May 2023 in Barcelona, Spain. The meeting was organised and hosted by the CORI partner Amphos21 and was attended by a large majority of the groups active in CORI.

The three days meeting was centred around technical updates by CORI partners on the technical progress made in the 3 R&D Tasks, namely (i) organics degradation, (ii) cement-organics interactions, and (iii) radionuclide-organics-cement interactions. Towards the fourth year of CORI, all Tasks have reported significant progress and CORI is expecting to reach the initially planned project objectives. As a number of PhD studies in CORI are completed or close to finalization, CORI wants to thank all young researchers CORI for their particular efforts and wish them all the best for the future careers.



A considerable time was also allocated to discuss the preparation of upcoming Deliverables in CORI and define the necessary steps to ensure that the related information flow proceeds effectively and in time.

CORI is proud to announce that the next CORI meeting will be held in connection to the *6th International Workshop on Mechanisms and Modelling of Waste / Cement Interactions*, in Prague, which is hosted by the Czech groups in CORI. For more information on this upcoming event, please visit the website at: <https://indico.fjfi.cvut.cz/event/207>.

WORK PACKAGE GAS

The WP GAS of the European Joint Programme on Radioactive Waste Management was very active in March!

The activities of the EURAD-GAS WP was first particularly highlighted at the 3rd EURAD Annual Event in Cyprus with several scientific and technical presentations given by many of the group members who were present. Then, we all met for an EURAD-GAS progress meeting in Delft. 42 scientists attended the meeting in Delft. The aim of this in-person meeting was to discuss the latest results of the WP and to foster interactions between partners to progress in the common understanding of gas transport mechanisms in clayey materials. It was the opportunities to have direct and fruitful exchanges on the transport of gas in clays, both from an experimental and a numerical perspective, with a view to the application in the development of geological disposal systems. Two successful events nearly one year from the end of the project!



WORK PACKAGE SFC

The work package is now one year from completion. The status is good with few exceptions. The plans are followed and carried out with great discipline.

A large number of high quality and impact publications has been completed. The work package is well prepared for the last year's work, where reporting, update of the State-of-the-art report (SOTA), scientific publications and conclusions and recommendations are of high importance for the nuclear fuel back-end community. Already the WP participants has been invited and are invited to a number of prestigious conferences. The results have been continuously dissemination in a number of international and national fora, such as IAEA, NEA/OECD, EPRI to give a few important examples.

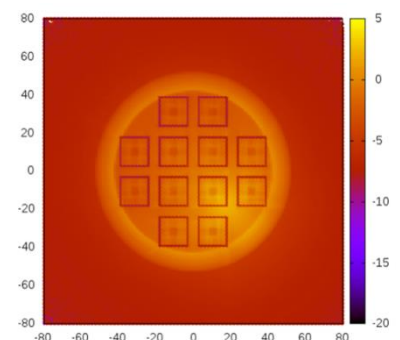
A number of spin-offs have been created as a consequence of the WP. A Decay Power group has been formed at NEA/OECD. At NEA interactions on development of the codes for determining the characterisation parameter such as decay power, criticality, radiation dose, nuclide inventory and mechanical integrity are done, with results from EURAD as a very important basis. An IAEA Coordinated Research Project (CRP) is in progress with the work package leader as chairman. At IAEA, a module in their e-learning on the back-end of the nuclear fuel cycle has been created on spent fuel characterisation. Recently, a Swedish council on spent fuel characterisation was established, with participation from SKB (as the WMO), SSM (regulator) and universities such as Uppsala University, under the Work package leader's chairmanship. Its mission is to coordinated the efforts on Swedish fuel characterisation and not least the complex and comprehensive characterisation instrument to be employed at the encapsulation plants, where all fuel assemblies will be measured before being encapsulated in the KBS-3 copper canisters. A number of large financial grants have also recently been awarded by the Swedish regulator SSM for research into the area, with Uppsala University as recipients, for example by financing a Ph.D. student, and SKB as participants in various ways.

The WP fulfils the important mission to integrate the relevant researchers in Europe in a way that was not the case before EURAD. Naturally, only part of the needs of Europe when it comes to spent fuel characterisation has been done, and many important issues remain, although everything planned in the WP is being executed.

The continuous and impressive work carried out by the Ukrainian partners during the illegal and terrible Russian war are to be particularly noted.

One delay concerns the laboratory work at European Commission laboratory JRC Karlsruhe, where a variety of problems has caused delays in particularly Task 3.

Supercomputer simulation (Uppsala University) of the gamma radiation from spent nuclear fuel assemblies in a KBS-3 copper canister.



WORK PACKAGE ROUTES

SMALL AND LARGE INVENTORY MEMBER STATES EXCHANGED VIEWS DURING A SUCCESSFUL WORKSHOP IN VIENNA!

The 1st workshop on Small Inventory Member States (SIMS) and Large Inventory Member States (LIMS) interactions has been held in May 2023 in the city of Vienna as part of the dissemination activities of the ROUTES WP (Waste Management Routes in Europe from Cradle to Grave) and was concluded on the last day by a tour of the Austrian predisposal treatment facilities and interim storage at Nuclear Engineering Seibersdorf (NES). The workshop aimed on highlighting the benefits of interactions between SIMS and LIMS and thereby focused on knowledge transfer between the member states. Altogether, the workshop was designed to be highly interactive throughout the two days to facilitate the exchange between the participants.

In two days, the participants, equally representing small and large inventory member states, were updated on the status of the work done on Radioactive Waste Management (RWM) strategies for SIMS in the ROUTES WP, discussed on possibilities of knowledge transfer between member states and opportunities of future cooperation between states with significantly different waste inventories. On the second day of the workshop, the group was joined by representatives of the civil society in the ROUTES WP, discussing ways of successfully taking the public along in the decision-making processes in RWM. During this discussion, special attention was paid to best practices in public relations in SIMS and LIMS.

This event was the first of two workshops on SIMS and LIMS interaction in the ROUTES WP. The 2nd workshop will be held in Portugal in November 2023, open for all interested parties of EURAD and international organisations.



Figure Visit of the Austrian predisposal treatment facilities and interim storage at NES

WORK PACKAGE GUIDANCE

REQUIREMENTS MANAGEMENT IS IN THE FOCUS

The guidance work package (WP12) aims at developing a comprehensive suite of instructional guidance documents that can be used by EU Member-States with radioactive waste management programmes, regardless of their phase or level of advancement with implementing their waste management activities. Requirements management has been selected as the broad topic for further guides to be developed within EURAD.

After the so-called pilot guide on “Cost Assessment and Financing Schemes of Radioactive Waste Management Programmes” (Deliverable D12.4) was finalised (reported and given as a recorded Lunch & Learn session) a topic selection process has been initiated for further guidance documents. As a starting point a literature survey was carried out with the aim of screening existing guides and guide-like documents with a clear link to the themes, sub-themes and domains of the EURAD Roadmap (signposting) and identify potential gaps, where further guidance could be useful. After a detailed and transparent topic selection process – in which the feedback from various end-users was taken into account – requirements management (RQM) has been selected as the broad topic for the further guides to be developed.

Based on the experiences of the pilot guide development a project-based methodology is applied for compiling the new guides, which has two important pillars. Firstly, experts from advanced programme countries are involved in the drafting of the guides, who have extensive experience in the field of RQM. Secondly strong emphasis is devoted to the incorporation of the feedback from the end-users. To support this goal three end-user groups are formed based on the experiences of the participants in the field of RQM. Each end-user group has a rapporteur that coordinates the information exchange. Several on-line workshops have been organised and several more will follow, where the end-users are involved in the decisions and can express their views on the draft documents. To find synergies and avoid overlap with ongoing activities coordinated by other international organizations (IAEA, OECD/NEA), the representatives of the relevant programmes of these entities have also been invited to the workshops. OECD/NEA is working on an issue where strong synergies are identified and a close collaboration has been initiated.

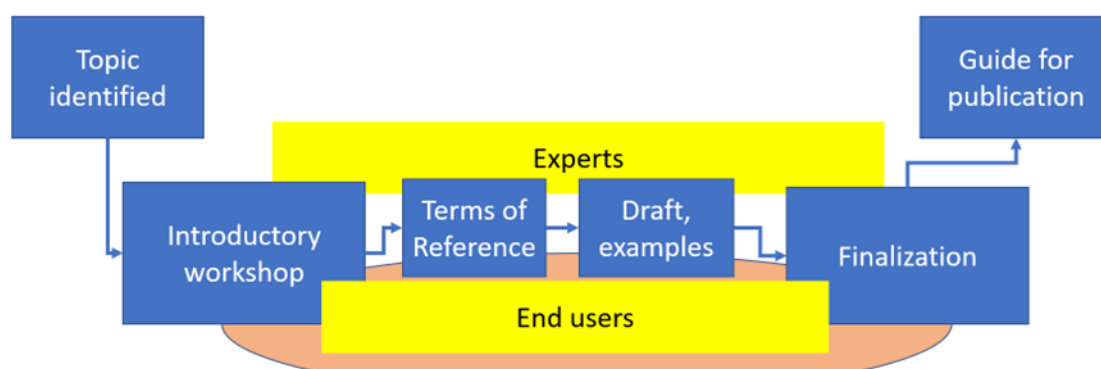


Figure updated guidance production process

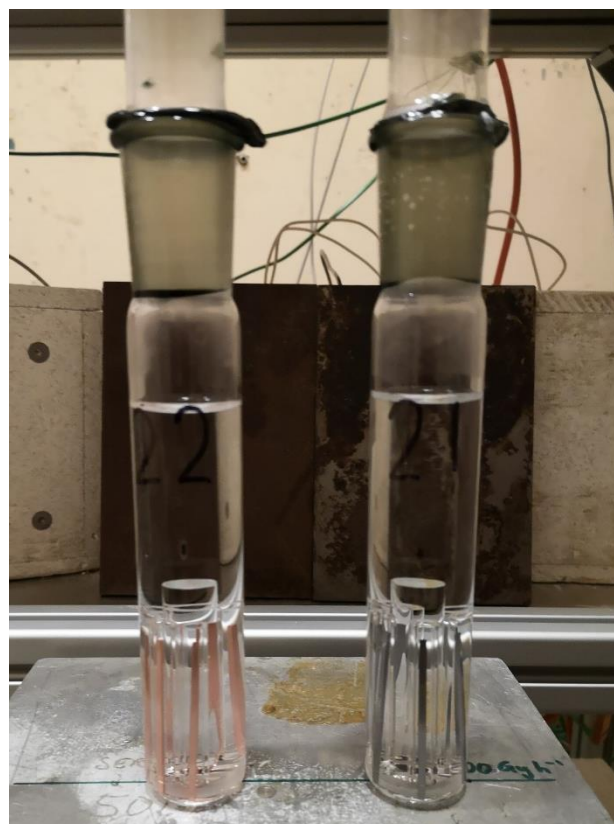
It was decided that, first a generic guidance on developing, using and modifying a Requirements Management System (RMS) will be developed, followed by two specific guidance documents. The topics of the two specific guides were chosen as: 'RMS application for post-closure safety' and 'RMS application for the overall waste management programme'. As the waste management programs in the different countries differ to some extent, also the RMS will differ. Thus, each program will need its own requirements system (newly developed or adapted from an existing requirements management system). Correspondingly, the main emphasis of the guidance documents is on 'the way of thinking' and not on the details of the system and the requirements.

It was emphasised by the end-users, that a training could effectively support the understanding of the application of RMS in practice. Therefore, it was decided to organise a training session most probably in January 2024, where the theory and principles of RMS will be illustrated by practical examples. The training will also provide a platform, where the participants can express their views and opinions, ask questions, which will be used as feedback to finalise the guidance documents.

WORK PACKAGE ConCorD

The research done within ConCorD has both an applied aspect, targeted to the performance optimisation of SF/HLW containers, and a more fundamental aspect, aiming to tackle remaining scientific questions. One of those fundamental unanswered questions is related to the interaction between irradiation and corrosion. There is still no agreement whether dose rate or total dose is the critical irradiation parameter that defines how gamma irradiation influences the corrosion of metallic container materials. Within the Task 3 of ConCorD, for the first time, corrosion experiments on both carbon steel and copper spanning 5 orders of magnitude of dose rate and 2 orders of magnitude of total dose are conducted systematically. The exposure is done in Jacob's ^{60}Co irradiation facility in a deaerated buffer solution for durations between 1 and 10'000 hours.

Preliminary results from carbon steel at shorter exposure durations indicate that the corrosion enhancement factor compared to unirradiated controls decreases with decreasing dose rate. Interestingly, the corrosion rate at low dose rates (1-10 Gy/hr) is lower than that of unirradiated controls. However, for longer exposure durations the enhancement factor increases for both increasing total dose and dose rate. The remaining analyses that will be done during the final year of ConCorD are expected to provide the necessary insight that will allow a more accurate lifetime predictions for disposal containers and provide guidance for future irradiation-corrosion experiments.

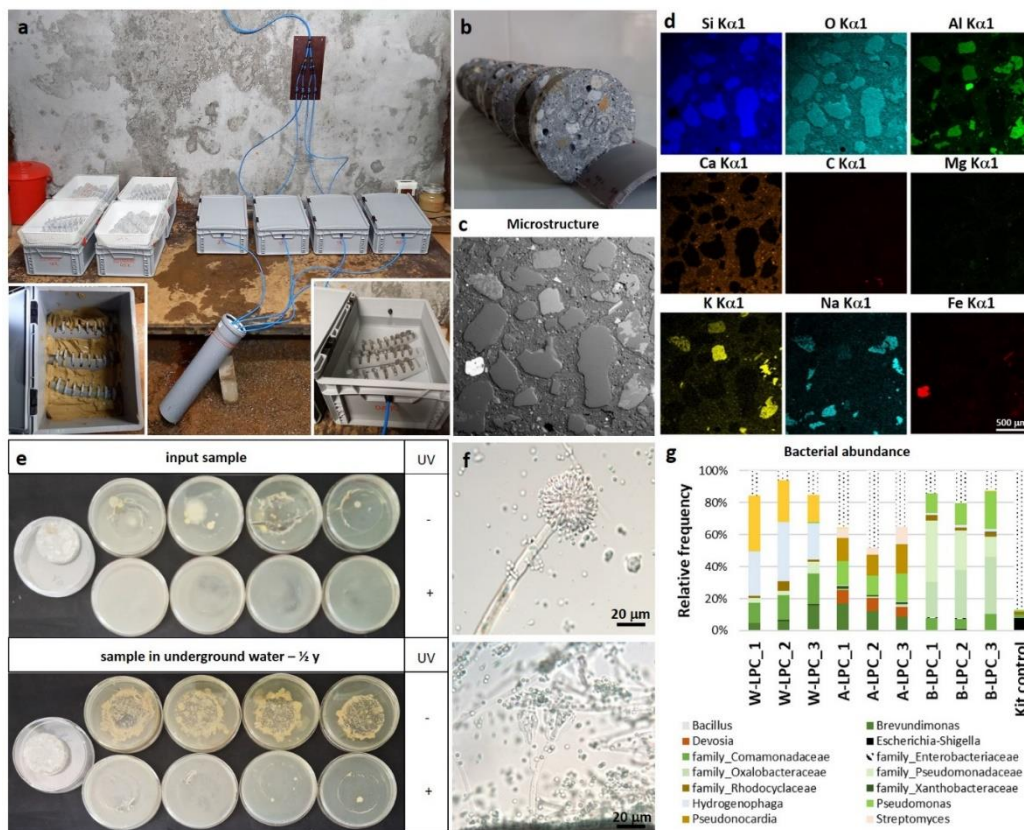


Sealed copper (left) and carbon steel (right) ampoules in the irradiation facility.

WORK PACKAGE MAGIC

MULTI-IONIC AND MICROBIAL INFLUENCE ON MECHANICAL AND STRUCTURAL PROPERTIES OF LOW PH CONCRETE – PART OF TASKS 2 & 3

The aim of this study is to determine whether microorganisms present in surrounding environment (air, water and bentonite) could cause or accelerate concrete deterioration and affect the mechanical and structural properties of low pH concrete LPC_SURAO (LPC). The work is carried out by a Czech team of universities (CTU and TUL) and research institutes (ÚJV and CVŘ), coordinated by SURAO. The three-year-old LPC samples are exposed to three simulated DGR environments at Bukov URL; the primary sources of microorganisms are Czech Ca-Mg BCV bentonite, Bukov groundwater and air.



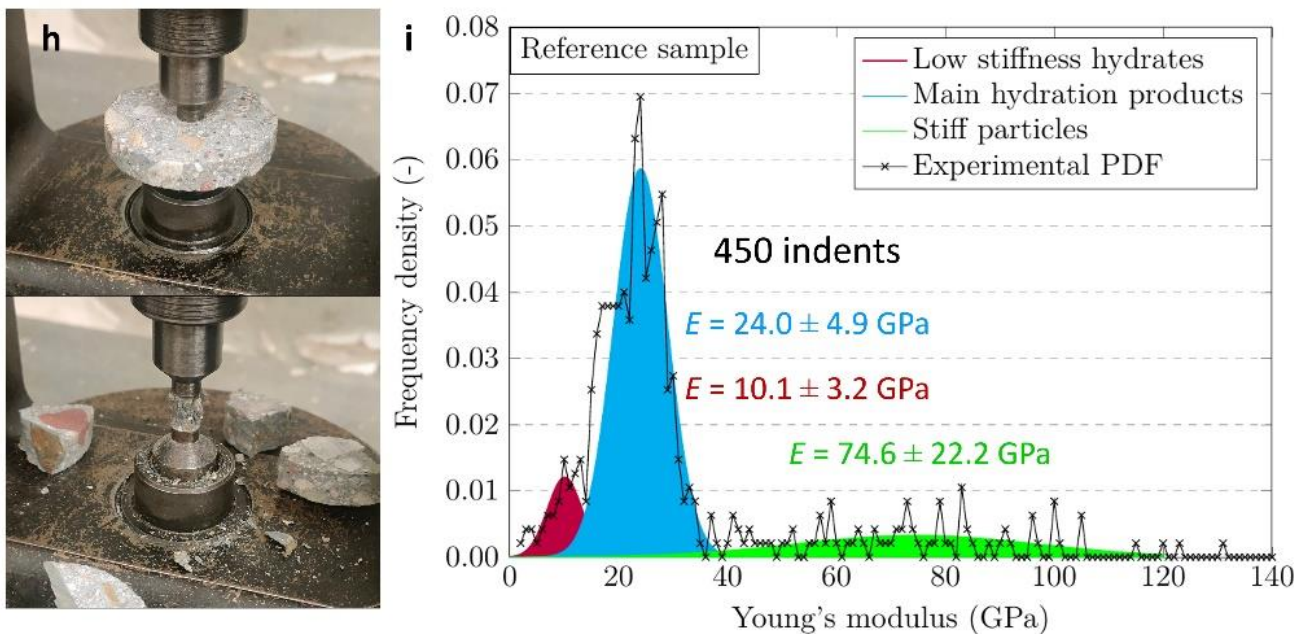
Experimental set-up (a), LPC input samples (b), SEM (c) and EDX (d) analysis, the effect of UV treatment on viability of microbial surface activity (e), microscopic pictures of fungi isolated from air-exposed LPC samples (f) and relative frequency of present bacterial genera detected after 6 months in LPC samples from different environments (g);

After initial characterization an “aging phase” with four sampling campaigns follow. Analyses include nanoindentation for microscale, double punch and ultrasonic tests for macroscale mechanics, microstructural and chemical tests. An extensive set of microbial activity analyses using both cultivation and molecular genetic approaches is used for detection of activity in

differently treated LPC samples, fresh underground water and water baths. To reveal origin of the microbial activity (surface vs. interior) in LPC samples, UV disinfection followed swabbing of samples prior to DNA extraction.

The program has now entered its second half; the results will be published in a next deliverable.

“Initial” characterization of 3 years old LPC: Uniaxial strength (15 cm cube) 65 MPa; pH 10.6; $E = 24$ GPa (nanoindentation); $E = 34$ GPa (ultrasonic); hydraulic conductivity $k_{10} = 10$ -12 m/s.



Destructive double punch test (h) and non-destructive characterization of elasticity by nanoindentation (i).

WORK PACKAGE MODATS

EUROPEAN MONITORING EXPERTS FOR DEEP GEOLOGICAL REPOSITORY EXCHANGED VIEWS WITH REPRESENTATIVES OF CIVIL SOCIETY: A SUCCESSFUL CHALLENGE!

How to bring together partners from civil society and European experts to discuss monitoring methods for future geological disposal facilities, for high and intermediate-level long-lived radioactive waste? This is the challenge that IRSN together with NTW accomplished in the frame of EURAD!

On 18-20 April 2023, IRSN and NTW organized a workshop in Nancy as part of MODATS, aiming to gather the expectations of civil society regarding the monitoring of geological disposal facilities for high and intermediate long-lived waste, which either do not yet exist, or are only just emerging and which are expected to operate for around 150 years, involving four generations of workers!



Participants came from seven different European countries: England, Austria, Belgium, France, Sweden, Slovenia and Switzerland, plus videoconference participants from Germany, Finland, Slovakia and Ukraine. They discussed the following three questions:

- What are the perceptions of the various stakeholders involved in monitoring of a geological disposal facility for radioactive waste?
- What would be the added value for safety of a plural interpretation of monitoring data?
- What are the main expectations of the various stakeholders in terms of monitoring?



Discussion groups debated topics ranging from reliability and sensor data to systems for data collection, storage, visualization, analysis and interpretation. Discussions also led to debates on the intergenerational transmission of data, knowledge and skills and the impact of monitoring on safety cases.

The workshop contributed to the establishment of a mutual understanding between representatives of European experts (operators, institutional technical experts and research units) and representatives of civil society (students, researchers in social sciences, experts from non-governmental organizations) on the challenges and issues of monitoring systems and their socio-technical interpretations.

The workshop finished with a presentation of the Cigéo project and a visit to ANDRA's underground research laboratory in the Meuse Haute-Marne region, where scientific experiments are carried out to study the geological environment directly inside the rock. Finally, a visit to the “technological space” enabled workshop participants to discover the technological prototypes and demonstrators developed as part of the Cigéo conception.



INTERACTIONS WITH THE CIVIL SOCIETY

Between the 24th and 25th May 2023, the 4th Workshop dedicated to "Interactions with the Civil Society (ICS)" took place in the very historical and royal city of Fontainebleau in a campus belonging to the school of Mines of Paris, involved in EURAD program as a Research Entity (RE). Therefore, two presentations of technical Work Packages (WP) were given by some searchers attached to this institution: Laurent De Windt (ACED) and Nicolas Seigneur (MAGIC).



A focus was also given to the recent outcomes of interactions with Civil Society in the technical WP MODATS, by Christophe Debayle from IRSN and in the CORI-UMAN-ICS process by Alexis Geisler-Roblin from NTW.

The main focus however was on the two strategic studies : UMAN and ROUTES where the most Civil Society members are involved. The two sessions dedicated to those helped envision more clearly:

- 1) pluralistic methods for uncertainty assessment, with an outlook on near-field uncertainties as it is elaborated in the work achieved by UMAN task 5;

- 2) transparency and public participation in radioactive waste management in different contexts, based on ROUTES results aiming at identifying best practices and recommendations for improving transnational standards.

Finally, a conclusive session dedicated to a reflection on the involvement of Civil Society members in EURAD, the cooperation and fruitful interactions with other colleges and the dissemination works helped gather some precious and numerous inputs to build the next and final Workshop which is meant to be in October 2023 in Brussels."





A look back

UMAN WORKSHOP ON THE MANAGEMENT OPTIONS AND PREFERENCES OF DIFFERENT ACTORS REGARDING NEAR-FIELD UNCERTAINTIES

In search of a common understanding on uncertainty management strategies, approaches and tools, WP UMAN organized during its implementation a series of workshops with the aim of collecting the options of different categories of actors (WMOs, TSOs, REs) regarding the options for reducing, mitigating or avoiding the impact of uncertainties on the disposal safety.

The 5th (and final) UMAN 3-day Workshop, planned for May 17, June 6 and 29, 2023 is dedicated to near-field uncertainties, focusing on those associated with:

evolution of the hydraulic conductivity in bentonite, taking into account the effects of resaturation, the evolution of the swelling pressure, as well as the inhomogeneity of the bentonite barriers;

evolution of metallic materials behaviour in different barriers and the potential impacts on the migration of radionuclides;

modelling the radionuclide transport in the near field: full 4D description vs. 1D, or mixed compartment, considering uncertainties associated with THMCBR processes dominating at different time scales, as well as with gas migration in near-field systems, which have been identified by the UMAN core group as the most significant for disposal safety.

On June 6, specialists from the three colleges participating in WP UMAN had the opportunity to share their experience in managing these uncertainties in their national programs.

The commonalities and differences in their opinions and preferences will be presented and discussed on June 29.





A look back

SNETP FORUM 2023

On the 16th May 2023, EURAD was invited to give a keynote presentation at the SNETP FORUM, in the session dedicated to “Waste management and recycling”.

After a general presentation of the programme, the major achievements and way forward were presented to the audience. The following discussion highlighted the links between the different work packages, how the management of the programme was conducted and the involvement of SNETP in the future programme.



Figure Chair, Co-Chair and speakers of the session “Waste management and recycling”



A look back

CONCORD ANNUAL MEETING – 22-24/05/2023, CIEMAT, MADRID, SPAIN

The first in person annual meeting of WP15 ConCorD (Container Corrosion under Disposal Conditions) took place at the end of May in Madrid, hosted by CIEMAT. Over 3 days, about 50 ConCorD participants highlighted the technical and scientific progress achieved during the first 2 years of the project. Our Ukrainian colleagues and international partners who could not travel to Spain joined the meeting online. Each of the Tasks organised specific sessions allowing in depth discussions and exchanges in the subjects of novel container materials, corrosion in presence of irradiation, microbial effects, and corrosion in an evolving nearfield environment. The meeting closed with a common session on modelling and integration of the results for performance assessment of SF/HLW containers. One of the central aims of the meeting was to plan and coordinate the final year of the work. After 2 years of only online meetings, it was an excellent opportunity to finally meet friends and colleagues, and to be able to sit together and have exchanges on the latest experimental outcomes of the programme.



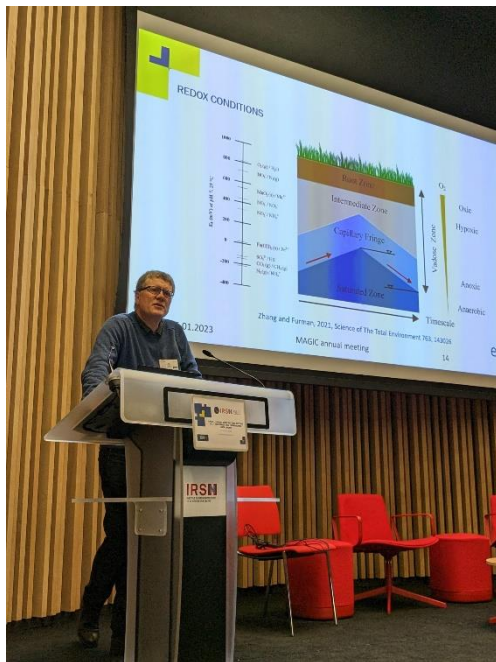


A look back

CHEMO-MECHANICAL AGING OF CEMENTITIOUS MATERIALS (MAGIC): TWO-DAY ANNUAL MEETING IN FONTENAY-AUX-ROSES, FRANCE

For the second MAGIC annual meeting, a two-day hybrid meeting was organized by IRSN in Fontenay-aux-Roses, France and Teams on 24-25 January 2023. Around 50 people took part in the meeting, 33 in-person and an average of 15 online. During the first day, the overall progress of the work package was presented and a workshop to update experimental data was organised, the second day was dedicated to a workshop on microbiology and a session on diversified technical and non-technical discussions.

The presentations made in the “experiment/modelling” workshop, in the task description and in the “young researchers” session with the ensuing discussions, provided a good overview of MAGIC’s current progress: with a systematic focus on the impact of chemical changes in cementitious materials on mechanical properties (Young modulus, cracking, compressive strength...) considering all relevant period in the life of a geological disposal (operating and long-term phases). A major effort was also made by a large number of partners by adding inputs on the Interactive Data Platform on Cement (IDPC) platform, a tool enabling data/results sharing and discussion between partners.



Jon Lloyd (University of Manchester) presenting the “Assessment of microbial populations likely to be encountered in geological disposals and which may create problems for concrete structures” during the microbiology workshop.

The European Commission carried out a mid-term review of the EURAD program and highlighted the lack of a microbial influence description that led to organize a workshop on microbiology during the annual meeting (non-planned initially in the road map of MAGIC). Several presentations given entitled “Knowledge synthesis on the microbial impact on cementitious materials in various contexts” or “Preliminary studies on the degradation of concrete due to microbial activity in geological disposals” enabling to share with all partners in MAGIC the current state of the art about their potential to accelerate chemical processes likely to generate mechanical damages. Discussions at the final session of this workshop were useful to prepare the “Chemistry and Microbiology” topical session organized jointly with ACED, CONCORD and MAGIC Work Package Leaders in Cyprus in March 2023 at the 3rd annual EURAD event.

UPDATED STRATEGIC RESEARCH AGENDA !

The EURAD Bureau represents the interests of the 3 Colleges and coordinates the strategic developments of the EURAD joint programme. One of the strategic milestones of EURAD was the update of its Strategic Research and Knowledge Management Agenda (SRA). This SRA is the basis of the joint programme as it paves the way for deploying new joint activities.

the 3 Colleges of EURAD and representatives of the PREDIS project, who provided valuable inputs to the process in several position papers and dedicated workshops. Views from Waste Generators and Civil Society Organisations were also considered in this process. The process was completed beginning of 2023 and the updated SRA (EURAD Deliverable D1.9) was formally delivered in March 2023.



The SRA update process (formally issued as EURAD Deliverable D1.8 in February 2022) was developed in 2021 by the Bureau, in close collaboration with the EURAD Project Management Office (PMO) and the organisations coordinating the Colleges (EURADSCIENCE, IGD-TP and the SITEX.Network for the RE, WMO and TSO Colleges, respectively). The update process, consisting in a consensus building approach, was then followed. It involved



This exercise was a major challenge for the EURAD Bureau and the Colleges. It was probably the most intense joint programming activity of EURAD, as it required a delicate consensus on the strategic needs of the actors for the future, including the identification of joint drivers behind these needs, respecting the EURAD vision and Roadmap, and considering the advancement of waste management programmes in Member States. The present SRA update reaffirms the willingness of the EURAD Colleges to work together, while respecting the independence of their missions, for the future of EURAD. This success gives confidence in EURAD's ability to meet its next major challenges, such as the on-going preparation of a second EURAD implementation phase.



Overview of the EURAD School of Radioactive Waste Management Mobility Programme

The School of Radioactive Waste Management launched its [Mobility Programme](#) in April 2020. The intention of the EURAD Mobility Programme is to financially support both junior and senior professionals, as well as PhD students from EURAD beneficiaries to visit infrastructures, undertake internships/exchange programmes between institutions which are active in radioactive waste management (RWM), follow training courses (life-long learning) in the field of RWM, and attend conferences/workshops in the field of RWM. These activities should serve competence building for the trainee and improve collaboration between EURAD beneficiaries. Mobility actions can also be seen as being complementary to training courses and/or part of a Continuous Personal Development (CPD) programme.

Since its launch, the Mobility Programme has received 72 applications, of which 47 were eligible for evaluation. The figure below shows the evolution of the number of eligible applications over the course of the four years the Mobility Programme has been running (figure 1). **Of the 47 applications 43 were approved, a success rate of 91.5%!**

The number of eligible applications steeply increased following the COVID-19 pandemic

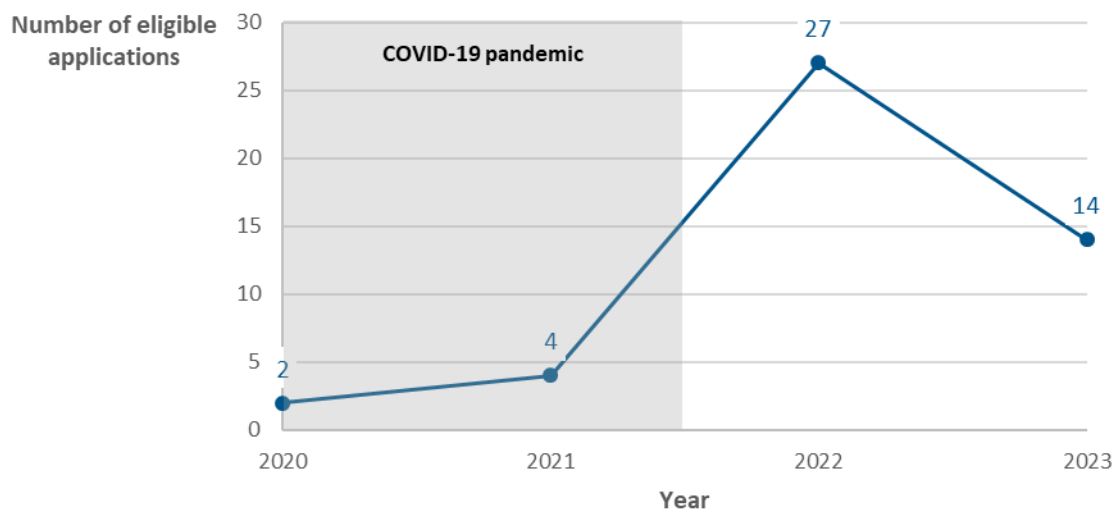


Figure 3 The number of eligible applications has steeply increased (by 675% in 2022) following the COVID-19 pandemic

When looking in more detail, we see that there are more men (60%) that apply compared to women (40%) (figure 2). Despite this difference, the gender balance per year is quite balanced, except for 2022. This indicates that both men and women are actively looking for financial support from the Mobility Programme.

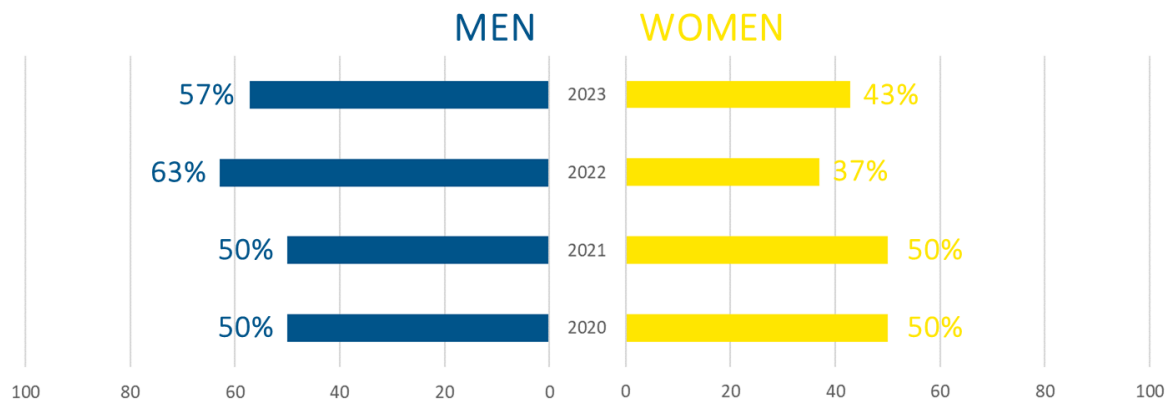


Figure 4 Comparison of the number of eligible mobility applications between the two genders reveals that there are slightly more men (60%) applying than women (40%). However, the number of applications per year is quite evenly distributed among them.

Finally, WP13 made an overview of the number of applications per EURAD WP and mobility type. Here, it becomes clear that most mobility actions are organised within the same work package. By comparison there are very few mobility actions between work packages. Between those two extremes, attending training courses and conferences/workshops are represented equally, representing 51% of the total number of eligible applications (figure 3).

Most mobility applications are performed within the same work package, less between work packages

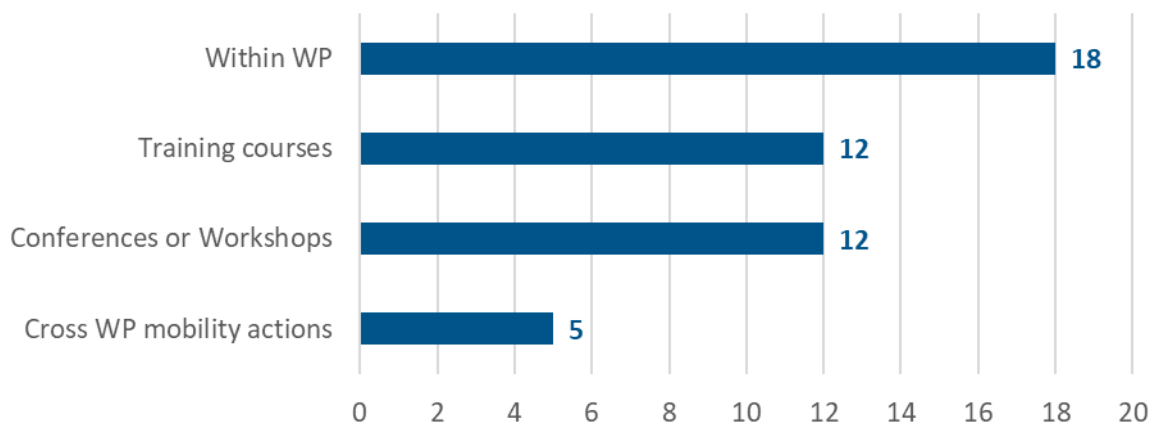


Figure 5 Most mobility applications are performed within the same work package, less between different work packages. The number of applications to attend training courses and conferences/workshops are evenly distributed between the aforementioned extremes.

When zooming in on the 'within WP' category, it becomes clear that most technical WPs have submitted an equal amount of mobility applications. However, most applications were submitted for performing mobility actions within the GAS and CORI WPs (figure 4).

Most mobility applications were submitted by the GAS and CORI work packages

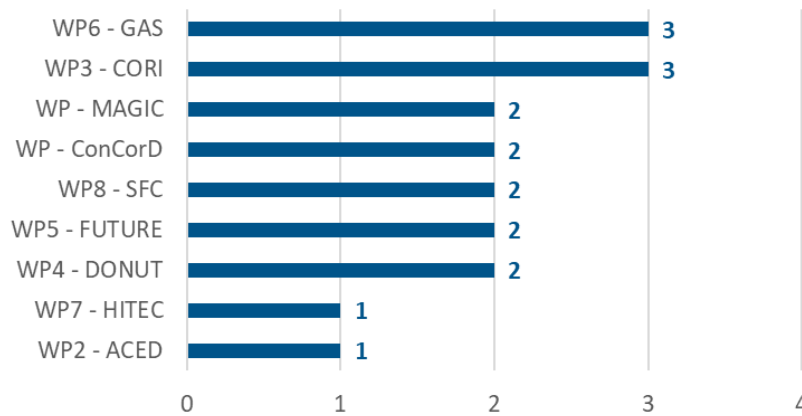


Figure 6 Most mobility applications were submitted by the GAS and CORI work packages, although the difference between them and the other technical work packages is minimal.

In conclusion, the EURAD Mobility Programme has known a difficult start in 2020, but has known a steep increase in success from 2022 on. Both genders are well represented among the mobility applicants, seeing slightly more men (60%) than women (40%) applying. Most technical work packages have requested at least one mobility action since 2020. Despite this, mobility actions between work packages prove to be less popular than initially thought. Since including the opportunity to be financially supported for attending training courses, conferences, and workshops, the number of applications for these categories has quickly increased. Currently, they make up 51% of all eligible applications, which proves that there is a real need from the community to have financial support to attend these events.

Finally, WP13 wants to remind all readers that the next application deadline is June 30th 2023. To apply, you can visit the [online application platform](#).

Information and discussion session on the SoK document on HLW/SF Containers (Domain 3.2.1)

On the 5th of June 2023, Fraser King, one of the five authors of the high Level waste (HLW)/spent fuel (SF) containers State-of-Knowledge (SoK) document ([Domain 3.2.1](#)) provided valuable insights during an information and discussion session jointly organised by WP13 Training and Mobility and WP11 State-of-Knowledge. The document addresses various aspects of container design and long-term performance. Specifically, it focused on the design and performance of “conventional” container materials, such as carbon steel, copper, titanium, and nickel alloys, including a discussion on copper-coated designs. The presentation covered topics such as safety functions, performance targets and container requirements, container material, environmental and mechanical conditions, container design and fabrication, post-closure corrosion, and lifetime prediction of containers. During the second part of the session, participants had the chance to actively engage with the speaker by asking questions and initiating discussions. This training session was open to all, especially those interested in EURAD SoK documents and HLW/SF containers.

The event was hosted online via Microsoft Teams and about 50 people attended the session live. For those who missed the live session or wish to revisit it, the recording is now available online at the EURAD School website (<https://euradschool.eu/eurad-training-course-recordings/>). You can still submit questions using the ‘question balloon’ button at the bottom right. These questions will be forwarded to the presenter. Additionally, it is also possible to download the presentation slides ([here](#)).

On behalf of WP11 and WP13, we express our gratitude to Fraser King and the other authors for sharing their expertise and to all the participants who made the event a success.

EURAD and PREDIS working together

The EURAD PMO, represented by Paul Carbol and Tara Beattie, attended the PREDIS Annual Workshop in Mechelen, Belgium, 23rd-25th May 2023. We exchanged and presented key achievements where EURAD and PREDIS have been working together – most notably the recent update to the [EURAD SRA 2023](#) – now available, which contains an overview of some of the more detailed RD&D needs communicated in the recently published [PREDIS SRA](#). Also, we exchanged on Knowledge Management and how EURAD and PREDIS experts are working together to populate the EURAD Roadmap. So far we have attracted top talent from across the RWM community to support this important work, but still have some domains where we seek expert authors – procurement and supply chains / design requirements, specifications and qualification / pilot-scale, full-scale testing and active commissioning / robotics / digital twin / safeguards / physical security / regulatory licensing / criticality safety / accident safety. If interested to support knowledge capture on any of the above listed domains, please get in touch with the EURAD PMO PMO@ejp-eurad.eu



Furthermore, the date and event place for joint EURAD-PREDIS summer school on Waste Acceptance Criteria's/Systems was settled at the PREDIS workshop. It will be hosted by Rež Research Centre and take place in Prague (Czech Republic) on 4-8 September 2023. The registration is open for both [EURAD](#) and [PREDIS](#) participants. The training is limited to 60 places.



Now published

Training materials (D2.3, D4.3, D10.1 and D15.3) – [Link \(D2.3 and 4.3\)](#) / [Link \(D.10.1\)](#) / [Link \(D15.3\)](#)

Those reports provide an overview of training materials linked to ACED, DONUT, UMAN and ConCorD work packages.

ACED – HLW Characterisation of glass/steel/buffer interaction experiments (D2.12) – [Link](#)

ROUTES - Review of radioanalytical characterisation of selected radioactive wastes and wastes with complex chemical and toxic properties (D9.7) – [Link](#)

Collection and analysis of actual existing knowledge about disposal options for SIMS (D9.10) - [Link](#)

Report presenting the results of the workshop dealing with possible conditioning routes for SIMS (D9.11) - [Link](#)

UMAN- Views of actors on identification and significance of uncertainties on site and geosphere (D10.7) – [Link](#)

State-of-Knowledge – Domain Insights

- Cemented LL-ILW (3.1.3) – [Link](#)
- Novel Containers (3.2.3) - [Link](#)

Guidance – Quality Management Procedure for Guidance Development (D12.2) - [Link](#)

Training - Implementation of first training courses developed and implemented depending on the priorities identified and approved within the EJP (D13.6) - [Link](#)

Several open publications linked to EURAD work packages are also available under the Publications section on [EURAD website](#):

- An absolute measurement of the neutron production rate of a spent nuclear fuel sample used for depletion code validation
- Note on the potential to increase the accuracy of source term calculations for spent nuclear fuel



Did you know?

You missed EURAD third annual event? You were there but you were not able to attend all our sessions?

Do not hesitate to check the summary of the event which is now available on EURAD website in the Publications section!

Click [here](#)



Upcoming events

JULY

11: [EURAD-2 public webinar #2](#)

24-27: EURODAY 2023

AUGUST

28-01/09: 2nd GAS/HITEC Joint Training course

SEPTEMBER

4-8: Summer School on WAC w/ PREDIS

13-15: SAFE ND 2023

23: TDB Project Course

24-29: Migration Conference



Workshop "Assessing the long-term evolution of EBS of waste disposal systems"

A joint workshop is organized from **08 to 10 November, 2023** by the workpackages ACED (Assessment of Chemical Evolution of ILW and HLW Disposal Cells) and DONUT (Development and improvement Of NUmerical methods and Tools for modelling coupled processes) within the project EURAD (European Joint Programme on Radioactive Waste Management).

We invite both partners and end-users from inside EURAD and interested partners from outside EURAD to submit an abstract and participate to the workshop.

The workshop will be aimed at exchanging state-of-the-art knowledge on:

- Gaining phenomenological understanding of processes at interfaces
- Modelling alterations at interfaces
- Modelling coupled process at larger scale
- Model abstraction, application in sensitivity and uncertainty analysis
- Machine learning in coupled reactive transport modelling

Deadline for abstract submission: September 15, 2023

More information: <https://www.sckcen.be/fr/eurad>



Save the date

PREDIS project will organize its ending conference on June 3-7, 2024 in Avignon (France).

Stay in touch !



We are out there



eurad



Egis in the UK

11 627 abonnés
1 sem. • Modifié

[Event] Great to see our [Galson Sciences Limited](#) (GSL) team join representatives from 12 countries at the EURAD ROUTES project meeting in Vienna last week to discuss waste management interactions between Large Inventory Membe ...voir plus

Voir la traduction



Vous et 63 autres personnes

3 replications

vous avez retweeté



Fisicoquímica de Actínidos y Productos de Fisión @FFfision · 4 mai ...
Hoy @carlasotoruiz, estudiante de doctorado de @fffision @CIEMAT_OPI, ha participado al XI Congreso Científico de Personal Investigador en Formación, presentando los primeros resultados de su tesis. ¡Enhorabuena! #ConCord @EJP_EURAD



c

European Joint Programme on Radioactive Waste Management a republié ceci



Ursula Alonso de los Rios · 1er

Permanent Researcher
22 min •

Happy to complete three fantastic days hosting at [CIEMAT](#) - Madrid the "2nd Annual Meeting of the project ConCorD (Container Corrosion under disposal conditions) of [European Joint Programme on Radioactive Waste Management EURAD](#). ...voir plus

Voir la traduction



5

1 replication

vous avez retweeté



David García Cobos @dgc147 · 9 mai

First day of WP CORI within [@EJP_EURAD](#) [@EU_Commission](#) is over. Nice presentations from WP leader and PMO office; outstanding work presented by Task 2 partners on organic compounds degradation in the frame of ILW disposal #Nuclear #Science #wastemanagement



2

4

125

