

Interdisciplinary research symposium

On the safety of nuclear disposal practices 2021

Technical and Social Approaches to Managing
the Hazardous Legacy of Nuclear Power Generation



| Time | Wednesday, November 10 | | |
|---------------|---------------------------------|--|---|
| 09:00 - 09:10 | Welcome | C. Hamann (Head Press and Public Relations, BASE) | DE/EN |
| 09:10 - 09:20 | P l e n a r y | Introduction to symposium safeND | J. Ahlswede (Head Division General Research, BASE) DE/EN |
| 09:20 - 10:00 | | Interdisciplinary perspectives in research for nuclear safety | B. Reichert (Head of Working Group Hydrogeology, University of Bonn), K. Kalmbach (Head of Strategy and Content, Futurium Berlin) & J. Birkholzer (Energy Geosciences Division Director, LBNL) Moderation: C. Hamann DE/EN |
| 10:00 - 10:20 | Coffee break | | |

Plenary

Room 1

Room 2

WORKSHOP WS III DE
Public opinion in the site selection process: survey methodologies
Organizers: Z. Felder (BASE) & A. Breyer (BASE)

SESSION 2A EN
Site selection - methods and overviews Part I
Chairs: W. Hund (BGE) & T. Vietor (NAGRA)

SESSION 4B EN
From decades of international Research, Development and Demonstration to a sustainable knowledge and information management Part I
Chairs: C. Bunzmann (BASE) & S.-J. Mayer (IAEA)

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|---------------|--|--|---|
| 10:20 - 10:40 | <ul style="list-style-type: none"> Introduction (Z. Felder, BASE & A. Breyer, BASE) Impuls presentation about methodic and results of the project EWident (S. Götte, aproxima) | Site selection for the best clay-hosted repository in Switzerland (T. Vietor, NAGRA) | Knowledge Management in the Federal Company for Radioactive Waste Disposal (G. Hoefler, BGE) |
| 10:40 - 11:00 | <ul style="list-style-type: none"> Impuls presentation about methodic and results to gather trust within the project TRANSENS (R. Seidl, University Hannover) | Can a repository site be safer than safe? – Criteria and methods for a safety-oriented comparison of repository sites (M. Navarro, BASE) | IAEA capturing State of Knowledge and developing high level guidance in Radioactive Waste Management (S.-J. Mayer, IAEA) |
| 11:00 - 11:20 | <ul style="list-style-type: none"> Discussion | Section 14 StandAG – identification of siting regions and associated challenges (W. Rühaak, BGE) | Comparing two concepts of the OECD-NEA RK&M Initiative (2011–2019): The Set of Essential Records (SER) and the Key Information File (KIF) (S. Hotzel, BASE) |

Topics

1 Decommissioning of nuclear facilities & Storage of radioactive waste

2 Disposing of High-level as well as low- and intermediate-level radioactive waste & Selecting a repository site

3 Participation processes for projects involving nuclear safety and disposal & Communications and sociotechnical aspects related to nuclear disposal

4 Interdisciplinary and cross-cutting aspects related to nuclear disposal

Time **Wednesday, November 10**

11:20 -11:40 **Coffee break**

Plenary

Room 1

Room 2

SESSION 3C DE/EN
**Herausforderungen und
Lösungen bei der
Transdisziplinarität in der
Endlagerforschung**
Chairs: K.-J. Röhlig (TU Clausthal)
& J.-A. Othmer (TU Clausthal)

SESSION 2A EN
**Site selection -
methods and
overviews Part II**
Chairs: W. Hund (BGE)
& T. Vietor (NAGRA)

SESSION 4B EN
**From decades of
international Research,
Development and
Demonstration to a
sustainably knowledge and
information management
Part II**
Chairs: C. Bunzmann (BASE)
& S.-J. Mayer (IAEA)

11:40 - 12:00

Applied transdisciplinary basic research about nuclear waste management: Hollow phrase or sensible concept? (K.-J. Röhlig, TU Clausthal)

Claystone formations in Germany: what we (don't) know about them and how we can change this (B. Schuck, BGR)

Introduction to EURAD and roadmap (P. Zuidema, Zuidema Consult)

12:00 - 12:20

Improving Participation for the German Search for a Nuclear Waste Repository Site: a WebGIS as a Transdisciplinary Approach to Support Dialogue? (P. Bräuer, University Kiel)

Methods for safety-related weighting and comparative assessment in the site selection process (MABeSt) (G. Frieling, BASE)

State-of-Knowledge & Guidance in EURAD Knowledge Management (A. Göbel, BGE)

12:20 - 12:40

A citizens' workgroup helps researchers reflecting their work (R. Seidl, University Hannover)

Preliminary safety assessments in the high-level radioactive waste site selection procedure in Germany (W. Rühak, BGE)

EURAD School of Waste Management (N. Belmans, SCK-CEN)

12:40 - 13:00

Geoscientific Characterisation and Interpretation (Geosynthesis) within the Preliminary Safety Assessment in the German Site-Selection Procedure for a High-Level Nuclear Waste Repository (S. Reiche, BGE)

Transdisciplinary research on Repository Safety: Challenges and Opportunities (K.-J. Röhlig, TU Clausthal)

Including civil society in R&D projects on Radioactive Waste Management: Interactions with Civil Society (ICS) in EURAD (J. Dewoghelaere, Mutatis)

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Time **Wednesday, November 10**

13:00 - 14:00 *Foyer* **Lunch**

Plenary

Room 1

Room 2

SESSION 2D *EN*
**Deep geological disposal –
understanding processes in
the multi-barrier system
Part I**
Chairs: J. Birkholzer (LBNL)
& B. Reichert (University
Bonn)

WORKSHOP WS V *DE*
**Interdisciplinary
workshop on safety and
uncertainties –
engineering approaches
embedded in the social
context Part I**
Organizers: A. Eckhardt
(risicare), T. Hassel
(University Hannover),
V. Mintzlaff
(TU Brunswick),
K.-J. Röhligh (TU Clausthal),
J. Stahlmann
(TU Brunswick)

SESSION 4C *EN*
**Alternative waste
management options: an
overview and state of the
art**
Chairs: J. Ahlswede (BASE)
& P. Zuidema (Zuidema
Consult)

14:00 - 14:20
Can We Safely Go to 200
degrees C? An Integrated
Approach to Assessing
Impacts to the Engineered
Barrier System in a High-
Temperature Repository
(J. Birkholzer, LBNL)

14:20 - 14:40
An interdisciplinary view to
the long-term evolution of
repository systems across
scales: the iCROSS project
(H. Geckeis, KIT)

14:40 - 15:00
Simulating the feedback
between corrosive gas
generation and water
availability for the
evaluation of radionuclide
mobility in the context of
radioactive waste disposal
(L. Wissmeier, CSD)

- Introduction (A. Eckhardt, risicare)
- Impulse presentation (V. Mintzlaff, TU Brunswick) about geological and geotechnical barriers
- Impulse presentation (T. Hassel (University Hannover) about technical barriers (canisters)
- Discussion

Alternative Disposal
Options for High-Level
Radioactive Waste

(M. Englert, Oeko-Institute)

Einschätzung der
Partitionierung und
Transmutation hoch-
radioaktiver Abfälle und
hypothetische Szenarien
für Deutschland
(F. Frieß, BOKU)

Deep borehole disposal of
intermediate-level waste
(D. Mallants, CSIRO)

15:00 - 15:20 **Coffee break**

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1 Decommissioning of
nuclear facilities &
Storage of radioactive
waste

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as low- and intermediate-level
radioactive waste & Selecting a
repository site

3 Participation processes for projects
involving nuclear safety and disposal &
Communications and sociotechnical aspects
related to nuclear disposal

4 Interdisciplinary and
cross-cutting aspects
related to nuclear
disposal

Time **Wednesday, November 10**

Plenary

Room 1

Room 2

SESSION 2D EN
Deep geological disposal – understanding processes in the multi-barrier system Part II
Chairs: J. Birkholzer (LBNL) & B. Reichert (University Bonn)

WORKSHOP WS V DE
Interdisciplinary workshop on safety and uncertainties – engineering approaches embedded in the social context Part II
Organizers: A. Eckhardt (risicare), T. Hassel (University Hannover), V. Mintzloff (TU Brunswick), K.-J. Röhlig (TU Clausthal), J. Stahlmann (TU Brunswick)

SESSION 4E EN
Long-term preservation – Interdisciplinary perspectives
Chair: D. Möller (BASE) & Heinz-Joachim Schaffrath (TU Darmstadt)

15:20 - 15:40
Combining innovative experimental approaches and cross-scale reactive transport modelling for assessing coupled hydro-geochemical processes at interfaces in deep geological repositories for radioactive wastes (J. Poonosamy, FZ Jülich)

- Thematic classification by I. Kock (BASE) and D. Dehmer (BGE) with discussion
- Impuls presentation by R. Seidl (University Hannover) and a representative of the working group “Population” of the project TRANSENS with discussion
- Synthesis (K.-J. Röhlig, TU Clausthal)

Stress factor human activities
(A. Eckhardt, risicare)

15:40 - 16:00
Investigation of Percolation-Driven Fluid Transport in Rock Salt Under Repository-Relevant Conditions (PeTroS) (C. Lüdeling, IfG)

Issues of long-term durability of paper – Labest Papier
(H.-J. Schaffrath, TU Darmstadt)

16:00 - 16:20
In situ corrosion of canister materials in bentonite: the IC-A experiment at Mont Terri (N. Diomidis, NAGRA)

Long-term Information about Nuclear Waste: 100.000 years and beyond
(M. Kunze, MOM)

16:20 - 16:40
Evaluation of the corrosion behaviour of modern spent nuclear fuels under repository conditions
(P. Kegler, FZ Jülich)

Lessons from archaeology and heritage studies for the long-term preservation of records, knowledge and memory concerning deep geological disposal sites for nuclear waste
(C. Holtorf, Linnaeus University)

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| | | |
|---|---|---|
| <p>POSTER</p> <p>online- platform: https://sympo- sium- safend.de</p> | <ul style="list-style-type: none"> ▪ 2A Site selection – methods and overviews ▪ 2B Surface exploration methods ▪ 2C Tectonics and geomechanics of the potential host rocks for nuclear waste ▪ 4A Activities in international research programs and collaborations <p>Chair: R. Kühn (University Halle) EN</p> | <ul style="list-style-type: none"> ▪ 2E Advances in designing geotechnical barrier materials ▪ 2F Chemistry and migration behaviour of radionuclides <p>Chair: A. Liebscher (BGE) EN</p> |
| <p>17:00 -18:00</p> | <p>The European Joint Programme on Radioactive Waste Management EURAD: Update of it`s strategic research agenda (D. Bosbach, FZ Jülich)</p> <hr/> <p>Development of a database for the analysis of the disposal system in the representative preliminary safety analysis (E.-M. Hoyer, BGE)</p> <hr/> <p>Suitability of flat bedded salt formations in Germany as the site for a repository for heat-producing radioactive waste (T. Popp, IfG)</p> <hr/> <p>A systematic approach for surface exploration of sites – A database to research and evaluate suitable methods (R. Dlugosch, BGR)</p> <hr/> <p>Investigation of Surface Exploration Programmes for Hydrological, Hydrogeological and Hydrogeochemical Issues in the Site Selection Procedure (K. Haneke, Brenk Systemplanung)</p> <hr/> <p>Open Access database of stress magnitudes in Germany (S. Morawietz, GFZ Potsdam)</p> <hr/> <p>Slip tendency analysis of major faults in Germany (L. Röckel)</p> <hr/> <p>The anisotropic properties of granites – effects of tectonic emplacement mode on potential crystalline host rocks for nuclear waste deposits in Germany (U. Kroner, TU Freiberg)</p> <hr/> <p>Permeability variation in crystalline rocks due to low-grade solution phenomena (R. Kilian, University Halle)</p> | <p>Compaction of crushed salt for the safe containment - Overview of the KOMPASS project (L. Friedenberg, GRS)</p> <hr/> <p>Deformation mechanisms and their microstructural indicators in the compaction of crushed salt as geotechnical barrier (K. Svensson, BGR)</p> <hr/> <p>Pilot plant tests to demonstrate the functionality of sealing elements made of salt cut bricks (U. Dusterloh, TU Clausthal)</p> <hr/> <p>Dissolution of simplified nuclear waste glass and formation of secondary phases (F. Brandt, FZ Jülich)</p> <hr/> <p>Impact of increased temperatures on the geochemical behaviour of trivalent actinides in aquatic systems (A. Skerencak-Frech, KIT)</p> <hr/> <p>THEREDA - Thermodynamic Reference Database (H. Moog, GRS)</p> <hr/> <p>Geochemical benchmark tests to validate the conversion of thermodynamic data for TOUGHREACT (T. Weyand, BASE)</p> <hr/> <p>Microscopic and spectroscopic investigations of uranium(VI) reduction by Desulfosporosinus hippei DSM 8344 (S. Hilpmann, HZDR)</p> <hr/> <p>Impact of the heterogeneity of the sandy Opalinus Clay facies at the Mont Terri underground research laboratory on radionuclide migration (N. Ait-Mouheeb, FZ Jülich)</p> |

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Time **Wednesday, November 10**

| | | | |
|---------------|----------------|--|---|
| 18:00 - 18:20 | <i>Plenary</i> | Closing with panel discussion about scientific highlights | T. Vietor (NAGRA) & D. Möller (BASE) Moderation: C. Hamann <i>DE/EN</i> |
| 18:20 - 20:00 | <i>Foyer</i> | Bowls & Fingerfood | |

Time **Thursday, November 11**

| | | | |
|---------------|----------------|--|---|
| 09:00 - 09:15 | <i>Plenary</i> | Opening with introduction about platform SaND and format "open forum" | C. Hamann (BASE), C.-R. Dietl (BASE) & W. Wartenberg (BASE) <i>DE/EN</i> |
| 09:15 - 09:40 | <i>Plenary</i> | Panel discussion about workshops | B. Laurich (BGR), I. Kock (BASE) & O. Sträter (University Kassel) Moderation: C. Hamann (BASE) <i>DE/EN</i> |

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Time **Thursday, November 11**

| | Plenary | Room 1 | Room 2 |
|---------------|--|--|---|
| 09:40 - 11:40 | <p>WORKSHOP WS II EN</p> <p>What do we need to trust in models? Organizers: I. Kock (BASE), M. Navarro (BASE), J. Eckel (BASE)</p> <ul style="list-style-type: none"> ■ Introduction by I. Kock (BASE) & M. Navarro (BASE) ■ Impulse presentation by I. Kock (BASE) "Best practices? Good practices!" ■ Impulse presentation by M. Navarro (BASE) "Beyond good practices? Building confidence in modelling results" ■ Discussion ■ Impulse presentation with discussion by T. Nagel (TU Freiberg) "Would Sherlock Holmes trust our models? Or experiments? A discussion starter." ■ Impulse presentation with discussion by K.-J. Röhlig (TU Clausthal) „We do not predict the future“ ... but what exactly are we doing? And how good is good enough? ■ Impulse presentation with discussion by W. Rühaak (BGE) "Trust in Models equals Trust in the Constitutive Assumptions?" ■ Wrap-Up | <p>WORKSHOP WS I EN</p> <p>Best-practice for laboratory testing of low-permeability materials Organizers: B. Laurich (BGR), J. Hesser (BGR), S. Mayr (BGR), L. Winhausen (RWTH Aachen), A. Ghanizadeh (University Calgary), A. Nitsch (University Bochum) J. Leuthold (KIT), C. Weber (BGR), G. Gaus (RWTH Aachen), S. Nolte (RWTH Aachen), P. Weniger (BGR)</p> <ul style="list-style-type: none"> ■ Impulse presentation by B. Laurich (BGR) "Overview of methods and relevance for testing low-permeable materials in the frame of nuclear waste disposal" ■ Impulse presentation by A. Nitsch (University Bochum) "How to asses permeability changes due to swelling of claystone" ■ Impulse presentation by J. Leuthold (KIT) ■ Impulse presentation by L. Winhausen (RWTH Aachen) "The pore pressure oscillation method as a proven tool for determining the hydraulic properties of low-permeable rocks" ■ Impulse presentation by G. Gaus (RWTH Aachen) "Transient gas flow measurements in low-permeable rocks: Which additional information can be obtained by utilization of multiple methods?" ■ Impulse presentation by C. Weber (BGR) "Coupled transport in permeability measurements" ■ Impulse presentation by A. Ghanizadeh (University Calgary) ■ Impulse presentation by J. Kulenkampff (HZDR) "Transport in tight material enlightened by process tomography" ■ Impulse presentation by S. Nolte (RWTH Aachen) "Experimental investigation of gas dynamic effects using a nanoporous, synthetic ceramic plug as tight rock analogue" ■ Open discussion | <p>WORKSHOP WS IV DE</p> <p>Transdisciplinary and psychology-ically resilient communication in the interaction of the stakeholders Organizers: P. Krütli (ETH Zürich), O. Sträter (University Kassel)</p> <ul style="list-style-type: none"> ■ Impulsvortrag von P. Krütli (ETH Zürich) und O. Sträter (Universität Kassel) ■ Rollenspiel mit Szenarien zur Beteiligung |

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Time **Thursday, November 11**

11:40 - 12:00 **Coffee break**

Plenary

Room 1

Room 2

SESSION 4A *EN*
**Activities in international
research programs and
collaborations**
Chair: H. Geckeis (KIT)

SESSION 2C *EN*
**Tectonics and
geomechanics of the
potential host rocks for
nuclear waste**
Chairs: M. Stipp
(University Halle) &
A. Henk (TU Darmstadt)

SESSION 2F *EN*
**Chemistry and migration
behaviour of radionuclides**
Chairs: K. Spahiu (SKB),
X. Gaona (KIT)

12:00 - 12:20
Twenty years of research
on spent nuclear fuel in
the context of final
disposal at KIT-INE in
multinational
collaborative projects
(M. Herm, KIT)

The SpannEnD project –
3-D stress prediction in
the upper crust of
Germany
(K. Reiter, TU Darmstadt)

Radionuclide
geochemistry: solubility
and thermodynamics in a
HLW repository
(D. Fellhauer, KIT)

12:20 - 12:40
The Grimsel test site –
more than 35 years of
underground research
(A. Martin, NAGRA)

Characterizing the
microstructural anisotropy
of fine-grained
phyllosilicate-rich rocks
(R. Kühn, University Halle)

Spatially resolved sorption
of Cm(III) on crystalline
rock: influence of surface
roughness and mineralogy
(M. Demnitz, HZDR)

12:40 - 13:00
International nuclear
material safeguards for
the final disposal of spent
nuclear fuel – why, what
and how
(I. Niemeyer, FZ Jülich)

Sub areas in steep rock
salt formations – what do
we know about the
geological composition of
North German salt
structures?
(L. Pollok, BGR)

Diffusive transport of
uranium and americium
through clay rock down to
ultra-trace levels
(D. Glückman, KIT)

13:00 - 13:20
International
collaboration in disposal
research: comparative
modeling of coupled
processes in the
DECOVALEX project
(J. Birkholzer, LBNL)

From process to system
understanding with multi-
disciplinary investigation
methods: set-up and first
results of the CD-A
experiment (Mont Terri
rock laboratory)
(G. Ziefle, BGR)

Cement as a component of
the multi-barrier system:
radionuclide retention in
cementitious environments
(X. Gaona, KIT)

13:20 – 14:20 *Foyer* **Lunch**

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nuclear facilities &
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Time **Thursday, November 11**

POSTER
online-
platform:
[https://sympo-
sium-
safend.de](https://sympo-
sium-
safend.de)

- **1A Interim storage of radioactive waste and spent nuclear fuel**
 - **1B Decommissioning of nuclear facilities**
 - **4D Interdisciplinary insights on decommissioning and disposal**
- Chair: S. Müller (KIT) **EN**

- **2D Deep geological disposal – understanding processes in the multi-barrier system**
 - **2G Numerical modelling for long-term safety analyses**
 - **4A Activities in international research programs and collaborations**
- Chair: K. Reiter (TU Darmstadt) **EN**

14:20 -15:20

Explanations for the development of a novel universally inside pipe separator for dismantling (contaminated) pipelines (M. Bachmann, KIT)

Developing a radiation-field-based monitoring system for the transport and storage cask inventory during extended interim storage (M. Stephan, HSZG)

Advances in distributed fiber optic radiation sensing (A. Wosniok, BAM)

Development and testing of a tool for the decontamination of corners and inner edges on concrete surfaces (S. Zhang, KIT)

Development of an automated milling system for the decontamination of the wall surface in a nuclear power plant (S. Kazemi, KIT)

Modelling of hydrodynamic and solute transport with consideration of the release of low-level radioactive substances (R. Winter, University Stuttgart)

What happens when the nuclear power plant goes? Social and economic consequences of dismantling for the site and its population (C. Kramer, KIT)

The European DISCO project: Deep geological disposal of modern spent nuclear fuel (D. Bosbach, FZ Jülich)

Overview of post-closure criticality safety RD&D topics in Switzerland (M. Wittel, NAGRA)

On the temperature in a final disposal site for high-level radioactive waste (U. Maurer-Rurack, BASE)

Mineral stability, brine development and rock-fluid reaction at repository-relevant temperatures (T<200°C) in the potential host rock rock salt (M. Mertineit, BGR)

Anaerobic corrosion of carbon steel in compacted bentonite exposed to natural Opalinus clay porewater: Bentonite alteration study (F. Heberling, KIT)

Development and quality assurance of computer programs for the review of long-term safety analysis (J. Eckel, BASE)

Open source software library for THM coupled processes in Python (C. Rucker, BASE)

Deciphering porosity clogging at barrier interfaces in deep geological repositories for radioactive waste (M. Lönartz, FZ Jülich)

Hydro-mechanical effects of seismic events in crystalline rock barriers (D. Kern, TU Freiberg)

Uncertainties in geomechanical models - exhaustive vs feasible approach (M. Ziegler, GFZ Potsdam)

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Time **Thursday, November 11**

15:20 - 15:40 **Coffee break**

Plenary

Room 1

Room 2

SESSION 2E DE/EN
Advances in designing geotechnical barrier materials Part I
Chairs: B. Laurich (BGR) & D. Bosbach (FZ Jülich)

SESSION 1A EN
Interim storage of radioactive waste and spent nuclear fuel Part I
Chairs: H. Völzke (BAM) & F.-N. Sentuc (GRS)

SESSION 3B EN
Nuclear social sciences Part I
Chairs: T. Keating (University Linköping) & L. Schwarz (FU Berlin)

15:40 - 16:00

Over thirty years research on crushed salt as barrier material: fundamental findings and open questions (K. Zemke, BGR)

Spectroscopic and chemical investigations on volatile fission and activation products within the fuel-cladding interface of irradiated pressurised water reactor fuel rod segments (T. König, KIT)

Justice in dealing with highly radioactive waste – an empirical perspective (L. Schwarz, FU Berlin)

16:00 - 16:20

SealWasteSafe: materials technology, monitoring techniques, and quality assurance for safe sealing structures in underground repositories (V. Lay, BAM)

Structural integrity investigations of spent nuclear fuel with finite element modeling (S. Pudollek, NAGRA)

Radioactive Waste Management Ethics and Public Policy: A Precautionary Approach (D. Oross & M. Eszter, Hungarian Academy of Sciences)

16:20 - 16:40

Michigan International Copper Analogue (MICA) project – current status (A. Liebscher, BGE)

Development of a mobile, automated, optical inspection system for radioactive barrels (T. Barretto, KIT)

A tentative useful-for-all definition of ‘safety’ in the context of radioactive waste disposal (S. Hotzel, BASE)

16:40 – 17:00 **Coffee break**

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| | Plenary | Room 1 | Room 2 |
|---------------|---|---|---|
| | <p>SESSION 2E DE/EN Advances in designing geotechnical barrier materials Part II Chairs: B. Laurich (BGR) & D. Bosbach (FZ Jülich)</p> | <p>SESSION 1A EN Interim storage of radioactive waste and spent nuclear fuel Part II Chairs: H. Völzke (BAM) & F.-N. Sentuc (GRS)</p> | <p>SESSION 3B EN Nuclear social sciences Part II Chairs: T. Keating (University Linköping) & L. Schwarz (FU Berlin)</p> |
| 17:00 - 17:20 | Methodology of structured development and validation of multiphysical constitutive models using the example of crushed salt compaction under 3D-THM load conditions (S. Lerche, TU Clausthal) | Actinides induced irradiation damage and swelling effect in irradiated Zircaloy-4 after thirty years of storage (M. Marchetti, KIT) | Has gentle regulation a chance? (U. Smeddinck, KIT) |
| 17:20 - 17:40 | Discussion of parameters used to distinguish suitable from less suitable HLRW bentonites (S. Kaufhold, BGR) | Impact of radiation-induced microstructures on the integrity of spent fuel elements in the long-term storage (N. Yanikömer, RWTH Aachen) | Narratives and images of the future for final disposal (S. Enderle, KIT) |
| 17:40 - 18:00 | Large-scale testing of a sandwich shaft sealing system at the Mont Terri rock laboratory (K. Wiczorek, GRS) | PREDIS: Innovative ways for pre-disposal treatment and monitoring of low and medium radioactive waste (E. Niederleithinger, BAM) | The secret of the copper box: public experiments and the prospects of living archives of Swedish nuclear waste (T. Keating, University Linköping) |
| 18:00 - 18:30 | <i>Plenary</i> Closing with panel discussion about scientific highlights | K. Reiter (TU Darmstadt), S.Müller (KIT) & T. Keating (University Linköping) Moderation: C. Hamann <i>DE/EN</i> | |
| 18:30 - 19:30 | <i>Foyer</i> Bowls & Fingerfood | | |
| 19:30 - 21:30 | <i>Online-Platform</i> Open Forum (discussion in small groups related to scientific topics gathered throughout the day in a hybrid format) | <i>EN</i> | |

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4 Interdisciplinary and cross-cutting aspects related to nuclear disposal

Time **Friday, November 12**

| | | | |
|---------------|---------------------------------|---|--|
| 09:00 - 09:10 | P l e n a r y | Opening | C. Hamann (Head Press and Public Relations, BASE) <i>DE/EN</i> |
| 09:10 - 10:00 | | Transdisciplinarity, deliberative democracy and statehood: reflections on the site selection process | K. Ott (Head Environmental Philosophy and Ethics, University of Kiel) Q&A-Moderation: C. Hamann (BASE) <i>DE/EN</i> |
| 10:00 - 10:20 | | Coffee break | |

| | Plenary | Room 1 | Room 2 |
|---------------|--|--|--|
| | SESSION 2B EN Surface exploration methods Chairs: F. Loeckle (BGR) & I. Kock (BASE) | SESSION 3A EN Nuclear humanities Chair: K. Kalmbach (Futurium) | SESSION 1B EN Decommissioning of nuclear facilities Chair: M. Rüffer (BASE) |
| 10:20 - 10:40 | Measurement Methods for Above-ground Site Investigation Programmes according to StandAG (Project 'MessEr') - an Overview (I. Kock, BASE) | The Making of a Safe Repository: Epistemic Practices and the History of Science (K. Krause, MPIWG) | Mobile attachment for automated crack milling (B. Froebus, KIT) |
| 10:40 - 11:00 | A systematic approach for surface exploration of sites – Analysis of international exploration programs (L. Richter, BGR) | What is good drinking water? 41 years of water conflicts around the Nuclear Research Centre Karlsruhe, 1956-1997 (A. Gutting, KTH) | LD-SAFE project: Laser Dismantling Environmental and Safety (P. Daguin, Onet) |
| 11:00 - 11:20 | Terrestrial Photogrammetry: a method to gather data on fractures for DFN modelling from exposed rock surfaces (F. Loeckle, BGR) | The international ethics of Australian nuclear heritage (N.A.J. Taylor, Deakin University) | Radiological characterization of a German PWR based on a highly resolved method for activity analysis and dose rate calculation (M. Nolden & A. Scaramus, RWTH Aachen) |
| 11:20 - 11:40 | | | Development of a novel tool for the automation of the contamination measurement (A. Wernke, KIT) |

11:40 – 12:40 *Foyer* **Lunch**

Topics

1 Decommissioning of nuclear facilities & Storage of radioactive waste

2 Disposing of High-level as well as low- and intermediate-level radioactive waste & Selecting a repository site

3 Participation processes for projects involving nuclear safety and disposal & Communications and sociotechnical aspects related to nuclear disposal

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Plenary

Room 1

Room 2

SESSION 2G *EN*
Numerical modelling for long-term safety analyses Part I
Chairs: J. Maßmann (BGR) & L. Wissmeier (CSD)

SESSION 3D *EN*
Participation in the search for a nuclear disposal site Part I
Chairs: M. Mbah (Oeko-Institute) & I. Richter (BASE)

SESSION 4D *EN*
Interdisciplinary insights on decommissioning and disposal Part I
Chairs: C. Drögemöller (University Hannover) & B. Wealer (TU Berlin)

12:40 - 13:00

Reactive transport modelling of long-term interactions between iron and MX-80 bentonite (C. Chaparro, KIT)

From a hard nuclear state towards a soft nuclear repository state – Participation, co-design, learning und reversibility in the site-selection process for a nuclear waste repository (A. Brunnengräber, FU Berlin)

Research needs in nuclear decommissioning: An analysis based on stakeholders' point of views (S. Müller, KIT)

13:00 - 13:20

Building the bridge between safety requirements and numerical modeling: An example considering crack development of Opalinus Clay in laboratory and field scales (T. Cajuhi, BGR)

Specific cultural and political challenges in cross-border public participation (F. Sperfeld, UfU)

Training needs assessment: Identification of competence fields for the dismantling of nuclear power plants (L. Thomaschewski, University Bochum)

13:20 - 13:40

The recent stress state of Germany - Results of a geomechanical-numerical 3D model (S. Ahlers, TU Darmstadt)

Management of high-level radioactive waste in Germany: Roads from storage towards disposal. Need and options for action (S. Chaudry, Oeko-Institute)

The economic organization of decommissioning nuclear power plants - an institutional economic analysis with case studies on the U.S., U.K., and Germany (B. Wealer, TU Berlin)

13:40 - 14:00

Coffee break

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| | SESSION 2G <i>EN</i> Numerical modelling for long-term safety analyses Part II Chairs: J. Maßmann (BGR) & L. Wissmeier (CSD) | SESSION 3D <i>EN</i> Participation in the search for a nuclear disposal site Part II Chairs: M. Mbah (Oeko-Institute) & I. Richter (BASE) | SESSION 4D <i>EN</i> Interdisciplinary insights on decommissioning and disposal Part II Chairs: C. Drögemöller (University Hannover) & B. Wealer (TU Berlin) |
| 14:00 - 14:20 | AREHS: Effects of changing boundary conditions on the development of hydrogeological systems: Numerical long-term modelling considering thermal-hydraulic-mechanical (-chemical) coupled effects (R. Kahnt, G.E.O.S.) | Participation of the foreign public in the site selection procedure: requirements and the question of informal participation (S. Schütte, Oeko-Institute) | Transdisciplinary research on the topic of long-term near-field monitoring of a geological repository with a view to building trust (J.-A. Othmer, TU Clausthal) |
| 14:20 - 14:40 | Numerical analysis on the integrity of potential host rocks - Modelling thermo-hydro-mechanical processes in the containment providing rock zone in crystalline rock (C.-G. Morel, BGR) | Representing future generations in public participation procedures regarding the siting of a nuclear waste repository (L. Hamacher, Bucerius Law School) | The use of muon radiography in safeguarding geological repositories (L. Thompson, University Sheffield) |
| 14:40 - 15:00 | Identification and evaluation of processes for co-disposal of high-level radioactive waste and low- and intermediate-level radioactive waste (A. Poller, CSD) | Transdisciplinary disposal governance - Learning and reflexion in and between organisations and through participation of the public (M. Mbah, Oeko-Institute) | |
| 15:00 - 15:10 | Coffee break | | |
| 15:10 - 15:30 | <i>Plenary</i> Closing and Outlook | P. Nanz (Vice President, BASE) | <i>DE/EN</i> |

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