MIND: Microbiology In Nuclear waste Disposal
NEWSLETTER 5 – April 2018

*The **Microbiology In Nuclear waste Disposal (MIND)** programme is a unique multidisciplinary project which brings together a broad range of leading research institutions and stakeholders in the field of radioactive waste disposal to address the Euratom 2014–2015 Work Programme topic NFRP 6 – 2014: Supporting the implementation of the first-of-the-kind geological repositories.*

The aim with the project is to contribute to a more complete and realistic safety case and to communicate the effects that microbiological processes will have on the geological disposal of intermediate and high level radioactive wastes.

Content of this Newsletter

For more information please contact: mind15@skb.se
or visit our webpage: www.mind15.eu
Follow us on Twitter: @mindh2020

This project has received funding from the Euratom research and training programme 2014–2018 under grant agreement No. 661880

1. Implementers' review board (IRB)

The IRB evaluates the progress of the MIND project by following the project on the webpage, reviewing and participating in discussions of the outcome at the yearly project meetings (PAM). The IRB consists of representatives from SKB, ANDRA, NWMO, NIRAS/ONDRAF, RWM, Nagra, Posiva, TVO, NUMO and SURAO. Other organizations that officially are following the project are: IRSN, CNSC and LANL.

Chair of IRB and technical coordinator.
Photo: Daniel Svensson

Actions

After PAM2 in Prague the IRB created a GAP-list that was circulated among the members of the IRB for comments and additions.

The chair of the IRB, Johan Andersson, had a follow-up meeting with the WP-leaders and coordinators in November 2017. The list was compared with the accomplishments within the MIND project so far and with the Grant Agreement. It turned out to agree very well with what has been done and what is currently being done.

The purpose with the IRB is to:

- Advice the project with critical evaluation concerning research quality and significance of outputs.
- Highlight opportunities for networking with other international research activites and raise awareness of our research programme where appropriate.

Next workshop

Next workshop is organized by the IRB and will be focussed on the assessment of the high-priority (priority 1-3) issues:

i) Degradation of: **organic waste**, isosaccharinic acid, ion exchange resins, dissolved or solid organic matter present in bentonite i.e. acetogenesis. ii) **Gas**: Pressure build up and chemical reaction. C-14 speciation. Oxyanions (i.e. nitrate, sulphate, carbonate) and organic substances. iii) Chemical reactions affecting redox potentials and associated overall geochemistry. iv) **Radionuclides.** Speciation and mobility. v) **Steel/ copper** (canister). **Sulphate reduction** and other redox reactions. vi) Bentonite. Redox reactions and **clay stability**. vii) Ionic strength. Metabolic activities in salt solutions (salt from host rock or waste component). viii) Water/space availability. Metabolic activity in low porosity environments (i.e. bentonite, host rock), ix) **pH**. Alteration. Very localised conditions could 'sustain' microbial life even though the general conditions do not. x) **Saturation**. Some repository scenarios may have long unsaturated phases.

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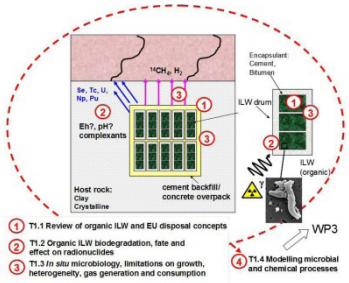
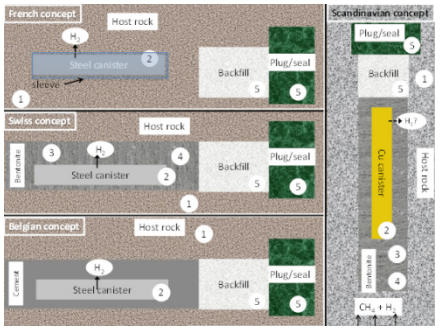
2. Scientific workpackages



http://www.mind15.eu/work-packages/wp-1/



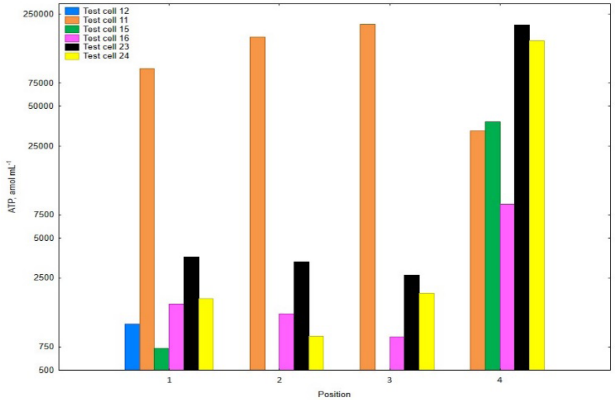
http://www.mind15.eu/work-packages/wp-2/

Progress

All tasks are progressing according to plans. There will be several deliverables coming by the end of May, after the annual project meeting in Lausanne.

Research Highlight

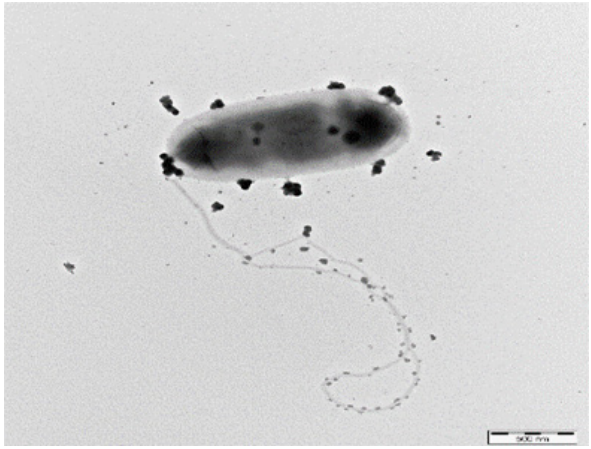
The effect of concrete on viability of bacteria in betonite has been investigated by Micans. The experiments indicate lower viability, analysed as ATP concentration, in vicinity to a concrete plug compared to positions further away from plugs.



Position 1 is closest to the concrete, and orange bars represent experiments without concrete. (Note exponential y-axis).

Research Highlight

The effect of caesium ions on anaerobic microbial community from undeground source was studied at RCR/TUL. The microbes were exposed to different concentrations of Cs+ ions (0.5, 1 and 5 mM) for 23 days under strictly anaerobic conditions. The results from qPCR, LIVE/DEAD cell staining and TEM analyses revealed growth promoting effect of the low Cs+ concentration and lethal effect of the highest Cs+ concentration.



TEM image showing bacteria in 0.5 mM Cs+ after eight days. Scale bar 500 nm.

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3. Work Package 3:

Evaluating and Sharing the Knowledge

Results obtained from work package 1 and 2 will be ensured of proper contextualization, while remaining key topics will be extracted by maintaining an active dialogue with stakeholders. The knowledge will be distributed to a broad audience, taking into account conceptualisation and perception issues.

http://www.mind15.eu/work-packages/wp-3/

Progress

After comparing the different bioinformatics analysis procedures used by several MIND partners to analyse microbial communities, 5 MIND partners contribute to an experiment in which different DNA extraction protocols are compared. To this end, EPFL distributed Opalinus Clay spiked with a cell mock community provided by SCK•CEN to the different partners. Extracted DNA samples were send back to EPFL, who amplified the 16S RNA amplicon and send it for sequencing. Finally, SCK•CEN will analyse the sequencing data. Results will be presented at the next PAM meeting by EPFL.

Social Science team of SCK•CEN involved in the MIND project will organize this year two workshops: one will be held at the University of Antwerp (Antwerp, Belgium) were findings elicited thus far within the MIND project will be presented to lay persons. And another one “Open up your MIND” where experts will discuss expert conceptualization and public perception.

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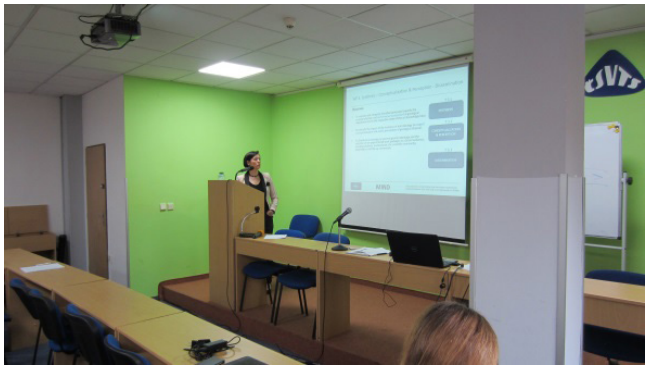


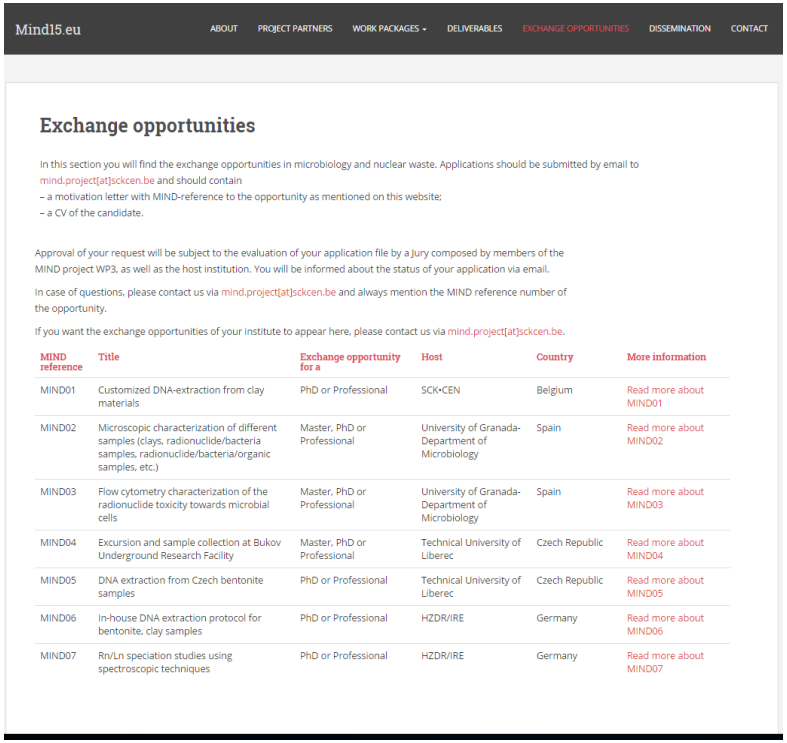
Photo: Birgitta Kalinowski

http://www.mind15.eu/work-packages/wp-3/

Progress

In 2016, an exchange programme was set up for Master and PhD students, as well as professionals. Carefully selected internship topics are made available by the MIND partners. From November 12th until 17th, 2017, Hanna Miettinen, senior scientist from VVT Technical Research Centre of Finland Ltd, performed a MIND exchange with the University of Granada. 'My exchange in the University of Granada was great' summarized her exchange experience. Check out the different exchange opportunities on the MIND website and send your students and colleagues abroad to take their knowledge, skills and competences in geomicrobiology to the next level!

The advanced training course: Geomicrobiology in radioactive waste disposal will be organized from October 8–11, 2018 at SCK•CEN (Mol, Belgium). Participation is free of charge and mobility grants are available via the ENEN+ project. See attached flyer for more information and on the website: http://academy.sckcen.be/en/Customised_trainings/Calendar



Mind15.eu ABOUT PROJECT PARTNERS WORK PACKAGES DELIVERABLES EXCHANGE OPPORTUNITIES DISSEMINATION CONTACT

Exchange opportunities

In this section you will find the exchange opportunities in microbiology and nuclear waste. Applications should be submitted by email to mind.project[at]sckcen.be and should contain
– a motivation letter with MIND-reference to the opportunity as mentioned on this website;
– a CV of the candidate.

Approval of your request will be subject to the evaluation of your application file by a Jury composed by members of the MIND project WP3, as well as the host institution. You will be informed about the status of your application via email.

In case of questions, please contact us via mind.project[at]sckcen.be and always mention the MIND reference number of the opportunity.

If you want the exchange opportunities of your institute to appear here, please contact us via mind.project[at]sckcen.be.

MIND reference	Title	Exchange opportunity for a	Host	Country	More information
MIND01	Customized DNA-extraction from clay materials	PhD or Professional	SCK•CEN	Belgium	Read more about MIND01
MIND02	Microscopic characterization of different samples (clays, radionuclide/bacteria samples, radionuclide/bacteria/organic samples, etc.)	Master, PhD or Professional	University of Granada-Department of Microbiology	Spain	Read more about MIND02
MIND03	Flow cytometry characterization of the radionuclide toxicity towards microbial cells	Master, PhD or Professional	University of Granada-Department of Microbiology	Spain	Read more about MIND03
MIND04	Excursion and sample collection at Bukov Underground Research Facility	Master, PhD or Professional	Technical University of Liberec	Czech Republic	Read more about MIND04
MIND05	DNA extraction from Czech bentonite samples	PhD or Professional	Technical University of Liberec	Czech Republic	Read more about MIND05
MIND06	In-house DNA extraction protocol for bentonite, clay samples	PhD or Professional	HZDR/IRE	Germany	Read more about MIND06
MIND07	Rn/Ln speciation studies using spectroscopic techniques	PhD or Professional	HZDR/IRE	Germany	Read more about MIND07

Screenshot of the available MIND exchange opportunities for Master and PhD students, as well as professionals.

http://www.mind15.eu/exchange_table

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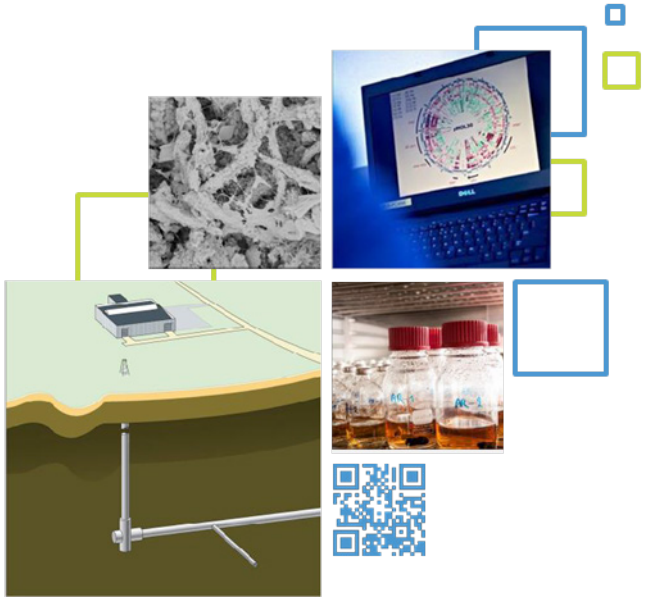
SCK•CEN ACADEMY
FOR NUCLEAR SCIENCE AND TECHNOLOGY

Advanced training course

Geomicrobiology in radioactive waste disposal

October 8 -11, 2018



For scientific/technical issues	For practical issues
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SCK•CEN Academy project collaborator	SCK•CEN Academy liaison officer
✆ + 32 14 33 21 56	✆ + 32 14 33 21 57
e-mail : tom.clarijs@sckcen.be	e-mail : academy@sckcen.be
Training course website: http://academy.sckcen.be	

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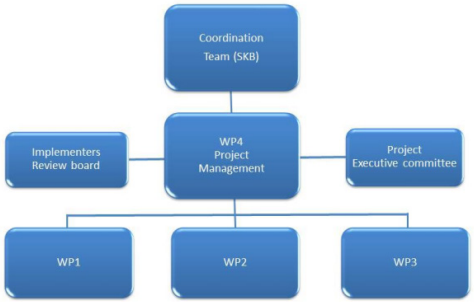
Work Package 4:

Project Management

The principal task for this work package is the compliance of the project with the provisions of the European Commission (EC) as defined in the Grant Agreement and the Consortium Agreement by ensuring that the consortium complies with the rules on decision-making as defined in the Consortium Agreement.



http://www.mind15.eu/work-packages/wp-4/

Project Annual Meeting

The third PAM will take place in Lausanne, Switzerland, May 7–9th. It will be hosted by the University of Lausanne. The focus of the meeting will be on the achievements in accordance with the evaluation of research gaps concerning Microbiology in Nuclear Waste Disposal. A GAP-list based on this, compiled by the Implementers Review Board, IRB, will be addressed.

Workshop with focus on GAP-list

May 7rd

12:00–12:30 Registration
12:30–12:40 Welcome and introduction
12:40–13:00 Plenary
13:00–16:30 GAP-workshop
16:30–17:00 Oral poster presentations
17:00–18:00 IRB-meeting/ Sequencing meeting
18:00–20:00 Icebreaker and Poster session

Scientific sessions

May 8th

08:15–11:50 WP 1 session
11:50–12:50 Lunch
12:50–16:10 WP 2 session
16:10–17:00 IRB and PEC meeting
17:00–20:00 Cathedral guided tour and Lausanne walking tour
20:00– Conference dinner

May 9th

08:30–11:30 WP 3 session
11:30–12:30 Lunch

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