

Impact of Thermo-Hydro-Mechanical-Chemical Processes on the Safety of Underground Repositories

Last Updated Monday, 09 November 2009

29 September to 1 October 2009, in Luxembourg

REGISTRATION IS NOW CLOSED

Conference Files

Final Conference Programme 13 Kb

Book of abstracts 2.6 MB

Poster Session 44 Kb

Workshop Files

Workshop Programme 6 Kb

Salt Working Group Programme 24 Kb

Crystalline Rocks & Buffer Group Programme 14 Kb

Clay Working Group Programme 27 Kb

Directions and Maps

Location of the European Commission, Jean Monnet Building (JMO), rue A. Wehrer, Kirchberg, L-2920 Luxembourg 412 kb

Interior plan of the Jean Monnet Building (JMO) 250 kb

See below for more details on conference and workshop venue.

Conference and Workshop Description

An international conference and workshop in the framework of the European Commission TIMODAZ and THERESA projects to be held from 29 September to 1 October 2009, in Luxembourg.

Jointly organised by the European Commission and EIG EURIDICE (Belgium), KTH (Sweden), ITC (Switzerland)

Sponsored / supported by

BfS, DBE, GRS, IRSN, NAGRA, NIRAS/ONDRAF, POSIVA, RAWRA, SCK.CEN, SKB

Hosted by the European Commission

The disposal of radioactive waste in deep geological formations has been a subject of intensive research activities in the last decades. Three main host rock formations are generally found to be the most suitable formations for deep geological disposal of these wastes: crystalline rocks, clay formations and salt. In all these formations, an important item for the long-term safety of underground disposal is the assessment of the combined effect of excavation, buffer emplacement and thermal output on the host rocks around the repository. More specifically, the extent of the associated damaged or disturbed zone (DZ/dZ) and their evolution with time are the focus of intensive research. The early THMC disturbances (thermal-hydrological-mechanical-chemical) created by the excavation, the operational phase and the thermal load might be the most severe transient processes that a repository will undergo on a large spatial scale. This is why experimental (laboratory and in-situ in Underground Research Laboratories) and numerical studies are on-going around the world to better understand the coupled THMC processes in the context of the long-term evolution and safety of repositories.

In November 2003, a European Commission CLUSTER Conference and Workshop on "Impact of the excavation disturbed or damaged zone (EDZ) on the performance of radioactive waste geological repositories" was successfully held and reflected well the state of the art of the EDZ at that time. The coming conference/workshop intends to go one step further from this EDZ CLUSTER conference by specifically addressing the DZ and buffer evolutions with time and temperature.

The objectives for the conference and workshop are to update, synthesize and work towards a consensus on:

- State of the art in understanding and characterization of THMC processes in host rocks, buffer and rock; buffer / seal interfaces
- State of the art in understanding the thermal impact on EDZ, TDZ (thermal induced damaged zone), on self sealing / healing capacities of host rocks
- Lessons learnt from experiments
- State of the art in capabilities of mathematical models and computer codes used for modelling coupled THMC processes at scale of lab and in-situ experiments and at scale of a disposal system.
- Assessment of impact of DZ and buffer evolution on performance of geological repositories
- How to integrate DZ and THMC processes in PA (Performance Assessment)
- Priorities for future research.

Main Topics

Present understanding of the nature, properties & evolution of the damaged zone

- Laboratory experiment characterization
- In-situ experiments
- Modelling

Present understanding of the THMC processes in host rocks

- Laboratory experiment characterization
- In-situ experiments

- Modelling

THMC behaviour at the interfaces host rocks & seal / buffer

- Laboratory experiment characterization
- In-situ experiments
- Modelling

Performance assessment & modelling

- Impact of DZ and buffer evolution on repository performance: How is DZ and buffer evolution handled in PA?

Significance and integration in Safety Case?

- PA case studies using computer models considering these impacts.

Structure of the conference (29.9.09) and workshop (30.9.09 - 1.10.09)

The whole event will last 2½ days and will consist of:

- One day conference on 29th September 2009 with keynote lectures, selected oral presentations and poster presentations. It will be held in a room with a capacity for 300 persons to allow the participants of scientists as largest as possible),

followed by a 1½ days of workshop (upon invitation only) which will consist of:

- One day (30th September 2009) of parallel working group discussion sessions on common topics and questions identified by the Organization Committee (on invitation), and
- a ½ day plenary session (1st October 2009) for presentation of the working groups discussions summaries, the workshop synthesis and final discussion.
- Closure of workshop on 1st October at around 12:30.

Workshop

Participation in the workshop will be open to individuals and organisations involved in the workshop specific topics (upon invitation only).

Three working groups will be set-up based on the different host rocks: one for Crystalline rocks & Buffer (Chairman : A. Gens), one for Clays (Chairman : F. Bernier) and one for Salt (Chairman : T. Rothfuchs). The following topics will be discussed:

- THMC evolution of near-field of repository system including:

- THMC evolution of barriers

- natural barrier: host rocks

- engineered barriers

- DZ evolution (during thermal period and long-term evolution, i.e. chemical degradation, creep, etc.)‏
- Interfaces (rocks / buffer / EBS, etc.)‏

- Lessons learnt from experiments
- Predictive capabilities of modelling
- Integration in PA and the safety case

As a guideline for the discussions, the following questions will be addressed in the working groups:

- What is the expected evolution of the DZ during the thermal period?
- What are the main uncertainties about DZ evolution and how can these uncertainties be dealt with?
- Under which thermal, hydraulic mechanical and chemical conditions can the favourable properties of host rocks and/or buffer (seal) be modified during the thermal period and how much can these properties be affected?
- Under which conditions does the change become irreversible, i.e. under which conditions will the future properties of the host rocks and/or buffer (seal) differ from the currently observed properties?

Participation to the workshop will be limited to enhance discussion. Each working group will be chaired by a representative of the Organization Committee, who will be assisted by a rapporteur in charge of preparing the working group summary and to produce a written contribution for the proceedings. Closure of workshop on 1st October at around 12:30.

Preliminary Conference Programme

Tuesday 29th September 2009

European Commission, Jean Monnet Building (JMO), rue A. Wehrer, Kirchberg, L-2920 Luxembourg

0845 – 0930

Arrival & Registration

0930 – 0945

Welcome + introduction (by director of EURIDICE)

0945 – 1030

General keynote lecture

C.F. Tsang

1030 – 1100

COFFEE

1100 – 1245
Crystalline rock and buffer session

(chaired by: Xiangling Li)

1100 – 1130
Keynote on crystalline rocks & bentonite buffer
L. Börjesson

1130 – 1150
Modelling the evolution of compacted bentonite clays in engineered barrier systems using the QPAC-EBS code
A. Bond

1150 – 1210

Detection of borehole wall disturbed zones and small scale rock heterogeneities with geophysical methods
K. Schuster

1210 – 1230
Representing THMC processes in performance assessment for the Yucca Mountain Repository
E. Hardin

1230 – 1245
Questions & Discussions

1245

End of morning session

1300 – 1400

LUNCH

1400 – 1545
Clay session (chaired by Antonio Gens)

1400 – 1430
Keynote on clay formations
X. Sillen

1430 – 1450
Comparative study of three in-situ heating tests in anisotropic media: the HE-D, TER and ATLAS experiments
B. Garitte

1450 – 1510

EDZ in clayey rocks: which effect on permeability (?)

R. Charlier

1510 – 1530

An experimental study of the time dependent behaviour of Boom clay under thermo-mechanical loading
Y. J. Cui

1530 – 1545

Questions & Discussions

1545 – 1600

COFFEE

1600 – 1745
Salt session (chaired by Antonio Gens)

1600 – 1630
Keynote on salt formations
W. Minkley

1630 – 1650
Evaluation and improvement of numerical THM modelling capabilities for rock salt repositories (THERESA project)
U. Heemann

1650 – 1710
Fluid infiltration processes into rock salt barriers resulting from fluid pressure build-up due to convergence, thermal expansion and gas generation
R. Wolters

1710 – 1730
Percolation through excavation damaged zone in rock salt: concept and numerical modeling
A. Hakan

1730 – 1745
Questions & Discussions

1745

End of afternoon sessions

1745 – 1800

SHORT BREAK

1800 – 2100

Poster session including Cocktail/Buffer

2100

Closure

Official Language

All oral and written communications of the conference and workshop will be in English.

Publication

Available for download : Book of abstracts - PDF 2.6 MB

The final proceedings will be published and distributed by EC after the Conference and Workshop. They will include a synopsis of the conference, a workshop summary, working group discussion summaries, the peer reviewed papers of the invited lectures (15 pages including figures), the extended abstracts for the oral presentations (10 pages maximum including figures) and for the posters (5 pages including figures).

Registration Fees

REGISTRATION IS NOW CLOSED
Conference venue and related details

Venue: European Commission, Jean Monnet Building (JMO), rue A. Wehrer, Kirchberg, L-2920 Luxembourg

Possible links for Luxembourg hotels (only four hotels are located around "le centre européen"):

<http://www.luxembourg.co.uk/luxhotels/index.php>

<http://www.ont.lu/hebe-en.html>

<http://www.tourist-office.org/luxembourg/luxembourg.htm>

Information on local transport

The Eurobus, number 16, runs from Luxembourg Airport to the Jean Monnet Building (stop Erasme/D'Coque on avenue J. F. Kennedy) at Kirchberg. It continues to Luxembourg city centre and the central railway station.

Busses number 5, 13, 18, and 21 run from the central railway station to a stop in front of the Jean Monnet Building.

Arrival is also possible from Frankfurt-Hahn Airport (low-cost airlines). From there a bus runs to Luxembourg railway station in 1 hour 45 min. Online reservation on: www.flibco.com

Organisation Committee

Christophe Davies (EC officer)

Xiangling Li (Coordinator of TIMODAZ project, Euridice EIG, Belgium)

Lanru Jing (Coordinator of THERESA project, KTH, Sweden)

Xavier Sillen (SCK•CEN, Belgium)

Maarten Van Geet (ONDRAF / NIRAS, Belgium)

Tilmann Rothfuchs (GRS, Germany)

Juergen Wollrath (BfS, Germany)

Mirko Polster (DBE, Germany)

SoHa Konopásková (RAWRA/SURAO, Czech Republic)

Jean-Dominique Barnichon (IRSN, France)

Tim Vietor (Nagra, Switzerland)

Vira Juhani, Kari Koskinen (Posiva, Finland)

Anders Sjöland (SKB, Sweden)

Conference and Workshop Secretariat

Euridice EIG (Xiangling Li)

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