THE SAFETY CASE FOR DEEP GEOLOGICAL DISPOSAL OF RADIOACTIVE WASTE: 2013 STATE-OF-THE-ART

October 7-9, 2013
OECD Conference Centre
2, rue Andre Pascal
75775 Paris Cedex 16
+33 1 45.24.82.00

PROGRAMME

The OECD requires all participants to register for entry at the main reception. To participate in the Symposium, please complete an online registration form (http://www.oecd-nea.org/rwm/igsc/sc2013/). For further registration enquiries, please contact Katia Karina Le Bot (Katia-Karina.lebot@oecd.org).
More practical information of the conference centre can be found at: www.oecd.org/conferencecentre

| DAY 1 – Monday October 7, 2013 |

| 09:00  | 1 | Opening Remarks – (5 min) |
| 1.1    | I | Welcome Notes |

Welcome from OECD NEA/ Symposium Chair, on behalf of NEA, IAEA and EC

| 09:05  | 2 | International development (since 2007 Symposium) |

Chair: Michael Siemann (5 min to introduce session)  

| 09:10  | 2.1 | EC Policy – (15 min) |

Ute Blohm-Hieber (European Commission)  
- EC directives and legal status

Confirmed
09:25 2.2 | IAEA recent initiatives, accomplishments, activities – (15 min)

Gerard Bruno (IAEA)
- Safety Standards
- Recent initiatives, accomplishments, activities

09:40 2.3 | ECREsearch – (15 min)

Christophe Davies (EU)
- Recent initiatives, accomplishments, activities

09:55 2.4 | Safety Case Peer Review – (15 min)

Claudio Pescatore (NEA)

10:10 2.5 | NEA work related to the Safety Case (MeSA, SC brochure) – (15 min)

Klaus-Jürgen Röhlig (TUC)

10:25 2.6 | NEA recent activities – (15 min)

Michael Siemann / Gloria Kwong (NEA)

10:40 BREAK – (20 min)

11:00 3 NATIONAL SAFETY CASE PRESENTATIONS

Compiling and reviewing the safety case at different stages of repository development

Chairs: Klaus-Jürgen Röhlig (Day 1), Claudio Pescatore (Day 2) (5 min to introduce session)

Rapporteurs: Abe van Luik, Gloria Kwong

The aim of this session is to share information and to discuss specific aspects and challenges when compiling or reviewing the safety case in relationship to different stages of national programmes. The intent is to identify technical and organizational issues and challenges as well as to shed light on the evolution of the safety case with programme progress.

- Speakers are asked to briefly describe the stage their national programme is at and the purpose(s) of the safety case or review to be presented. Implementers and regulators from each country are asked to co-ordinate this part of the presentation as far as possible in order to avoid redundancy and to save speaking time.

- Implementers are asked to give an overview of the structure and technical content of their safety case. If the safety case to be presented evolved from earlier safety reports (produced at previous stages of the programme), they are encouraged to discuss both lines of continuity (which data, methods and tools are re-used and/or continuously further developed) and important changes (which data, methods and tools have either drastically changed or at all been abandoned and why had such decisions been made). Are there changes in the issues focused on? Why did these changes occur? Were these issues addressed early enough? Ideally, this might lead to lessons
which can be learned by programmes at earlier stages.

- Regulators are asked to focus on the technical content of their review as well as on planning aspects and challenges. If possible, key technical outcomes and recommendations for the next stage of the programme should be presented. Regulators are encouraged to refer to earlier stages of the programme, to their findings and recommendations made at these stages, and the way they had been addressed by the implementer as well as by the regulator (i.e. changes or specify new guides). Please elaborate if international (e.g. NEA) or other peer reviews were being utilized in the process.

- Both implementers and regulators are asked to explain the role of their work in supporting the decision process. Please explain discuss expectations and real outcomes. Are there discrepancies and if so, why?

- Both implementers and regulators are asked to concisely summarise what they consider the key challenges they had and will face (technical, organizational, etc.) and how they are or will be addressed. If possible, they should discuss which of these challenges are site or concept specific, which are specific for the stage the programme is at, and which are “generic”. What would you do the same way, what would you do differently if you were again in a similar situation?

- In addition to these generic questions applicable to all session I presentations, below some case-specific questions are listed. The time limitation might prevent from addressing all the questions – please make adequate choices.

<table>
<thead>
<tr>
<th>11:05</th>
<th>3.1</th>
<th>Building generic safety cases: examples from the UK, the US and Korea</th>
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<tr>
<td>11:05</td>
<td>3.1a</td>
<td>UK experience</td>
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<td><em>Lucy Bailey, NDA – [20 min]</em></td>
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<td>• Given that many international (e.g. IAEA and NEA) documents define safety assessment as “site-specific” – what are the specific challenges of building a case without specifying a host rock?</td>
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<td>• Often, e.g. in the European Pilot Study, the staged repository development is described in a way that prior to the “siting phase” a “conceptualization phase” takes place. To what extent did you conceptualise your repository system (including safety concept and repository layout) to be assessed, to what extent did you leave it generic? Please discuss advantages and drawbacks.</td>
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</table>

| 11:25  | 3.1b| Using Safety Assessment Techniques to Build Confidence in Repository Performance: The U.S. Experience |
|        |     | *William Boyle, US DOE-NE – [20 min.]*                             |
|        |     | Generic safety cases for future disposal repository in granite, shale/clay and rock salts – methodologies |
and outcomes. Also to address questions in 3.1a.

11:45  **3.1c**  Experience of the Republic of Korea

_Jongtae Jeong, KAERI, Korea – [20 min, 15 min questions to NDA, DOE and KAERI]_

Generic safety cases for future repository. and address questions in 3.1a. In addition,

- Please explain to what extent the A-KRS design is linked to the KURT site. To what extent is it generic?

- What type of host rocks and sites does your country consider in the generic assessment? Is this assessment a generic one or is it a site-specific trial assessment tailored to the circumstances at the KURT site?

12:20  **LUNCH** – (1 hr 10 min)

13:30  **3.2**  Safety case for preparing and performing a site selection process: the Swiss example and experience

13:30  **3.2a**  Safety case for preparing and performing a site selection process: the Swiss example and experience

_Piet Zuidema, Nagra– [20 min]:_

- Please explain to what extent the (site specific) Opalinus Clay safety report has been used for preparing the suggestions for potential sites for the selection process.

- How are generic safety assessment calculations used in defining the required properties of the potential host rocks?

- How do safety assessment calculations evolve during the ongoing site selection process?

- How does repository concept development evolve during the ongoing site selection process? E.g how do you account for the different HLW/LILW co-disposal options?

- Please explain the role of the NEA review in your national programme.

13:50  **3.2b**  Ann-Katrin Leuz, ENSI– [20 min, 10 min questions to Nagra and ENSI]:

- Please explain ENSI’s role in defining and carrying out the site selection process.

- How did you review Nagra's case and what were the issues at that time? What lessons did you derive for the site selection process?
### Developing the safety concept and the design of a geological repository: the Belgian example

**14:20 3.3**  
*Manuel Capouet, Ondraf/Niras – [20 min]:*

- Please explain the modification your concept underwent over the last years and how the safety strategy was used to support these changes.
- Please explain the interplay with defining, revising and carrying out your R&D programme.

**14:40 3.3b**  
*Frédéric Bernier / Frank Lemy, FANC – [20 min, 10 min questions to Ondraf/Niras and FANC]:*

- Please explain your role concerning guidance or advice about the R&D programme.

### Safety case for license application for a final repository: the French example

**15:10 3.4**  
*Fabrice Boissier, Andra – [20 min]:*

- Please address the interplay between construction feasibility, design specification and expected long-term performance. What QA measures did you implement or do you plan to implement? Will you take advantage from experience in other industries? What construction and operation tests are carried out or planned?
- How does the licensing process interact with the industrial conception process?
- Please address the relationship between surface and underground facilities (siting, layout, safety).
- Please explain the role of the previous NEA peer reviews in your national programme

**15:30 3.4b**  
*Loïc Tanguy, ASN [20 min]*  
[10 min questions to Andra and ASN]:

- How do you prepare for reviewing the license application to be expected in 2015. Please explain how you follow Andra’s R&D and how you recruit and prepare your own staff.
- To what extent do you influence the decisions Andra is making on the way to its license application? Are there regulatory evolutions needed?

### Safety case for license application for a final repository: the Swedish case

**16:00 BREAK – (30 min)**

**16:30 3.5**  
*Allan Hedin, SKB – [20 min]:*

- Please explain to which extent the license you have been applying for is prescriptive and how much freedom it still leaves for later decisions? How will these later decisions be taken and
approved?

- Please address the way you address the challenges associated with detailed planning for construction, operation, and closure. What is already settled? What has still to be done?

16:50  3.5b  Bjorn Dverstorp, SSM – [20 min, 10 min questions to SKB and SSM]  

- Even if only preliminary review results on selected issues might be available at the time of the symposium, SSM can provide important input by presenting its unique review approach.
- Please explain the way you are organizing your review, how you recruit and train SSM staff and how you take advantage from external resources.
- How did your review approach evolve from SR‐Can (and earlier reports) to SR‐Site?
- Please explain the role of the NEA peer review in your national process.
- How do you interact with stakeholders (pave way for the presentation in session 6)?
- Please identify issues on that you have focused on so far in your review. What type of complementary information has SSM asked SKB to provide? What issues have been forwarded to SSM by national review bodies?

17:20  3.6  Safety case for license application for a final repository: the Finnish case  

17:20  3.6a  Safety Case for licensing a spent fuel repository at Olkiluoto, Finland  

Juhani Vira, Posiva– [20 min]  

- Safety case of Olkiluoto. Same questions as for 3.5a, in addition:
- Please elaborate on the specific role of the ONKALO URL – which kind of evidence from the URL has been used in the safety case?

17:40  3.6b  Jussi Heinonen, STUK– [20 min, 10 min questions to Posiva and STUK]  

- Please explain the way you are organizing your review, how you recruit and train STUK staff and how you take advantage from external resources.

18:10  Cocktail reception / END OF DAY 1
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<tr>
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| 09:00 | 3 | NATIONAL SAFETY CASE PRESENTATIONS (cont’d) |  | Compiling and reviewing the safety case at different stages of repository development  
*Chair: Claudio Pescatore (Day 2)*  
*Rapporteurs: Abe van Luik, Gloria Kwong* |
| 09:00 | 3.7 | Safety case for re-certificating and operating a facility: the USA example | Abe Van Luik, DOE-WIPP – [20 min] | WIPP – Safety Case Evolution of an Operating Repository Facility  
- Please explain the evolution of your safety case from the initial certification to the current re-certification. What has been maintained, what has been changed and why?  
- When explaining this evolution, please address the role (or otherwise) of  
  - the evolution of the state of the art (at the international level)  
  - your own operational experience  
  - your R&D  
  - advice from the regulators  
- Do you consider the prescribed re-certification periods as useful for your own work? Should they be longer or shorter? |
| 09:20 | 3.7b | WIPP Continued Oversight | Tom Peake, US EPA – [20 min, 10 min questions to WIPP and EPA] | WIPP Continued Oversight  
- Is the regulatory guidance for the preparation of the application essentially the same as for the previous certification or are there requests specific for the re-certification?  
- Did you provide specific advice for the application, perhaps based on the previous certification?  
- When organizing your review, which experience from earlier reviews was particularly important? To what extent were you able to rely on staff with experience from that previous phase? Was there a continuity problem?  
- Did you review the application as a “new” document or did you rather consider the “delta” compared to the previous application?  
- Do you consider the prescribed re-certification periods as adequate? Should they be longer or shorter? |
09:50  Session 3.0 Panel discussion between participants and audience – [30 min]

10:20  Break [30 min]

10:50  Staff management, training and knowledge management  
Chair: K. Röhlig  
Hitoshi Makino, JAEA [15 min, 15 min discussion]

The talk will address the following:
- Is there a common understanding on what a safety case is and the competences it demands?
- How are the competences achieved?
- How are data and decisions recorded and preserved so that the project is not going back on previous steps?
- How to prepare generational changes? Both in terms of aging personnel and aging technologies?

11:20  Keynote lecture on long-term governance of CO2 storage  
Chair: K. Röhlig  
Régis Farret, INERIS [30 min](confirmed)

11:50  LUNCH [1 hr 25 min]

13:15  Specific issues and challenges in safety case development

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<th>Session 6b Chair: Abe van Luik (5 min to introduce session)</th>
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<td>Rapporteur: Björn Dverstorp</td>
<td>Rapporteur: Trevor Sumerling</td>
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13:20  6a.1 Handling QA in the Finnish Programme  
Juhani Vira, POSIVA - [15 min, 5 min questions] (tentatively confirmed)

Please prepare your talk to address the following:
- Is safety case QA a special case of QA in general? In what way?
- How does QA for the safety case interface with QA for safety case supporting activities?
- What have been the main challenges for Posiva in quality management of safety case activities?

6b.1 R&D in safety case development – [15 min, 5 min questions]
Philippe Lalieux, Ondraf/Niras (confirmed)

- IGD-TP

Please prepare your talk to address the following:
- How do we know when there is enough R&D, nationally and internationally?
- How transferable are R&D results across projects and across nations? Can we have examples?
- How is QA reported / described in the safety case?
- What is not a QA issue in the realization of a safety case?
- In what way does QA support confidence in the safety case?  
  How is this aspect promoted?
- How is a QA-culture implemented in preparing for a safety case?
- How do QA needs and importance change on approaching licensing? What is Posiva’s experience?

13:40  6a.2  Issues related to quality assurance in safety case development –[15 min, 5 min questions]

Jürg Schneider, Nagra (confirmed)

Please prepare your talk to address the following:

- Is safety case QA a special case of QA in general? In what way?
- How does QA for the safety case interface with QA for safety case supporting activities?
- What have been the main challenges for Nagra in quality management of safety case activities?
- How is QA reported / described in the safety case?
- What is not a QA issue in the realization of a safety case?
- In what way does QA support confidence in the safety case? How is this aspect promoted?
- How is a QA-culture implemented in preparing for a safety case?
  How do QA needs and importance change on approaching licensing? What is Nagra’s experience?

14:00  6a.3  Morsleben repository – Interdependence of technical feasibility and functionality of geotechnical barriers and safety case development

Jürgen Wolrath, BfS– [15 min, 5 min questions] (confirmed)

- What are the current high priority issues in R&D related to the safety case? Any why?
- Is R&D only “technical” or is there room for other R&D in supporting safety case development?
- Have research results in URLs helped to develop and communicate the safety case? How

6b.2  Harmonisation of regulations

Bengt Hedberg, SSM– [15 min, 5 min questions] (confirmed)

- WENRA

Please prepare your talk to address the following:

- How is WENRA contributing to harmonizing approaches in Europe regarding the development of the safety case?
- Could best practices and benchmarks regarding safety cases be identified by WENRA?
- How do regulators verify that their guidance is actually implementable?

6b.3  ICRP guidance

Jacques Lochard, CEPN - [15 min, 5 min questions] (confirmed)

Please prepare your talk to address the following:

- The new ICRP-122 text, why the evolution from ICRP-81 was needed?
- Main differences and commonalities to the ICRP-
What are the key aspects of radiation protection to be considered in the safety case?

Explain the new concept of oversight.

What does the ICRP say on the meaning of numbers?

81?

- What are the future R&D needs and prospects in relation to the safety case from the point of view of regulators?
- What are the high priority issues in R&D related to the safety case from the point of view of regulators? And why?

### 14:40 Break (30 min)

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<th>7a</th>
<th>Performance and safety assessment</th>
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<tr>
<td>Chair: Lucy Bailey <em>(5 min to introduce session)</em></td>
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<td>Rapporteur: Ann-Kathrin Leuz</td>
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<td><strong>7a.1</strong></td>
<td>Performance Assessment</td>
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<td>Hellä et al., Saanio &amp; Riekkola Oy, Finland</td>
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<tr>
<th>15:15</th>
<th>7b</th>
<th>Scientific and technical basis</th>
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<tr>
<td>Chair: Jürgen Wollrath <em>(5 min to introduce session)</em></td>
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<td>Rapporteur: Jon Walsh</td>
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<td><strong>7b.1</strong></td>
<td>Applicability of Indicators in Clay and Salt Representing the Safety Function Containment</td>
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<td>Wolf, GRS mbH</td>
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<tr>
<th>15:35</th>
<th>7c</th>
<th>The broader perspective: Safety case, programme decision and society</th>
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<td>Chair: Doug Ilett <em>(5 min to introduce session)</em></td>
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<td>Rapporteur: Trevor Sumerling</td>
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<td><strong>7c.1</strong></td>
<td>Independent Modelling in SSM's Licensing Review of a Spent Nuclear Fuel Repository</td>
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<td>Xu et al., SSM, Sweden</td>
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<th>15:35</th>
<th>7a.2</th>
<th>Formulation of Radionuclide Release Scenarios</th>
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<td>Marcos et al., Saanio &amp; Riekkola Oy,</td>
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<th>15:35</th>
<th>7b.2</th>
<th>Study on the operational safety issues in Japanese disposal concept</th>
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<td>Suzuki et al., NUMO, Japan</td>
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<th>15:35</th>
<th>7c.2</th>
<th>Setting up a Safe Deep Repository for Long-Lived HLW and ILW in Russia</th>
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<td>Polyakov et al, Russia</td>
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<td>15:55</td>
<td>7a.3</td>
<td>Assessment of Radionuclide Release Scenarios for the Repository System</td>
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<td>16:15</td>
<td>7a.4</td>
<td>Biosphere Assessment</td>
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<td>16:15</td>
<td>7a.5</td>
<td>Preliminary Safety Analysis of the Gorleben Site</td>
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<td>16:15</td>
<td>7a.6</td>
<td>Used Fuel Repository Post-Closure Safety Assessment in Crystalline Rock</td>
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<td>17:15</td>
<td>7a.7</td>
<td>PAMINA and areas for further development</td>
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<td><strong>The broader perspective: safety cases in areas other than deep geological disposal</strong></td>
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<td>7d.1</td>
<td>The Safety Case in Support of the License Application of the Surface Repository of Low-Level Waste in Dessel</td>
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<td>7d.2</td>
<td>Development of an Environmental Safety Case Manual</td>
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<td>7d.3</td>
<td>Licensing Review Process of the European Spallation Source (ESS) Research Facility in Sweden</td>
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<td>7d.4</td>
<td>Radioactive and Conventional Toxic Waste Compared – an Integrated Approach, useful for an appraisal of CCS</td>
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<td>09:00</td>
<td>8</td>
<td><strong>Societal context of the Safety Case</strong></td>
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<td>7 presentations (20 min each), including a 30 min break and a 30 min panel discussion at the end of session</td>
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<td>09:05</td>
<td>8.1</td>
<td>Communication issues specifically between technical and non-technical communities including UK social aspects in looking for volunteer municipalities</td>
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<td>09:25</td>
<td>8.2</td>
<td>How did the Swedish communities organize themselves in reviewing a safety case</td>
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<td>09:45</td>
<td>8.3</td>
<td>Challenges of communicating safety case results to different audiences</td>
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<td>10:05</td>
<td>8.4</td>
<td>Demonstrating safety: lessons learnt by INSOTEC</td>
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<td>10:25</td>
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<td>Experience of the FSC</td>
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<td>10:45</td>
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<td><strong>Break</strong> – (30 min)</td>
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<td>11:15</td>
<td>8.6</td>
<td>Experience of Japan</td>
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<td>11:35</td>
<td>8.7</td>
<td>CLIS</td>
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<td>11:55</td>
<td>8.8</td>
<td>Extended Reviewing or the Role of Potential Siting Cantons in the On-going Swiss Site Selection Procedure (“Sectoral Plan”)</td>
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<td>12:15</td>
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<td>Panel Discussion – (30 min)</td>
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<td><strong>LUNCH</strong> – (1 h 15 min)</td>
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<td>14:00</td>
<td>9</td>
<td><strong>Rapporteur reporting and participant feedback</strong></td>
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<td>14:00</td>
<td>9.1</td>
<td>Session 3 rapporteurs and participant feedback - (20 min)</td>
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**DAY 3 – Wednesday October 9, 2013**
14:20  9.2  Session 6a rapporteur and participant feedback - *(10 min)*
14:30  9.3  Session 6b rapporteur and participant feedback - *(10 min)*
14:40  9.4  Session 7a rapporteur and participant feedback - *(10 min)*
14:50  9.5  Session 7b rapporteur and participant feedback - *(10 min)*
15:00  9.6  Session 7c rapporteur and participant feedback - *(10 min)*
15:10  9.7  Session 7d rapporteur and participant feedback - *(10 min)*
15:20  9.8  Session 8 rapporteur and participant feedback - *(10 min)*
15:30  9.9  Panel discussion (to be led by Session Chair) *(30 min)*
16:00  9.10  Symposium Chair, K-J Röhlig, closes symposium (summary to be supported by consultant) *(30 min)*

**16:30**

**Symposium Adjourn**

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**POSTER SESSION in main meeting room,**

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<td>P1</td>
<td>Radioactive waste has found itself a place in the 21th century's archaeological stratum</td>
<td><em>Cécile Massart, Belgium</em></td>
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<td>P2</td>
<td>Uncertainty in Hydraulic Tests at a Fractured Rock</td>
<td><em>Ji, Korea Atomic Energy Research Institute, Republic of Korea</em></td>
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<td>P3</td>
<td>Suitability of a Spent Fuel Interim Storage Canister for Final Disposal in a Deep Geological Repository</td>
<td><em>Cuda, ENRESA, Spain</em></td>
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<td>P4</td>
<td>Unleashed Microbes may threat the Safety of Radioactive Waste Repositories</td>
<td><em>Pedersen, Microbial Analytics Sweden AB, Sweden</em></td>
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<td>P5</td>
<td>Iron/Argillite Interactions in Radioactive Waste Disposal Context: Oxidizing Transient and Bacterial Activities Influence</td>
<td><em>Chautard et al., IRSN, France</em></td>
</tr>
</tbody>
</table>

Presenters will be available to discuss their work with the audience during breaks.