Minutes of Project Progress Meeting – PPM 01

Time: 15 March, 2011
Location: SKB´s head office, Stockholm
Participants: Erik Thurner, SKB (Chair)
Fredrik Johansson, SKB
Magnus Kronberg, SKB
Christer Svemar, SKB (Secretary of meeting)
Gilles Armand, Andra
Jacques Morel
Tim Vietor, Nagra
Hanspeter Weber, Nagra
Jukka-Pekka Salo, Posiva
Keijo Haapala, Posiva
Christophe Davies, European Commission

Distribution: Participants, LUCOEX Steering Committee, European Commission (Deliverable D1.6)

1 Welcome and introduction

Erik Thurner welcomed the participants to this first Project Progress Meeting – PPM 01.

Monica Hammarström, Director of Technology at SKB, described the context of the LUCOEX project, its importance and wished the participants good luck in pursuing the project objectives.

Erik Thurner informed of the first Steering Committee Meeting, held over the telephone on Thursday 10 of February 2011, and pointed out that the Steering Committee was established and has taken on its responsibilities in the LUCOEX project.

2 Chair of PPM 01

Erik Thurner was elected chair of the meeting.
Christer Svemar was elected responsible for the meeting minutes.

3 Agenda

The draft agenda was accepted as distributed prior to the meeting.
The Agenda is enclosed as Appendix 1.

4 European Commission presentation

Christophe Davies presented general information from the European Union, Euratom FP 7 and specific considerations of important to the LUCOEX project.

The presentation is enclosed as Appendix 2.

Christophe Davies specially mentioned:

- The three 20% European Union goals on greenhouse gas emission.
- The SET plan for R&D to support these goals.
- The R&D on IV generation reactors, which is planned to be supported with a sum on the order of GEURO 1.
- That Euratom treaty is based on 5-year periods, and that FP 7 now is under preparation of being extended with another two years, i.e. 2012-2013, in order to comply with the European Union treaty, which already has 7-year plans.
- That FP 7 so far has made contributions to 16 projects with a sum of MEURO 37.4.
- That the next call in Geological Disposal is due 7 April 2011 and has a budget of MEUR 7.
- That the call includes a specific topic aimed at increasing participation of organisations in New Member States in Euratom research .
- That China now is taking part in two FP 7 projects.
- That the Technology Platform IGD-TP has now produced an advanced draft Strategic Research Agenda and is also working on the related Deployment Plan.
- That LUCOEX shall serve the European Commission with three status reports, month 18, 36 and 48. This includes financial reporting (Form Cs) on the LUCOEX participant's portal at the dedicated European Commission web site.
- That a poster describing the project is requested by the European Commission at each physical experiment open to visitors. Any publication including the posters has to acknowledge EC financial support in the form described in the "guidance notes on project reporting" available at http://cordis.europa.eu/fp7/find-doc_en.html and use the European flag and the Euratom FP7 logo.
- That interest gained on pre-financing amounts shall be registered and be used as a part of the total contribution from the European Commission stated in the Grant Agreement.

5 WP 2 (Nagra)

Hanspeter Weber presented objectives, activities and considerations of WP 2.

The presentation is enclosed as Appendix 3.

Hanspeter Weber specially mentioned:

- That the 3 m diameter tunnel will be supported with steel ribs and steel arches supplemented by up-to 150 mm thick shotcrete.
- That canister diameter of just over 1 m leads to a bentonite buffer thickness of approximately 0.6 m.

- That canister surface temperature will at a maximum be 135°C with a thermal load of 1500 W per canister. The consequent rock surface temperature will at a maximum be 55°C.
- That bentonite buffer is emplaced in the form of crushed highly compacted bentonite cushions. They are emplaced by screw feeder.
- That the tight time plan shows installation during 2013.
- That the most critical activity is judged to be the excavation of the tunnel.

6 WP 3 (Andra)

Jacques Morel presented objectives, activities and considerations of WP 3.

The presentation is enclosed as Appendix 4.

Jacques Morel specially mentioned:

- That 740 mm diameter, 40 m long horizontal holes will be lined with 20 mm thick steel pipes.
- That steel lining is required at Bure because the stresses at 500 m depth are high, higher than in the Mont Terri experiment in WP 2.
- That the lining for the head part (“insert”, first 10 m) is inserted in 2 m long sections being welded together at the mouth of the tunnel before being pushed in place. Welds have no requirement on water tightness. The lining for the “usable part (in which heating will be done)” is inserted in 2 m long sections being mechanically fitted together with no requirement on water tightness.
- That the temperature in the lining is not expected to exceed 90°C.

Freezing has been judged to cost more than the selected method with steel lining. The selection also considered the requirement on retrievability during a time period of up to a couple of hundred years.

7 WP 4 (SKB)

Magnus Kronberg presented objectives, activities and considerations of WP 4.

The presentation is enclosed as Appendix 5.

Magnus Kronberg specially mentioned:

- That the volume between plug and distance block will be filled with uncrushed bentonite pellets through an opening in the plug, that afterwards is sealed by welding.
- That block manufacturing is a time critical activity, as access to the press is limited.

8 WP 5 (Posiva)

Jukka-Pekka Salo and Keijo Haapala presented objectives, activities and considerations of WP 5.

The presentation is enclosed as Appendix 6.

Jukka-Pekka Salo and Keijo Haapala specially mentioned:

- That the deposition hole boring will be carried out in Onkalo in August this year (2011).
- That tests will start with concrete blocks before introducing bentonite.

- That the bentonite blocks will be manufactured by isostatic compaction technique.
- That the vacuum suction lifting technology will need a water ratio in the bentonite block of a minimum of 13%.
- That installation activities are planned to be completed by early 2014.

Several methods exist for verifying that the gap is properly filled with pellets, and the final selection of reference method will depend on the outcome of the work in this WP 5.

9 Review of each others' plans

The meeting discussed the issue of cross-reviewing of the WPs' different activity plans and concluded that reviewing should be one vital part in the LUCOEX interaction process. It is mentioned in each WP and the practical means of achieving the objective was suggested to be direct communication between the WP Leaders.

Tim Vietor announced that WP 2 soon will be prepared to distribute a test plan for review. Keijo Haapala informed that WP 5 activity plan is in an advanced state of finalization and can son be distributed among participants for coordination. Andra and SKB conveyed similar information.
It was further announced that each WP plan will advertise the times for the most interesting activities for staff secondment, on-site training and other suitable moments for disseminating events.

10 Technology themes in common among WPs

The discussion concluded that the WPs have the following themes in common:

- Tunnel and disposal cell excavation.
- Instruments and instrumentation.
- Bentonite block and pellets production and emplacement.

Each of these themes should be addressed in workshops in conjunction with future PPMs.
A general suggestion from the meeting was to consider "watching" and "being present" as main means of integrated dissemination among the participants.

11 Meeting Plan

The series of PPMs was discussed with the following outcome:

- PPM 02: March 2012 at Olkiluoto, Finland.
- PPM 03: September 2012 at Bure, France.
- PPM 04: June 2013 at Mont Terri, Switzerland.
- PPM 05: April 2014 at Äspö, Sweden.

The themes of workshops in conjunction to these PPMs were suggested to be:

- Olkiluoto in March 2012: Tunnel and disposal cell excavation.
- Bure in September 2012: Instruments and instrumentation.
- Mont Terri in June 2013: Bentonite block and pellets production and emplacement.

12 Mid-term Workshop

The discussion revealed that major advantages would be gained if this workshop is organized in conjunction with the seminar "Clay in Natural and Engineered Barriers for Radioactive Waste Confinement" on 22-25 October 2012 in Montpellier, and it was suggested that the Steering

Committee reconsiders the decision taken in SCM 01 to de-couple the two events. The proposal from PPM 01 is to arrange the Mid-term Workshop from mid Thursday October 25 to mid Friday October 26.

The workshop was suggested to be divided into four themes:
- Presentation of the four concepts in focus in LUCOEX.
- Tunnel excavation technology.
- Instruments and instrument installation.
- Bentonite block and pellets manufacturing and installation.

A workshop organization should be appointed with one representative from each participant.. Hanspeter Weber was announced as the Nagra representative in the team.
Gilles Armand pointed out that the organizing committee of the Montpellier seminar need to get information on the LUCOEX plan, number of participants, requirement on facilities and other practical issues in order to be able to assist in best possible way.

13 Large Workshop

The Large Workshop was proposed to be arranged as a two-day event at Äspö in conjunction with the PPM 05. The same organization team was proposed to be appointed as for the Mid-term Workshop. Christophe Davies is ready to take part in the programme committee of the Large Workshop.

14 Training and Scholarships

The programme comprises all together 20 scholarships, which are budgeted to cover travel, lodging and daily allowances, but no salary or person hour compensation:
- 2-week training: 2 persons per 2 training events.
- 2-week on-site training: 1 person per 4 training events.
- Participation in Mid-term Workshop: 2 persons.
- Participation in Large Workshop: 2 persons.
- Participation in WP-specific workshops: 2 persons per 4 workshop events.

Each scholarship event will be announced at the public web site, where also application shall be made from interested persons.

Each LUCOEX participants have the joint responsibility for the timing of events, specification of conditions and specification of counter-performance. Who and when will be specified in the Communication Action Plan, which will be drafted by Fredrik Johansson and submitted to the Projectplace for comments and finalization.

The discussion on whom to address in order to achieve as wide spread of the announcements as possible concluded that not only universities in Member States and Switzerland should be on the list but also the industry in form of consultants and industrial company employees. The LUCOEX Coordinator was suggested to seek advice from other EC supported projects like PETRUS besides the network available through the Technology Platform IGD-TP.

Christophe Davies pointed out that the experience from other projects indicates a possibility that too few will apply, which should be considered in the preparation of announcements and the means of making them known.

15 Staff secondment

The following activities were presented at the meeting as suitable for "staff secondment". The time frames are preliminary:

- Nagra: Tunnel excavation in early 2012 and buffer installation in mid 2013.
- Andra: Cell test excavation mid 2011 and full scale excavation in February 2012 (M13-15). Emplacement of the heaters start in July 2012.
- Posiva: Block installation in April 2013.
- SKB: Supercontainer installation in mid 2012.

16 Global Meeting Time Plan

The Coordinator will summarize all meeting, training, dissemination and staff secondment information on an Excel spread sheet and submit it to the Projectplace, and make it subject to adjustment or supplement by each participant when new information becomes available.

17 Communication Action Plan

Fredrik Johansson presented the embryo to Communication Action Plan. He commented that the plan is only focusing on "external" information in the Grant Agreement and suggested that the Plan also should include "internal" information, which was considered as a good addition.

Fredrik Johansson announced that he will compile the Plan and submit it to the Projectplace for comments and finalization.

18 European Added value

Christer Svemar informed of the contact with the Technology Platform IGD-TP and the interest to cooperate when a brief text of mission and objectives has been forwarded. Christer Svemar will compile this info as soon as possible.

The meeting suggested that the topic is added on to the agendas of the Mid-term and Large Workshops respectively in the following way:

- Mid-term Workshop: participating implementers are invited to take part.
- Large Workshop: one theme/session is devoted to the benefits other Member States may have from dissemination of LUCOEX results.

19 Indicator and indicator criteria

The set of indicators and indicator criteria were presented and discussed with the conclusion that the indicator criteria need to be defined with a baseline against which the future evaluation can be made. It was suggested that the Coordinator provides these baseline descriptions and submits them to the Projectplace.

20 Project Plan

Christer Svemar presented the draft Project Plan and pointed out some issues of discussion.

The issue on filing postal mails and important e-mails resulted in a need for a solution to file e-mails. Christer Svemar referred to the SKB way of creating a specific e-mail address within SKB to which e-mails could be copied.

Christer Svemar further suggested that the solution should be made participant-specific and that each addressee of e-mails could decide which e-mails should be stored and which should not.

21 Risk Assessment

Fredrik Johansson informed of the Risk Assessment in the project. Each WP bears the responsibility to manage risks in accordance to the standard applied by Nagra (WP 2), Andra (WP 3), SKB (WP 1, WP 4 and WP6) and Posiva (WP 5) respectively.

Selected major risks are forwarded to the Risk Manager – Fredrik Johansson – who compiles a Global Risk List, which is subject to analysis at each coming PPM and basis for information at subsequent Steering Committee Meeting.

The template SKB is using will be filed at the Projectplace as an example of means of how to proceed with Risk Assessment.

At the next meeting the Risk Assessment topic is introduced by a presentation of SKB's Risk Management procedure.

EC requirement regarding risk assessments is that it should describe contingency plans including cancellation tasks and use of budgeted resources in case of delay or failure to execute a given task in the planned timeschedule.

22 Project Presentation

A Project Presentation shall be compiled in accordance with the EC request. A template has been provided and the Presentation will be inserted in the EC document on FP7 projects presentation later in 2011.

Christer Svemar in addition proposed to compile a PowerPoint presentation on the LUCOEX to be available to every participant and its staff. This PowerPoint document would be filed at the Projectplace and up-dated when new information is available.

23 Newsletter

Four Newsletters are due during the course of LUCOEX, one each year (Month 12, 24, 36 and 48). All four will be edited by the Coordinator based on contributions from the participants.

Posiva has announced specific WP 5 Newsletters.

All Newsletters will be published on the public web site after submission to the EC.

24 Web-site portal

Fredrik Johansson reported that the public web site is in progress. The web hotel has been ordered and the design will be made as soon as SKB´s web site designer becomes available.

25 Projectplace

The Projectplace is open and Fredrik Johansson gave a short presentation of the status. He will shortly distribute invitations to designated participants.

Fredrik Johansson compiles a manual on the most important part of how to use the Projectplace. Fredrik will in the future serve as the “super user”, to whom everyone with questions may turn for assistance.

26 Decision making forwarded to Steering Committee Meeting

Suggestions and proposals presented at the PPM 01 are forwarded to the Steering Committee Meeting 02 for formal decisions.

27 Next Project Progress Meeting

The next meeting will be held at Olkiluoto at the Vuojoki Mansion in March 2012.

Appendix 1

LUCOEX Project Progress Meeting - PPM 01 – Agenda
Theme: Integrated planning

28 **March 14th, 2011**

Time GMT+1

12.00	Lunch	SKB
13.00-13.10	Opening of meeting, selection of Chair of meeting, approval of the Agenda. Presentation of participants	SKB
13.10-13.30	EC information	C Davies
13.30-17.30	**Session 1 - Integrated planning of Technical Tasks** **Expected outcome:** • **Identification of technical issues in common between WPs and how they could be addressed in an integrated way.** • **Time plans** **Focus:** • **Presentation of technical tasks and activities re work and time**	
13.30-13.35	**Introduction**	SKB
13.35-14.30	**WP2. Full Scale Emplacement Experiment (FE) Mont Terri** General Task 2.1 Detailed experiment planning Task 2.2 Tunnel construction and support Task 2.3 Preparation of the emplacement Task 2.4 Emplacement activity Task 2.5 Final reporting of WP 2	Nagra
14.30-15.20 (incl coffee)	**WP3. ALC Full scale emplacement experiment at Bure** General Task 3.1 Detailed design of the experiment including an in situ test of forced casing digging to prepare the digging of the cell Task 3.2 Emplacement of the cell Task 3.3 Final reporting of WP 3	Andra
15.20-16.25	**WP4. KBS-3H** General Task 4.1 Detailed WP planning Task 4.2 Manufacturing of distance blocks and buffer blocks for the supercontainer Task 4.3 Upgrading of deposit machine Task 4.4 Multipurpose test Task 4.5 Final reporting of WP4	SKB

16.25-17.30	**WP5. KBS-3V Emplacement tests in ONKALO** General Task 5.1. Detailed WP planning Task 5.2 Demonstration of buffer components emplacement Sub-task 5.2.1. Development of the tool for filling the gap between the buffer and host rock Sub-task 5.2.2. Buffer emplacement testing Task 5.3 Quality assurance and problem handling Sub-task 5.3.1. Development of the quality requirements and quality assurance methods Sub-task 5.3.2. Development of the quality assurance equipment Sub-task 5.3.2. Development of the quality assurance equipment Task 5.4. Final reporting of WP5	Posiva
18.00	Dinner hosted by SKB	
March 15th		
08.30-08.45	**Summary of Session 1**	All
08.45-10.15	**Session 2 - Integrated planning of Common Tasks** **Expected outcome: Clarifying and updating of integrated planning for common tasks.** **Focus: Common tasks for integration.**	All
08.45-09.15	**Workshops in WP1, WP2, WP3, WP4 and WP5** **Guideline for presentations:** • **Each WP presents plans and ideas.** • **The discussion is expected to generate a common plan for LUCOEX.** Task 1.5 Networking and dissemination of results Subtask 1.5.1 Mid-term workshop in conjunction with the international meeting on “Clay in natural and engineered barriers for radioactive waste confinement” Subtask 1.5.2 Large workshop in conjunction with Project Progress Meeting Task 2.6 Integration Subtask 3.4.1: Small workshop in conjunction with Project Progress Meetings of WP3 Task 4.6 Integration Sub-task 5.5.1. Integration	All
09.15-09.45	**Training and scholarships in WP1, WP2, WP3, WP4 and WP5** **Guidelines for presentations:** • **Each WP presents plans and ideas.** • **The discussion is expected to generate a common plan for LUCOEX.** Task 1.6 Training programmes and training activities Task 1.7 Scholarships Task 2.6 Integration	All

	Subtask 3.4.2 Active exchange of experiences Task 4.6 Integration Sub-task 5.5.1. Integration	
09.45-10.15	**Secondment of staff in WP2, WP3, WP4 and WP5** **Guidelines for presentations:** • **Each WP presents plans and ideas.** • **The discussion is expected to generate a common plan for LUCOEX.** Task 1.8 Planning of programme on secondment of staff Task 2.6 Integration Subtask 3.4.2 Active exchange of experiences Task 4.6 Integration Sub-task 5.5.1. Integration	All
10.15-10.30	**Coffee**	
10.30-11.30	**Session 3 - Coordination and Management** **Expected outcome: Plan for issues that are carried out in cooperation.** **Focus: Identification of all issues and discussion on how they should be addressed jointly.**	SKB
10.30-11.00	**WP1. Coordination and integration** **Preparation** • **Each WP contributes with thoughts and ideas on the items below.** • **The discussion is expected to generate a common plan for LUCOEX.** Task 1.1 Coordination of management meetings Task 1.2 Integrated planning Task 1.3 Risk assessment Task 1.4 Communication Action Plan Task 1.9 European added value Task 1.10 Final reporting of WP1 Task 1.11 Summarising and reporting of LUCOEX results Task 2.6 Integration Task 3.4 Integration Task 4.6 Integration Sub-task 5.5.2. Dissemination	SKB
11.00-11.30	**WP6. Management and dissemination** **Preparation** • **Each WP contributes with thoughts and ideas on the items below.** • **The discussion is expected to generate a common plan for LUCOEX** General Task 6.1. Setting up and operating the Organisation for coordination of LUCOEX Task 6.2 Project Presentation	SKB

	Task 6.3 Newsletter Task 6.4 Web-site portal Task 6.5.Support for Production of necessary documentation regarding LUCOEX work and activities	
11.30-12.00	**Session 4 - Project Plan** **Expected outcome: Input and guidelines for finalizing the Project Plan** **Focus: Discussion of different parts for obtaining a common view.** General Table of contents Contributions needed from all Time plan for finalisation	SKB All
12.00-12.45	**Lunch**	
12.45-14.15	**Session 5 – Miscellaneous** **Expected outcome: Means of addressing the issues.** **Focus: Identification of all issues and discussion on how they should be addressed jointly.**	SKB
12.45-13.15	**Scrutinising of Performance/research indicators and criteria** General Review of the list of indicators and criteria in the Grant Agreement and how to implement them in the project work	SKB All
13.15-14.15	**Initial Risk Assessment** General Review and improvement of the “generic” list in the Grant Agreement Initial risk analysis and resulting action list	SKB All
14.15-14.30	**Summary, conclusions and end of PPM**	Chair

Appendix 2

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Euratom FP7 (2007-2011/13) in Geological Disposal

DG RTD (Research and Tech. Develop.)
Unit J2 – Nuclear Fission
Christophe Davies

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OVERVIEW

1. Nuclear fission in EU Energy policy
2. Waste Directive
3. Programme status in Geological Disposal
4. Project management issues
5. Concluding remarks

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1) EU Energy policy:

EU Energy Policy (2007 Council summit)

AN ENERGY POLICY FOR EUROPE

- **By 2020 – the three 20s:**
  - 20% reduction in greenhouse gas emissions compared to 1990 levels (30% if global agreement)
  - 20% improvement in energy efficiency
  - 20% increase in share of renewable energy (and 10% + in use of biofuels for vehicles)
- **By 2050 : 80 to 95% cuts in emissions**

energy for a changing world

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SET-Plan R&D technology proposals (European Industrial Initiatives: EIIs)

- Seven R&D technology proposals:
  - Wind: 20% EU electricity by 2050,
  - Solar: 15% EU electricity by 2020,
  - Electricity grid: 35% of renewable elec. Integrated,
  - Bio-Energy: 14% of Eu energy mix by 2020,
  - Carbon Capture Storage: competitive by 2020-25,
  - Generation –IV nuclear reactor: prototype by 2020, commercial deployment by 2040,
  - Smart cities: new energy efficient heating, electricity and transport systems in 25-30 pioneer cities by 2020 (40% GHG reduction)

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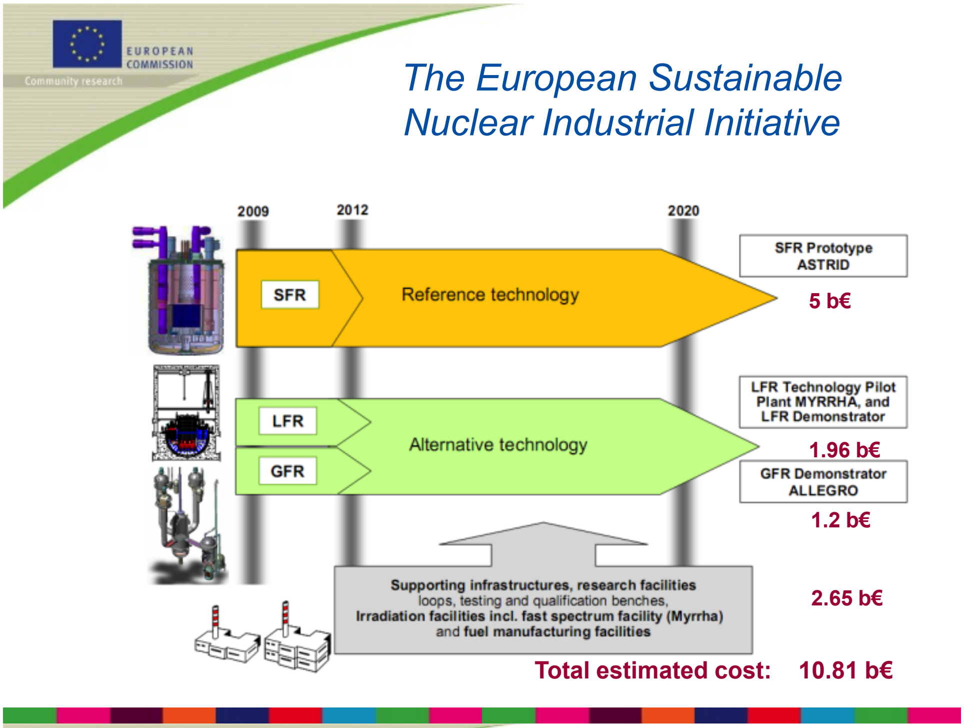
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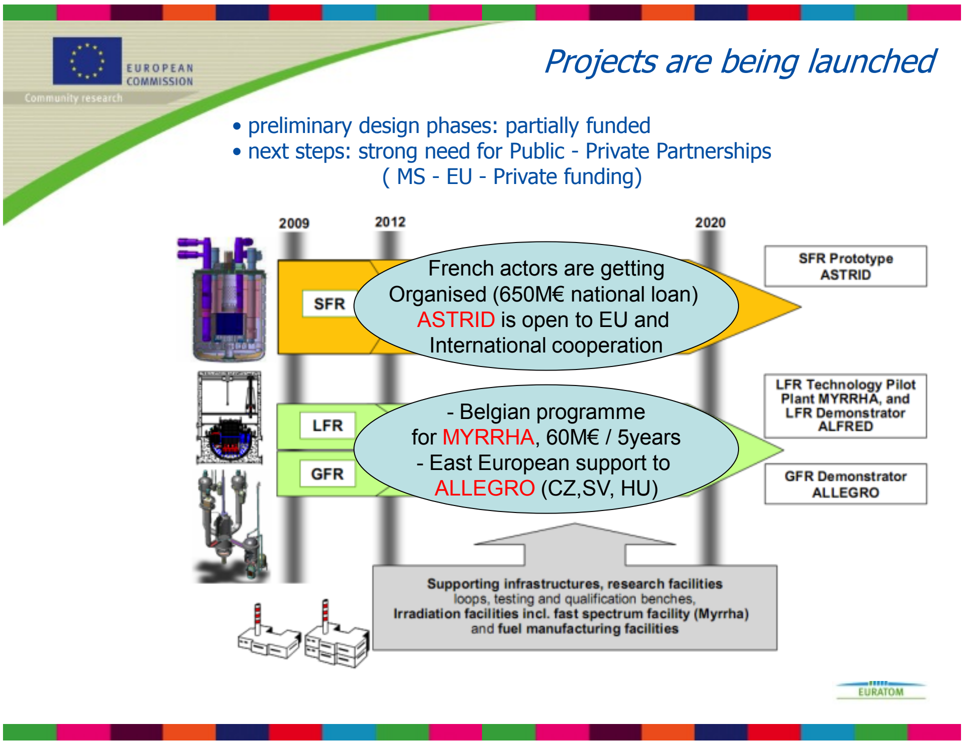
Community research
The European Sustainable Nuclear Industrial Initiative
2009
2012
2020
SFR
Reference technology
SFR Prototype ASTRID
5 b€
LFR
GFR
Alternative technology
LFR Technology Pilot Plant MYRRHA, and LFR Demonstrator
1.96 b€
GFR Demonstrator ALLEGRO
1.2 b€
Supporting infrastructures, research facilities loops, testing and qualification benches, Irradiation facilities incl. fast spectrum facility (Myrrha) and fuel manufacturing facilities
2.65 b€
Total estimated cost: 10.81 b€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Projects are being launched
• preliminary design phases: partially funded
• next steps: strong need for Public - Private Partnerships (MS - EU - Private funding)
2009
2012
2020
SFR
French actors are getting Organised (650M€ national loan) ASTRID is open to EU and International cooperation
SFR Prototype ASTRID
LFR
GFR
- Belgian programme for MYRRHA, 60M€ / 5years - East European support to ALLEGRO (CZ,SV, HU)
LFR Technology Pilot Plant MYRRHA, and LFR Demonstrator ALFRED
GFR Demonstrator ALLEGRO
Supporting infrastructures, research facilities loops, testing and qualification benches, Irradiation facilities incl. fast spectrum facility (Myrrha) and fuel manufacturing facilities
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Commission communication

‘A strategy for competitive, sustainable and secure energy’

COM(2010)639, 10 November 2010

http://ec.europa.eu/energy/strategies/2010/2020_en.htm

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Reference to the contribution of nuclear energy

“Given the renewed interest in this form of generation in Europe and worldwide,

- *research must be pursued on radioactive waste management technologies and their safe implementation,*
- *as well as preparing the longer term future through development of next generation fission systems, for increased sustainability and cogeneration of heat and electricity,*
- *and nuclear fusion (ITER).”*

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Commission proposal for a Council Directive on

‘the management of spent fuel and radioactive waste’

COM(2010) 618 final, 03 November 2010

Key requirements

- *“Member States are asked to present national programmes, indicating when, where and how they will construct and manage final repositories aimed at guaranteeing the highest safety standards.*
- *Internationally agreed safety standards become legally binding and enforceable in the European Union.”*

http://ec.europa.eu/energy/nuclear/waste_management/waste_management_en.htm

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Programme status in GD

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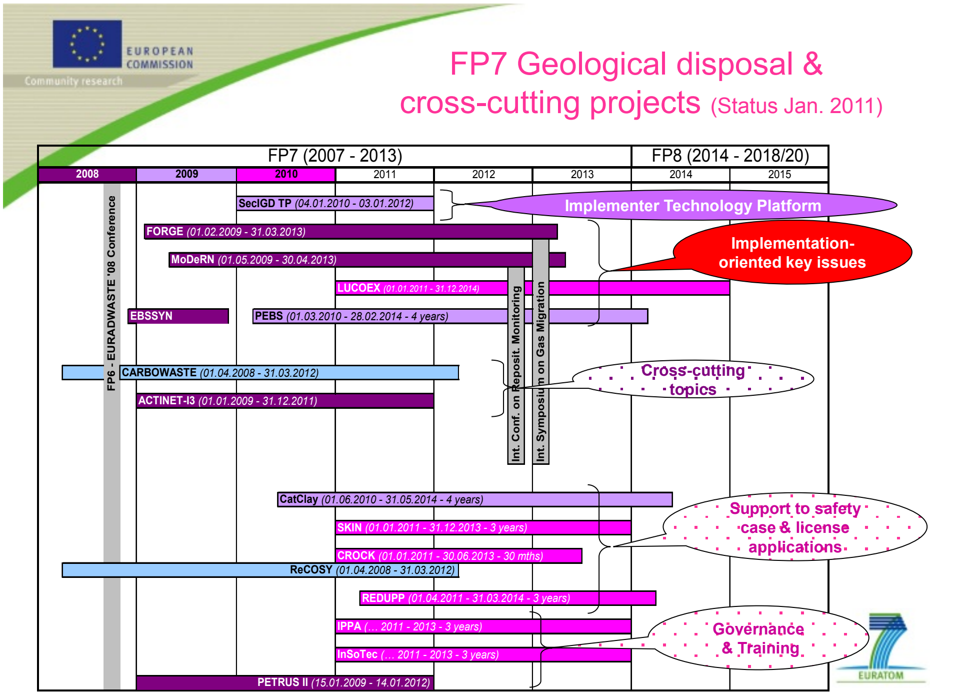

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2) Status Euratom FP7:

Management of radioactive waste: after 4 calls (2007-2010)

Area	# projects	total cost (indicative)	EC contribution (indicative)
Geological disposal + (cross-cutting & E&T)	**16**	**73.2 M€**	**37.4 M€**
P&T + (cross-cutting reactors)	**5**	**49.9 M€**	**22 M€**
Total	21	123.1 M€	59.4 M€

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FP7 – Fission project synopses

http://ec.europa.eu/research/energy/euratom/publications/fission/index_en.htm

Volume II: call 2008

Volume I: call 2007

Work programme & call (WP2011)

Work Programme 2011: http://cordis.europa.eu/fp7/wp-2011_en.html

Call for proposals published 20 August 2010,

Deadline 07 April 2011

Evaluation of proposals: End May 2011

Start/end of project negotiations: End July 2011 / end October 2011

Start of projects: From 01 January 2012

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Activity area: Management of radioactive Waste – Geological disposal

- Topic 1.1.1: Research activities in support of implementation of GD
  Collaborative Project(s) (maxi EUR 3 million/project) and/or
  Coordination and Support Action(s) (maxi EUR 1 million/project)
- Topic 1.1.2: Support for regulatory functions in the area of GD
  e.g. (methods for uptake of research results; harmonisation of applicable criteria, guidance and interpretation of ICRP recommendations; methods of interactions with implementers via e.g. an IGD-TP "mirror group")
  Coordination Action, maxi one (maxi EUR 1 million/project)

Indicative budget EUR 7 million

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Other Activity areas of interest to GD

Indicative budget EUR 5 million (three areas:
1) Infrastructures (one topic),
2) Human resources , Mobility and Training (one topic),
3) Cross-cutting actions (two topics).

1. Infrastructures – Access to infrastructures
   - Topic 4.2.1: Transnational access to large infrastructures
     Coordination and Support Action(s) (maxi EUR 1 million/project)
2. Human resources , Mobility and Training
   - Topic 5.1.1:Euratom Fission Training Schemes (EFTS) in nuclear energy and radiation protection
     Coordination and Support Action(s), maxi 3 (maxi EUR 1 million/project)

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Other Activity areas of interest to GD

3. Cross-Cutting Actions

- Topic 6.0.1: Actions supporting programme implementation and other Activities
  e.g. (promotion and uptake of results; communication & dissemination; contribution to strategic objectives via pilot initiatives on benchmarking, mapping, networking; preparation of possible future Community actions via prospective studies, exploratory measures, pilot actions). Does not include support to workshops & conferences.
  Coordination and Support Action(s), (maxi EUR 1 million/project)

- Topic 6.0.2: Enhancing involvement of New Member States (NMS)
  i.e. (facilitate any process for increased involvement of NMS in Euratom FP activities) via generic projects on networking activities, pilot studies to investigate how to integrate and to become more closely involved in Community activities. Does not concern cooperation in very specific R&D areas
  Coordination and Support Action(s), (maxi EUR 1 million/project)

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Cooperation with Third countries

Open under Euratom bilateral agreements e.g. Russia and China

- Cooperation welcome inter alia in GD topics 1.1.1 & 2 however not an obligation
- Principle of mutual interest and benefit
- Participation arrangements:
  - Bodies encouraged to join as full consortium partners in the Euratom Grant Agreement; however possibilty of cooperation via two separate projects (coordinated or parallel projects) linked by a coordination agreement,
  - Coordination agreement to include issues of Intelectual Property Rights (IPR),
  - Participation normally at zero cost to Euratom unless case can be made

EURATOM

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Technology platform for waste disposal: IGD-TP

EURATOM

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IGD-TP

(Implementing Geological Disposal of radioactive waste Technology platform)

Launched in Nov. 2009

- Supported by Euratom Sec IGD secretariat project:
  (January 2010 –December 2011) http://www.igdtp.eu/

- Two main activities:

1. Develop a Strategic Research Agenda (SRA),
   - Draft presented at the Exchange Forum, 09 February 2011, Paris
2. Prepare a Deployment Plan for joint execution
   - In 2011

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SRA Key topics (Dec. 2010)

Key topic 1:	**Safety Case**
Key topic 2:	**Waste forms and their behaviour**
Key topic 3:	**Technical feasibility and long-term performance of repository components**
Key topic 4:	**Development strategy of the repository**
Key topic 5:	**Operational Safety**
Key topic 6	**Monitoring**
Key topic 7:	**Governance and Stakeholder involvement**

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Project management : a few contractual issues

- Reporting: (within 60 days of end of period), (payment within 105 days of receipt)
  - → Two periodic reports at months 18 & 30 and a final report at M30
    - Publishable summary of work
    - Justification of use of the resources
    - Financial statement (individual) & summary financial report (coordinator)
  - → Report on distribution of the EC financial contribution 30 days after receipt of final payment
  - → Guidance notes on project reporting: http://cordis.europa.eu/fp7/find-doc_en.html
  - → Deliverables (technical) & reports prepared and submitted online:
    - via SESAM, technical part
    - via FORCE, financial part (originals by post)
    - Access via participant portal: http://cordis.europa.eu/fp7/pp_en.html

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Publications / dissemination:

- Scientific publications: (references & abstract submitted to the EC latest 2 months following publication), contract article II.30)
  - ➔ Acknowledgement of Euratom programme in publications / presentations:
    - *"The research leading to these results has received funding from the European Atomic Energy Community's Seventh Framework Programme (FP7/2007-2011) under grant agreement n° 269658"*
    - Use Euratom FP7 and project logos:
      logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm
      logo of the 7th FP: http://ec.europa.eu/research/fp7/index_en.cfm?pg=logos
    - Expenses for participation in international workshops and events only accepted if for presentation of the project or key parts of it, Annex I, section section B.2.4. resources to be committed

Payment modalities:

- Pre-financing: (within 45 days of signature of the grant agreement by the EC)

Pre-financing 80% of total	**€ 2,341,333.33**
Guarantee fund	**€ 219,500.00**
Net paid	**€ 2,121,833.33**

- ➔ Interim payments based on financial statements (EC contribution= amounts justified & accepted * funding rate)
- ➔ Maxi payment before completion: 85 % of total EC contribution (Retention 10% and 5% guarantee fund)
- ➔ Final payment

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Concluding remarks:

- Nuclear renaissance confirmed in many EU MS:
  - ➔ EU Energy Policy & Energy 2020 strategy Communication launched and supported by SET plan,
  - ➔ Nuclear to play a key role in Energy policy,
  - ➔ Recommendation to pursue research on radioactive waste management technologies and their safe implementation,
  - ➔ Commission proposal for directive on spent fuel and radioactive waste management in Nov.2010
- Geological disposal in Euratom FP7
  - ➔ Substantial contribution at mid-term of FP (16 projects for =~ 37 m€ EC contribution). Good coverage of research fields already achieved.
  - ➔ Three remaining calls in FP7 (2011, 2012 & 2013).

    Future proposals to respond inter alia to key topics of the IGD-TP Strategic research Agenda.

    Focussed research and on key uncertainties, in particular if supported by national waste management programmes.

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Thank you for your attention

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Appendix 3

WP2: Content Project Meeting Presentation

Full Scale Emplacement Experiment (FE) at Mont Terri Rock Laboratory

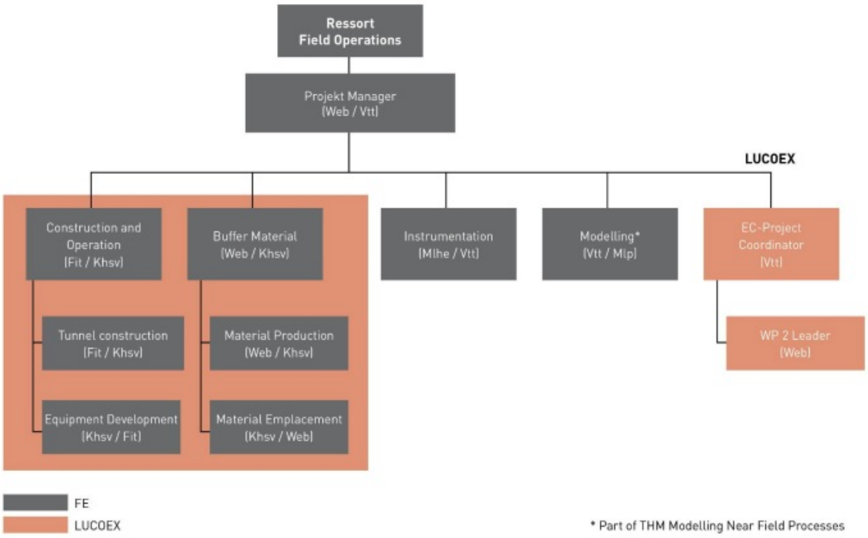
1. Objectives, Design, Organisation

2. Tasks

WP2: Objectives

- Provide a confirmation of the suitability of the repository design basis or give clear insights regarding how it should be modified
- Construct an emplacement tunnel using modified standard equipment (e.g. modified road header) and adequate support measures (anchors, lining or steel rips)
- Manufacture the bentonite buffer in a suitable form and density
- Design, manufacture and (in situ) test equipment necessary for waste and buffer emplacement
- Demonstrate the suitability of the concept

Project FE / LUCOEX **Organigramme**



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Design of the Experiment

- Full - scale experiment in the Mont Terri rock laboratory
  - Tunnel diameter ca. 2.8 m (incl. Lining); Length about 50 m
  - Excavation parallel to bedding with Road Header
  - outside the currently used lab region
- Pre-Instrumentation of experiment location for in-situ characterisation (“Zero measurements“)
- Instrumentation of bentonite buffer and host rock
- Use of realistic lining concept (shotcrete, anchors, steel rips)
- Ventilation over 1 year
- 3 simulated BE canisters (1500 W; SF “Abklingverhalten“)
- Reference backfill material (blocks and granular bentonite)
- Heating and monitoring over 15 years
- THM Modelling programme

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WP2: Tasks

- Task 2.1 Detailed experiment planning
- Task 2.2 Tunnel construction and support
  - Evaluation of construction and support method
  - Modification of tunnelling machine
  - Tunnel construction and ventilation period
- Task 2.3 Preparation of the emplacement material; blocks, pellets (granulates)
- Task 2.4 Emplacement activity in the Rock Laboratory Mont Terri to emplace the canister, the bentonite blocks and the granular bentonite in the tunnel and sealing section including QC procedures
- 2.5 Final reporting of WP 2

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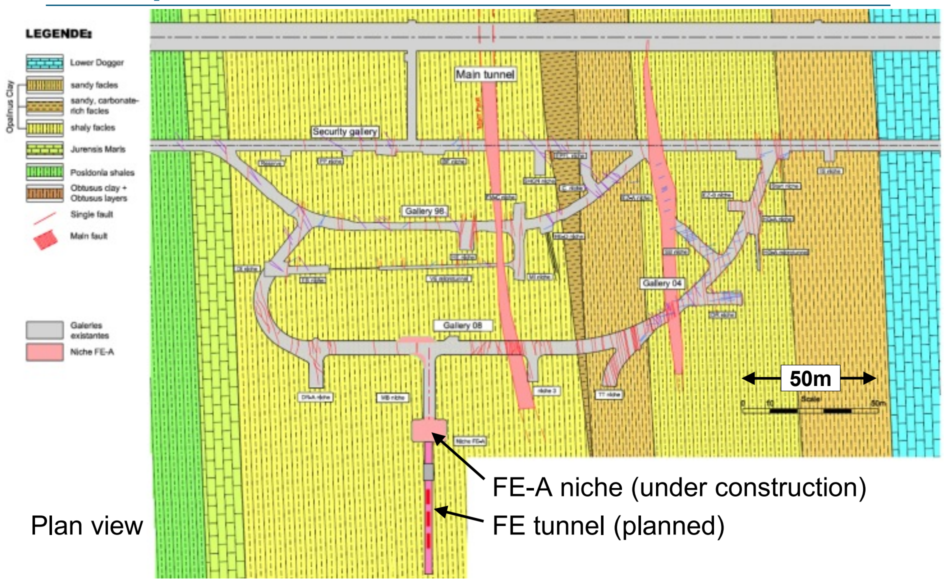
FE-Experiment, Location



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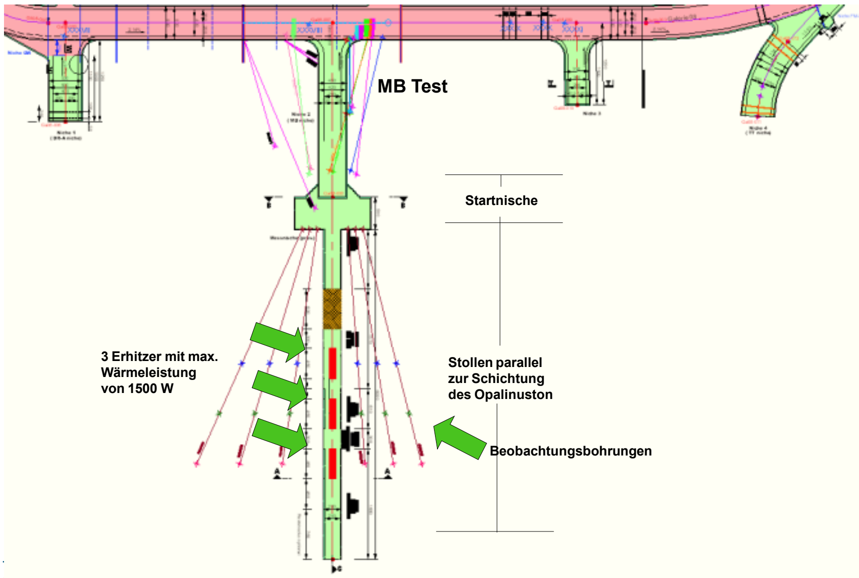
Planned FE Experiment (Heater Experiment)



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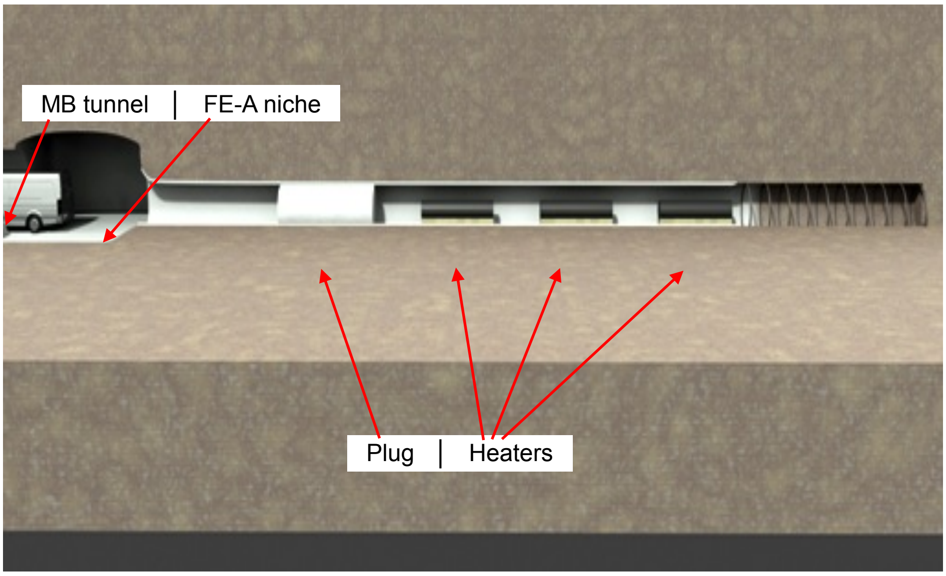
FE-Experiment, Design



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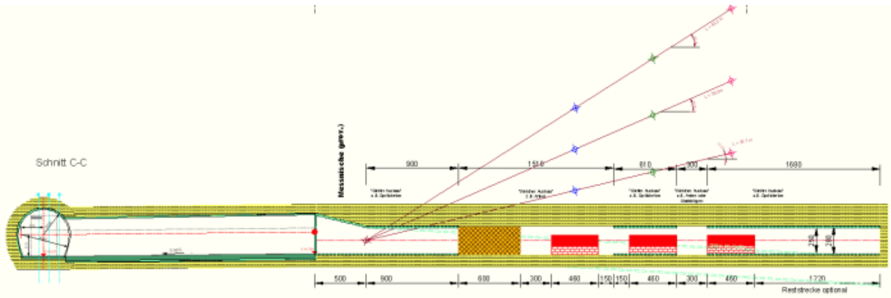
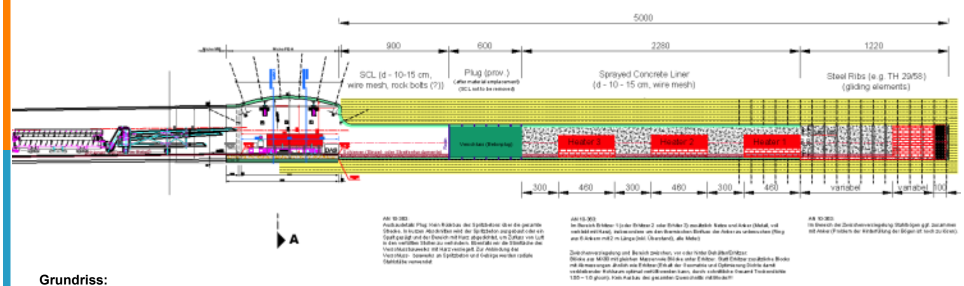
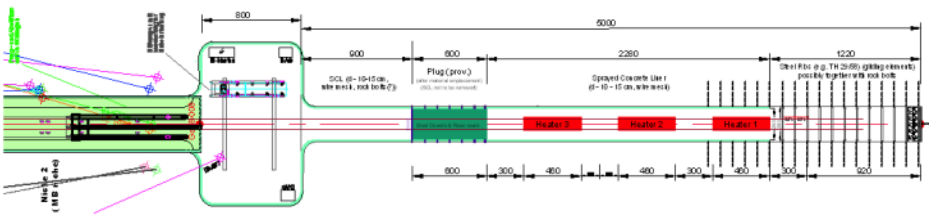
Side view



FE-Experiment vertical and horizontal section

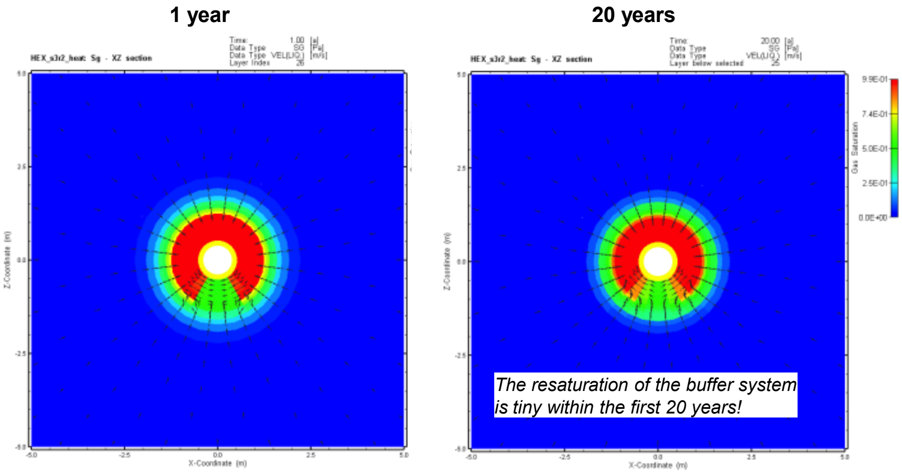


Grundriss:



FE Experiment – Modeling TOUGH2 Simulations

▪ Buffer resaturation



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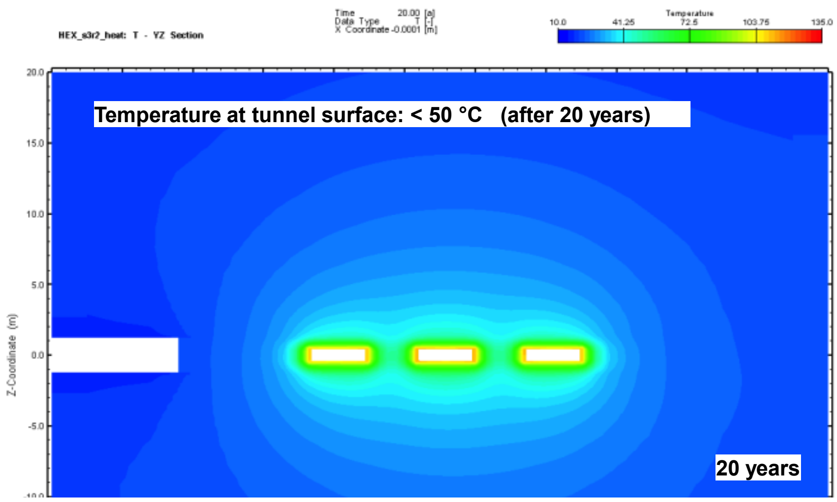
FE experiment – TOUGH2 Simulations

▪ Temperature evolution



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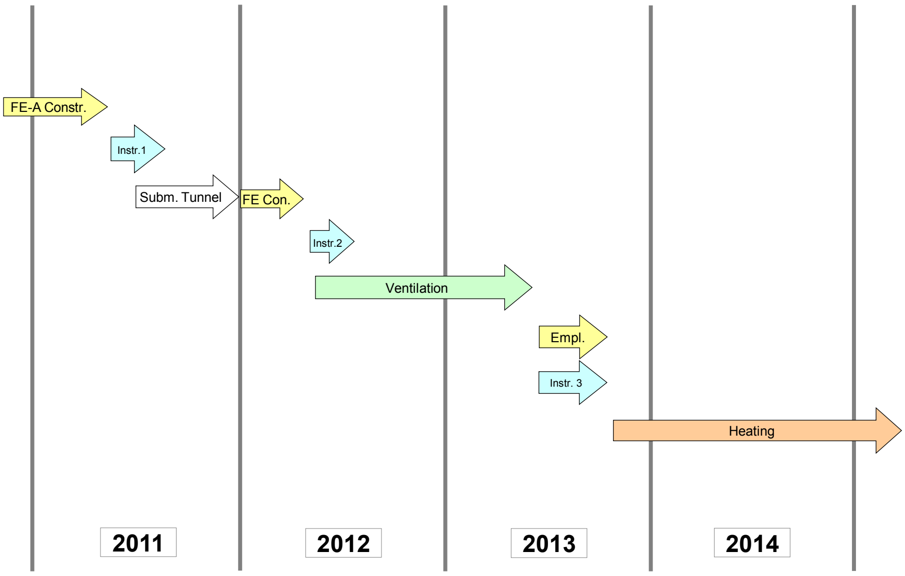
WP2: Task 2.1 Overview Time planning



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Task 2.2 Tunnel Construct. Entrance MB Tunnel

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Entrance MB Tunnel

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Excavation Start Niche FE-A

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Tunneling

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Bentonitblockpress 650 to Alpha Ceramics (D)

WD 2.0

DD 1.8

wc 11%

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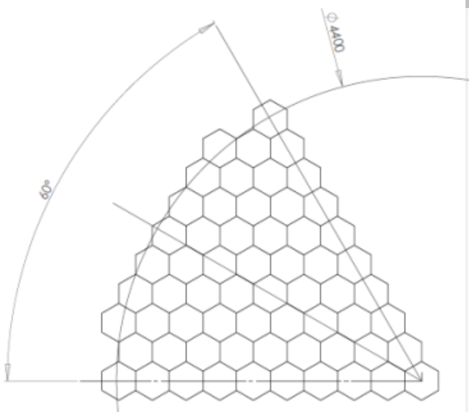
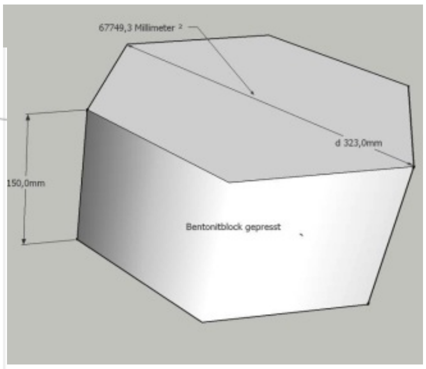
nagra

FE - Hexagonale Bentoniteblocks für “Sealing”





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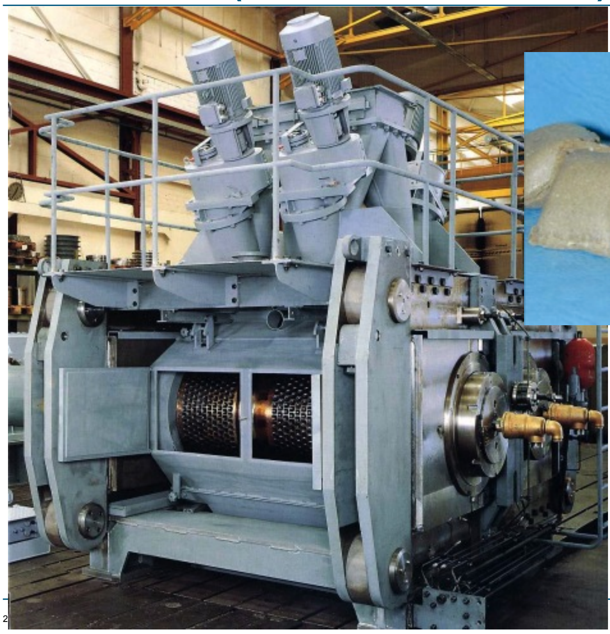
Roller Press (Bentonite-Cushions)



Production Bentonite Granulate

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ESDRED tests with twin auger system

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ESDRED Emplacement tests (steel cylinder 2m)

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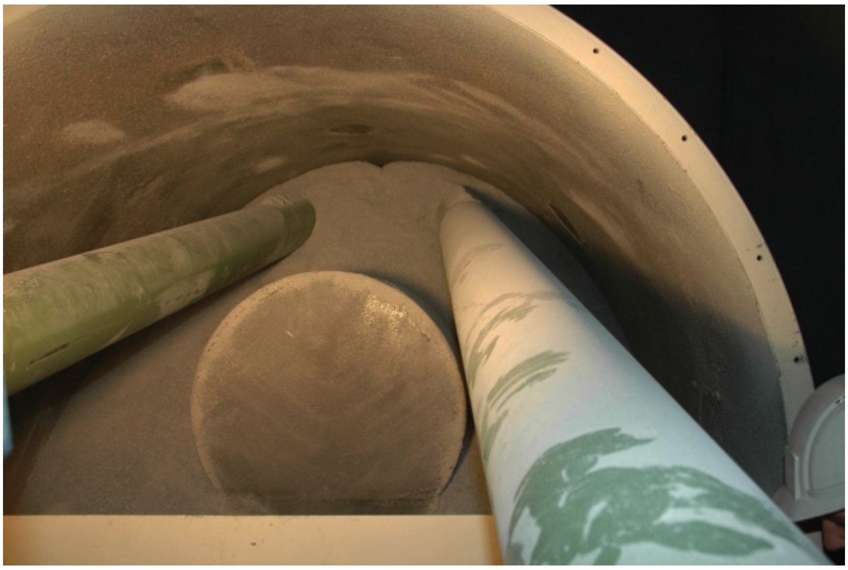
Emplacement tests with granular bentonite



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Emplacement tests with granular bentonite

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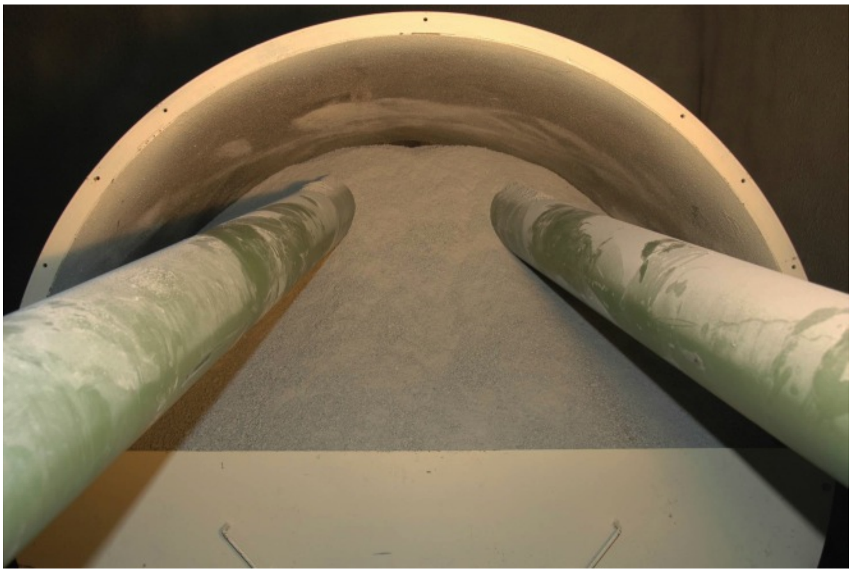
Emplacement tests with granular bentonite



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Inspection opening at roof of steel cylinder

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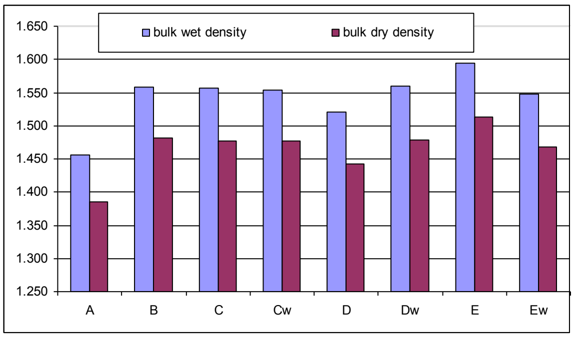
ESDRED Test Results Bentonite-Granulates



A 100 % coarse rounded granular material, embedded in two layers
B 92 % coarse, 8 % fine, two layers
C 85 % coarse, 15 % fine, two layers
Cw 85 % coarse, 15 % fine, two layers
D 70 % coarse, 30 % fine, two layers
Dw 70 % coarse, 30 % fine, repeat run, two layers
E 64 % coarse, 28 % fine, 8 % briquettes, two layers
Ew 64 % coarse, 28 % fine, 8 % briquettes, repeat run, only one laye

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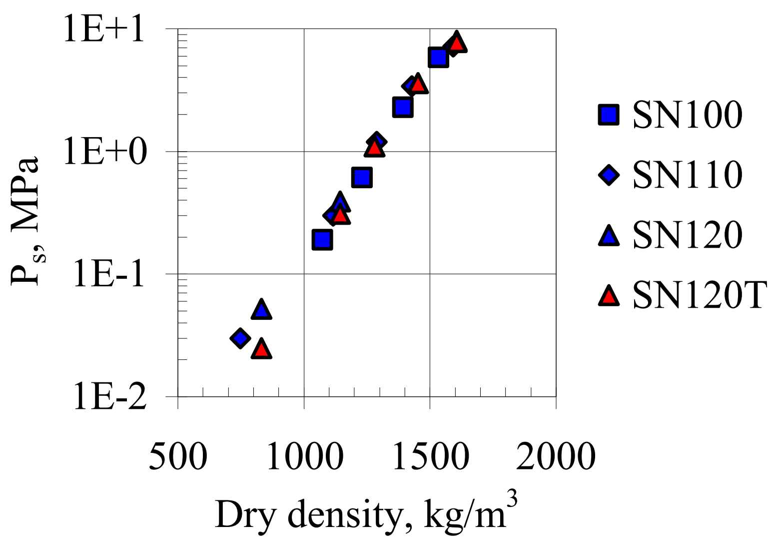
Swelling Tests with granular bentonite (CT)



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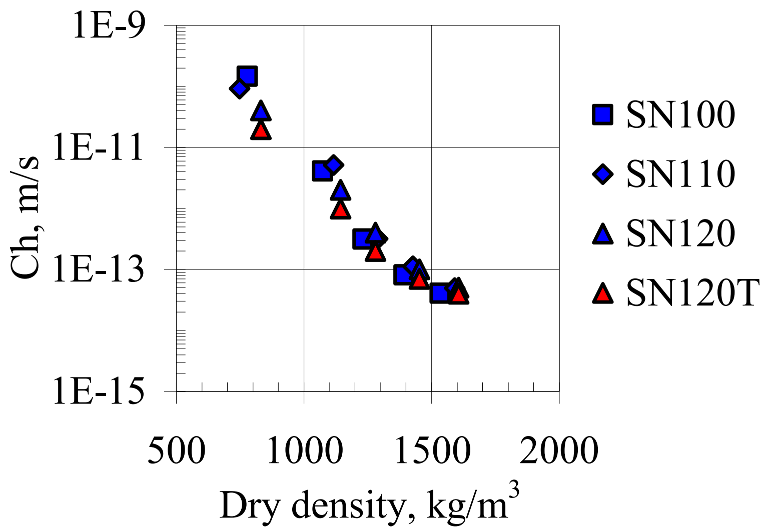
Hydraulic Conduc Tests with granular bentonite



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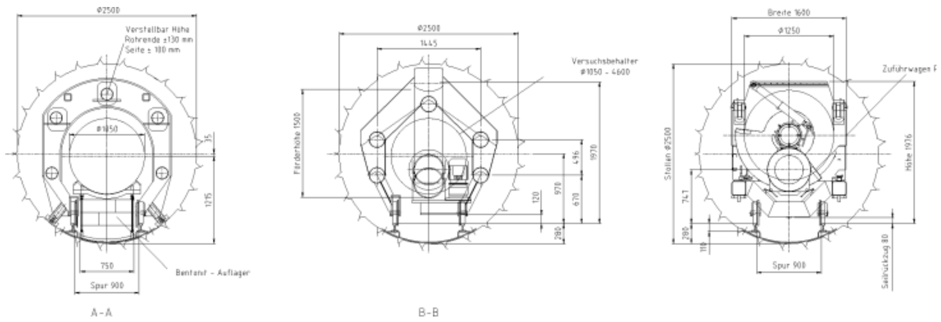
Future Full Scale Emplacement Experiment



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FE / LUCOEX: Heater

External Dimensions	Diameter	1050 mm
	Length	4.6 m
	Total weight (estimated)	5’700 kg for 40 mm wall thickness
Outer body	Wall thickness	In the order of 40 mm
	Material	Carbon steel
Inner tube	Gap to outer body	< 20mm
	Material	Carbon steel

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FE / LUCOEX: Heater

Parameter	Value
Number of heaters:	3
Type of heating:	Electrical
Shape:	Cylindrical
Heater length:	4.6 m
Outer diameter:	1.05 m
Power:	1500 W (nominal)
Redundancy:	Yes (two resistors)
Casing material:	Carbon steel
Minimum weight:	4’500 kg
Max. surface temperature:	135° C
Max. outer pressure:	5 MPa
Test duration:	15-20 years

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FE-Experiment, Instrumentation (Overview)

What do we want to measure?	Instrumentation		
	Phase 1	**Phase 2**	**Phase 3**
	Rock		Buffer
	Far-field	Near-field	
Temperature	X	X	X
Saturation	-	X	X
Pressures	X	X	-
Deformation	X	X	-

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FE Instrumentation Phases

- Excavation of the FE-A niche [on-going]
- Instrumentation Phase 0+1 [approx. June 2011]
  - Preparation of the data acquisition system (DAS)
  - Instrumentation of the tunnel climate sensors
  - Drilling of long boreholes from the FE-A start niche
  - Instrumentation of the mid-/far-field host rock
- Excavation of the FE tunnel [end of 2011 / beginning of 2012]
- Instrumentation Phase 2 (I-Ph.1)
  - Drilling of short boreholes from the FE tunnel
  - Instrumentation of the near-field host rock
- Ventilation [for approx. 1 year]
- Installation of the heaters on bentonite blocks and emplacement of the bentonite pellets
- Instrumentation Phase 3 (I-Ph.3) [simultaneously with emplacement]
  - Instrumentation of the bentonite backfill
- Construction of the sealing concrete plug

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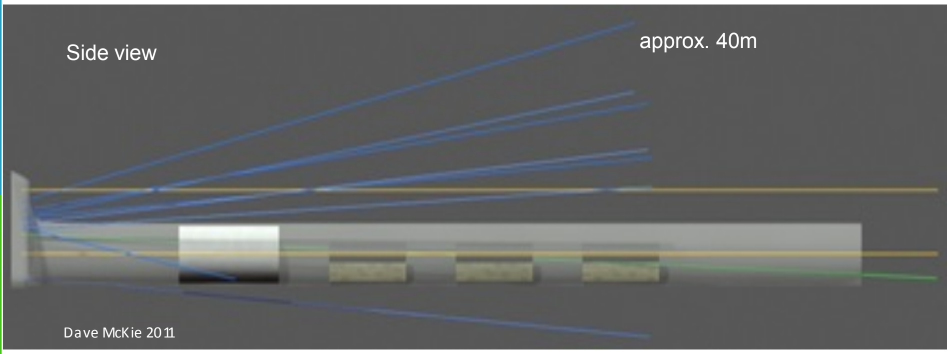
FE-Experiment, Instrumentation (Phase 1)

- Outlook on the instrumentation of the host rock (far-field)
  - Exploration borehole [in green]
  - Hydraulic (multi) packer systems [in blue]
  - Boreholes for deformation measurements [in orange]



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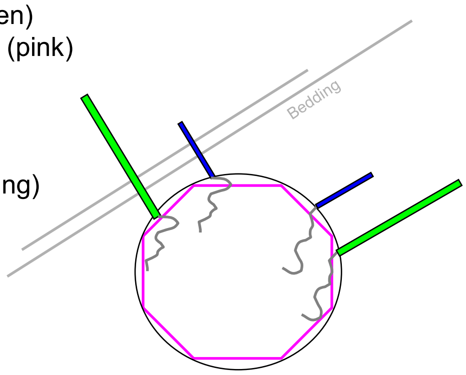
FE Instrumentation Phase 2 (2012)

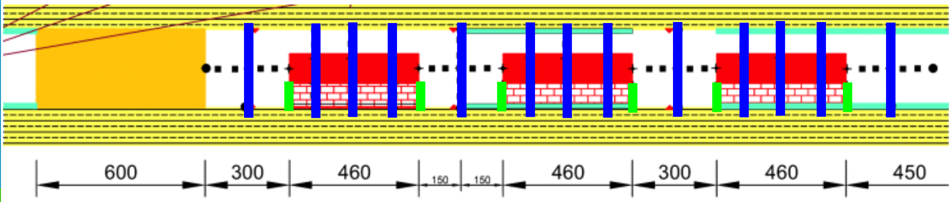
- Approx. 7 measurement sections (heaters+gaps)
  - temperature & saturation & porewater pressure (blue)
  - deformation host rock (green)
  - deformation tunnel surface (pink)



- We are paying attention to
  - Implications resulting from construction (e.g. rock bolting)
  - Implications resulting from emplacement
- Problems we are solving
  - Durability and redundancy of sensors
  - Cable guidance → extra boreholes?

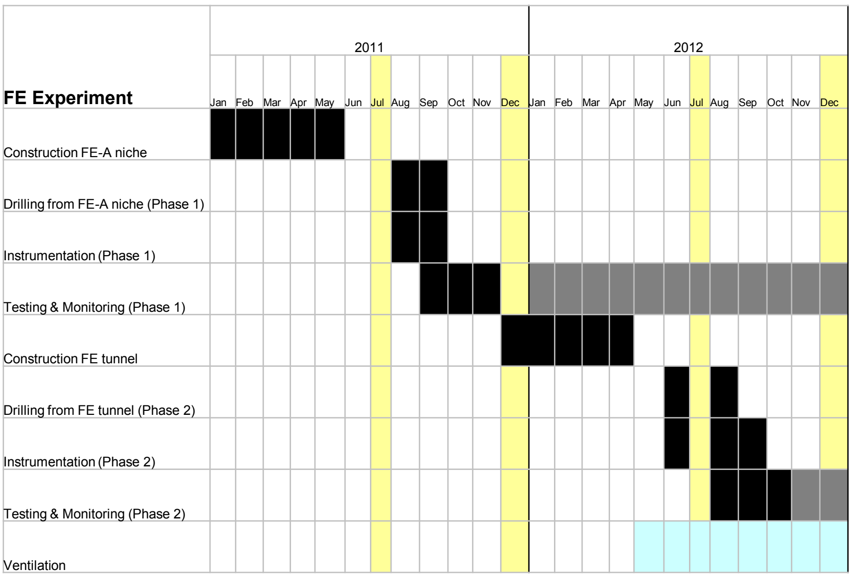
FE Instrumentation Phase 3 (2013)

- Approx. 7-10 measurement sections (heaters+gaps)
  - Within bentonite and on rock surface (in blue)
    - Temperature and saturation
    - (Total pressure)
  - On canisters
    - Temperature and movement (in green)



Svensk Kärnbränslehantering AB

Detailed experiment time planning



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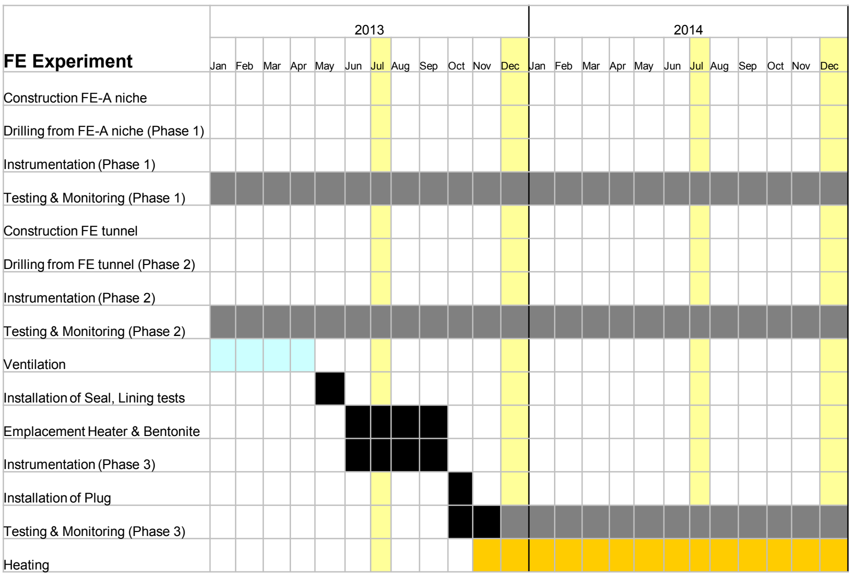
Detailed experiment time planning



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Thank you
for your attention

nagra

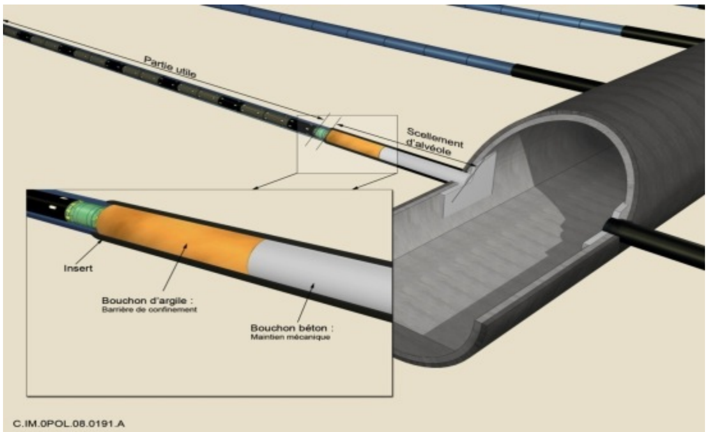
Appendix 4

Full scale emplacement experiment
(expérimentation ALC Phase 3)
LUCOEX Meeting – Stockholm

Andra concept for HL-LL waste disposal cells

Horizontal micro tunnels, about 700 mm in diameter, cased with steel casing

- Usable part 30 m long used for containers disposal,
- Head part 10 m long used for cell sealing
- End steel plug and shield steel plug



Objectives of the ALC experiment

The main objectives of the ALC experiment « Alvéoles HA Phase 3 » are :

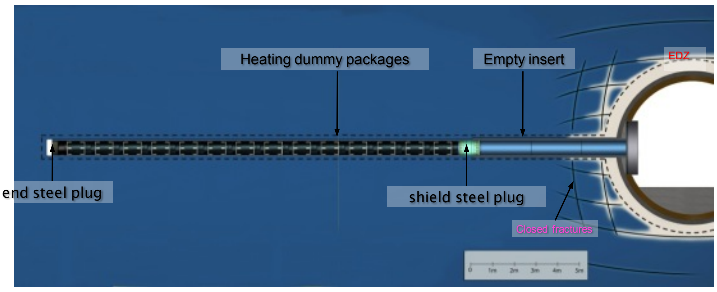
- test the making up of the cell (head & usable part) and of different equipments into the cell (end steel plug and shield steel plug),
- verify the suitable working of the head insert to absorb the thermal dilation of the casing,
- provide data on the casing behaviour under thermal loading,
- verify the design of the cell head to limit thermal gradients on the drift wall,
- study the THM behaviour of the interface between rock and casing and of the surrounding rock (not included in LUCOEX).

Demonstration cell characteristics

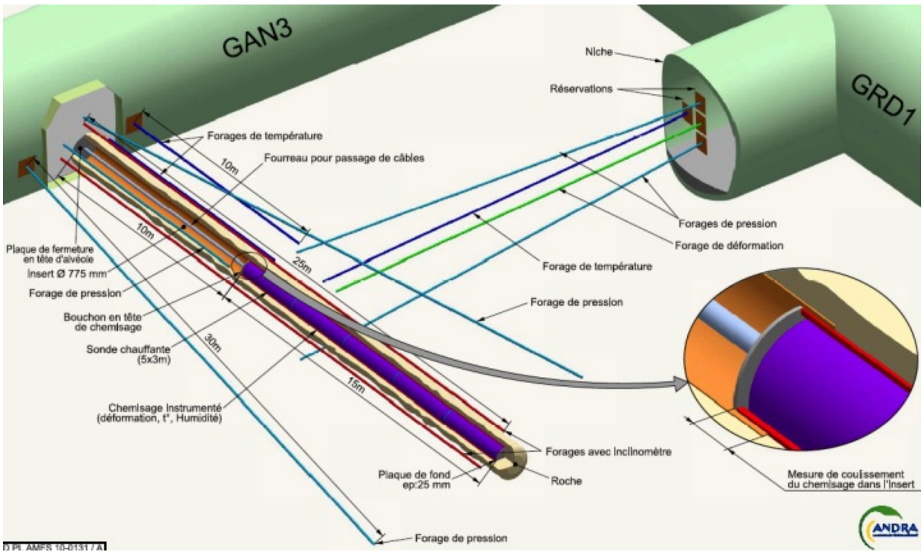
25 m long micro tunnel:

- Usable part 15 m long excavated 740 mm Ø, steel casing 700 mm Ø
- Head part 10 m long excavated 791 mm Ø, steel casing 775 mm Ø
- End steel plug and shield steel plug

Heating will be carried out in the 15 m long of the usable part, up to 90°

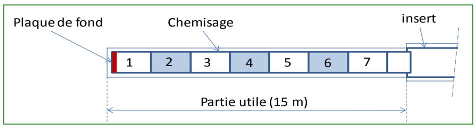


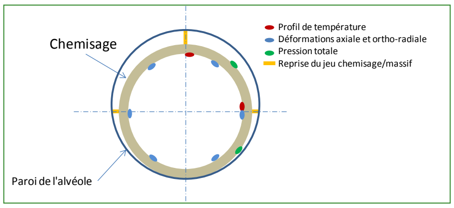
Instrumentation in peripheral boreholes



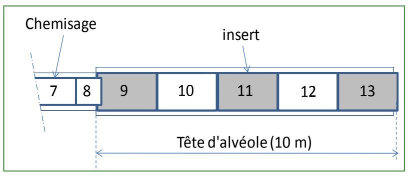
Instrumentation of the steel casing

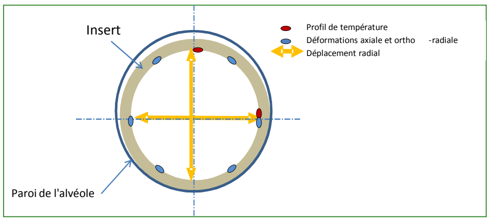
- Casing in the usable part, 700 mm ext. Ø: temperature, deformation, total pressure, thermal dilatation, convergence at the interface rock/casing



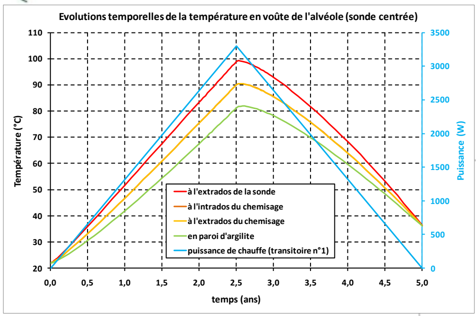


- Casing in the head part (« insert »), 775 mm ext. Ø: temperature, deformation, convergence of the steel casing, relative displacement between usable part casing and insert

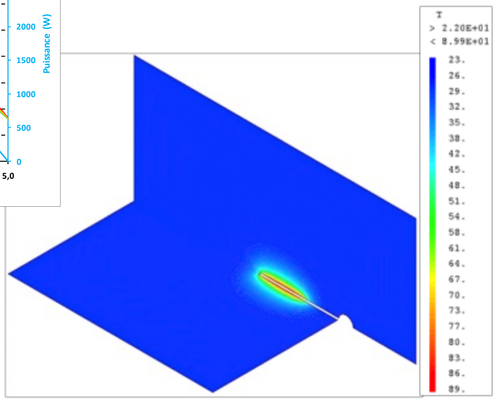




Thermo-mechanical modelling

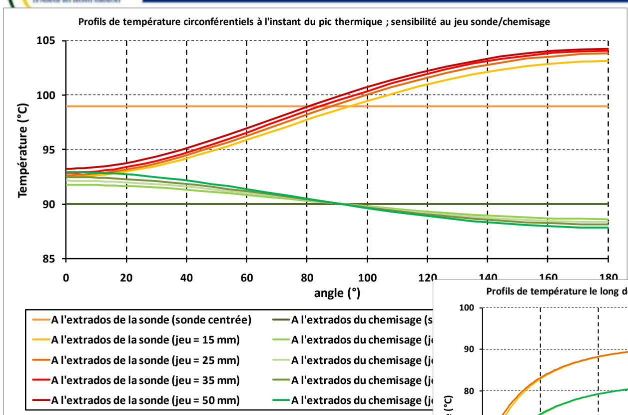


Simulation of heating cycle



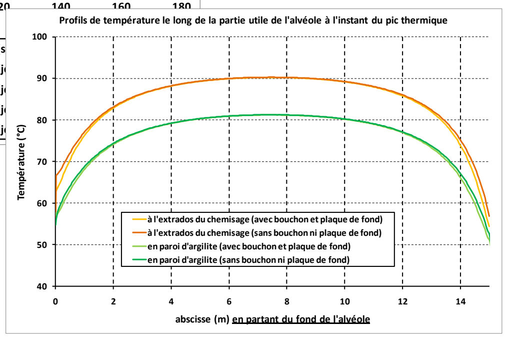
Thermal field around the demonstration cell at 90°

Thermo-mechanical modelling (2)



Influence of heaters position in the cell

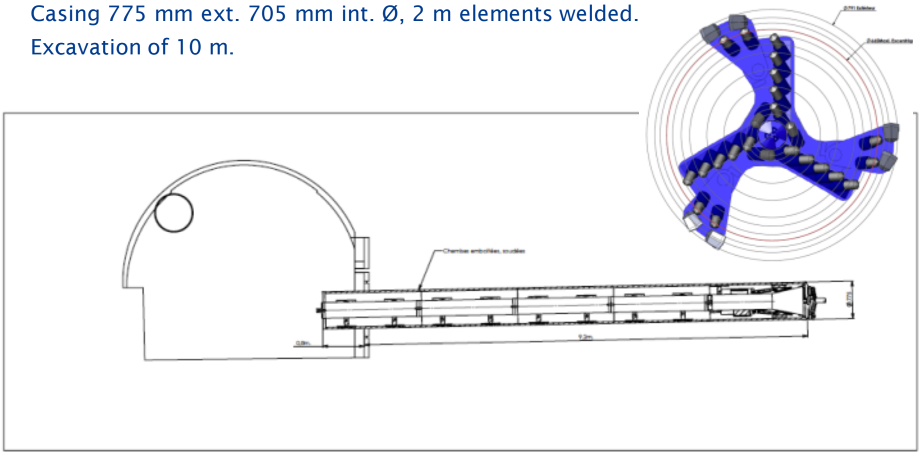
Influence of steel plugs



Preliminary test of the head part feasibility

A preliminary test of the head part of the demonstration cell will be carried out in ALC experiment Phase 2, in June 2011.

Casing 775 mm ext. 705 mm int. Ø, 2 m elements welded.
Excavation of 10 m.



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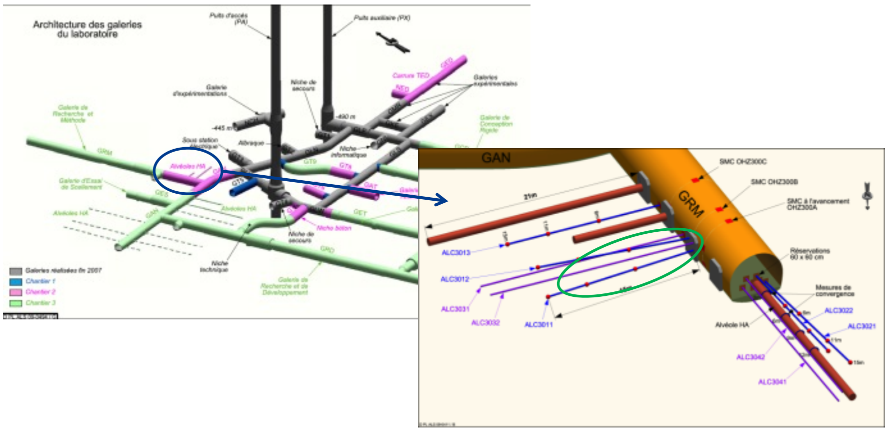
Preliminary test of the head part feasibility (2)

This test will be carried out in GRM drift.

The axial load on the casing will be recorded during the test.

depending on the results, modification or adaptation of the machine and method for ALC phase 3.



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Current status of the project

- Call for tender for casing instrumentation has started:
  - ☐ conception phase is planned to be done for October 2011,
  - ☐ qualification phase for December 2011,
  - ☐ Installation during excavation of the demonstration cell in February 2012.
- Call for tender for heaters is currently being prepared, start March 2011:
  - ☐ conception phase is planned to be done for February 2012
  - ☐ Installation planned or July 2012
- Peripheral boreholes will be performed between August and November 2011.

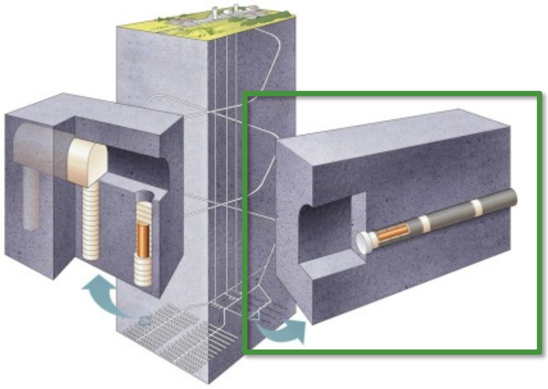
- Preliminary test of the feasibility of the head part of the cell ("insert"), is planned in June 2011.

  ➡ small delay for the first deliverable "*Report on the preliminary test of forced casing digging*", July 2011 instead of June 2011

- Test plan of the ALC experiment Phase 3 planned for April 2011, English version for September 2011.

Appendix 5

Work Package 4, KBS-3H
LucoeX Project Progress Meeting 01
March 14th -15th , 2011
Magnus Kronberg



Contents

- **The KBS-3H Project**
  - *Background*
  - *Reasons for developing KBS-3H*
  - *KBS-3H key components in the design*
  - *Current Project status*
- **KBS-3H System Design, upcoming Project phase**
- **Full scale demonstration**
  - *KBS-3H previous demonstration*
  - *LucoeX WP 4, Multi Purpose Test (MPT)*
  - *Time Schedule*

Contents

- **The KBS-3H Project**
  - *Background*
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Background, KBS-3H

Pass Project (1990-1992)

- **Comparison of KBS-3 to other geological disposal methods**
  - *Very Long Holes*
  - *Very Deep Boreholes*
  - *WP-Cave*
  - **KBS-3**

JADE Project (1996-1998)

- **Comparison of KBS-3 disposal methods**
  - *Horizontal KBS-3 (one canister per drift)*
  - *KBS-3-2C (two canisters in one KBS-3V deposition drift)*
  - **KBS-3V (one canister in each deposition hole). Reference design**
  - **Medium long holes (MLH), later known as KBS-3H**

KBS-3H Project phases

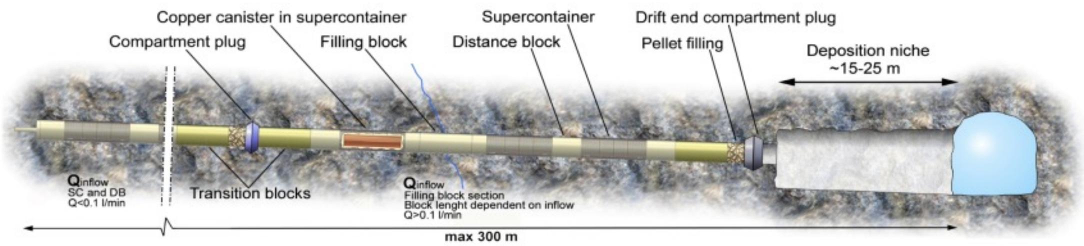
- **KBS-3H Feasibility study (Prestudy), 2002**
- **KBS-3H Basic design, 2003**
- **KBS-3H Demonstration, 2004-2007**
- **KBS-3H Complementary studies of horizontal emplacement, 2008-2010**
- **KBS-3H System Design, 2011-2014**

Reasons for developing KBS-3H

Most of the positive effects of horizontal emplacement are related to the smaller volume of excavated rock (approximately 1/3 compared to KBS-3V). Examples of positive effects are:

- Reduced cost for construction.
- Less environmental impact during construction.
- Reduced disturbance on the rock mass during construction and operation.
- Prefabricated disposal container enables an easier quality assurance.
- Enables a more industrialised process during construction and disposal.
- Strengthens the confidence in the KBS-3 method.

KBS-3H key components in the design

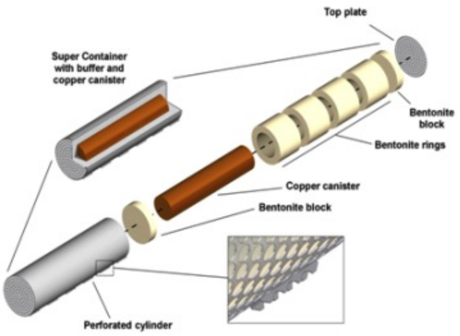


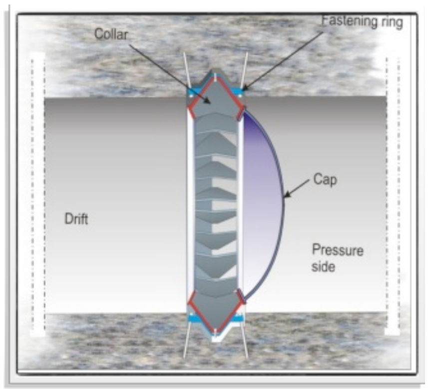
Filling components
- Drift end component
- Space next to the plugs (transition blocks and pellets)
- Space inside the plugs
- Filling blocks

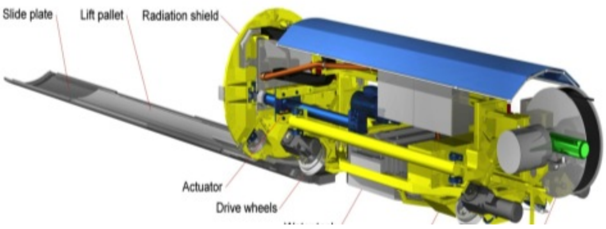
Supercontainer section
- Supercontainer incl. buffer
- Distance block

Plugs
- Compartment plug
- Drift end compartment plug

KBS-3H key components in the design

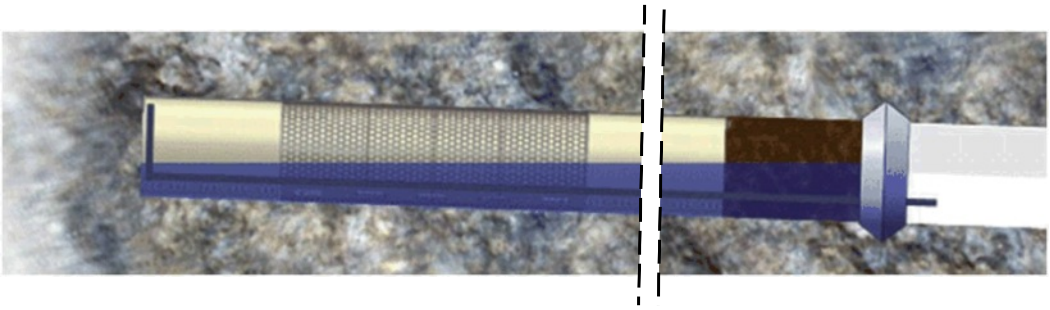






The development and demonstration of the deposition machine was included in ESDRED

KBS-3H reference design: DAWE (Drainage, Artificial Watering and air Evacuation)



Schematic illustration of DAWE, in the repository case the sections will be ~150 m long with multiple canisters and distance blocks.

Current Project status

- Substantial development and evaluation since 2002 has brought KBS-3H to a maturity that is close to what has been developed for KBS-3V.
  - Robust KBS-3H reference design has been established, DAWE(Drainage, Artificial Watering and air Evacuation).
  - Long term safety studies have recommended a material for the Supercontainer, plugs and other supporting structures, titanium.
  - KBS-3H description is developed, layout adaptations for Forsmark and Olkiluoto, drilling techniques, operational and personal safety.
  - Several design components tested in full scale, drilling and reaming of a KBS-3H drift, deposition equipment, compartment plugs, Mega Packer (post grouting).

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  - *KBS-3H previous demonstration*
  - *LucoeX WP 4, Multi Purpose Test (MPT)*
  - *Time Schedule*

KBS-3H System Design, upcoming project phase

- Main goal:
  - **Produce KBS-3H design and system understanding to such a level that the preparation of a PSAR and the comparison between KBS-3V and KBS-3H is possible**
- System Design (according to SKB:s model of delivery)
  - Revise the requirement specification
  - Develop the Basic design
  - Plan for industrialization and inspection
  - Preliminary operational safety program
  - Verification
  - Risk analysis

KBS-3H System Design, main activities

- Long term safety related
  - Safety assessment, Olkiluoto and Forsmark
  - Production line reports
  - Layout adaptations, Olkiluoto and Forsmark
  - Large/lab scale buffer studies
- Licensing related
  - Facility and system descriptions
  - KBS-3H detailed characterization program/RSC
  - Full scale tests
  - Environmental impact
- Quality, costs
  - MTO, operational and workers safety
  - Cost calculations

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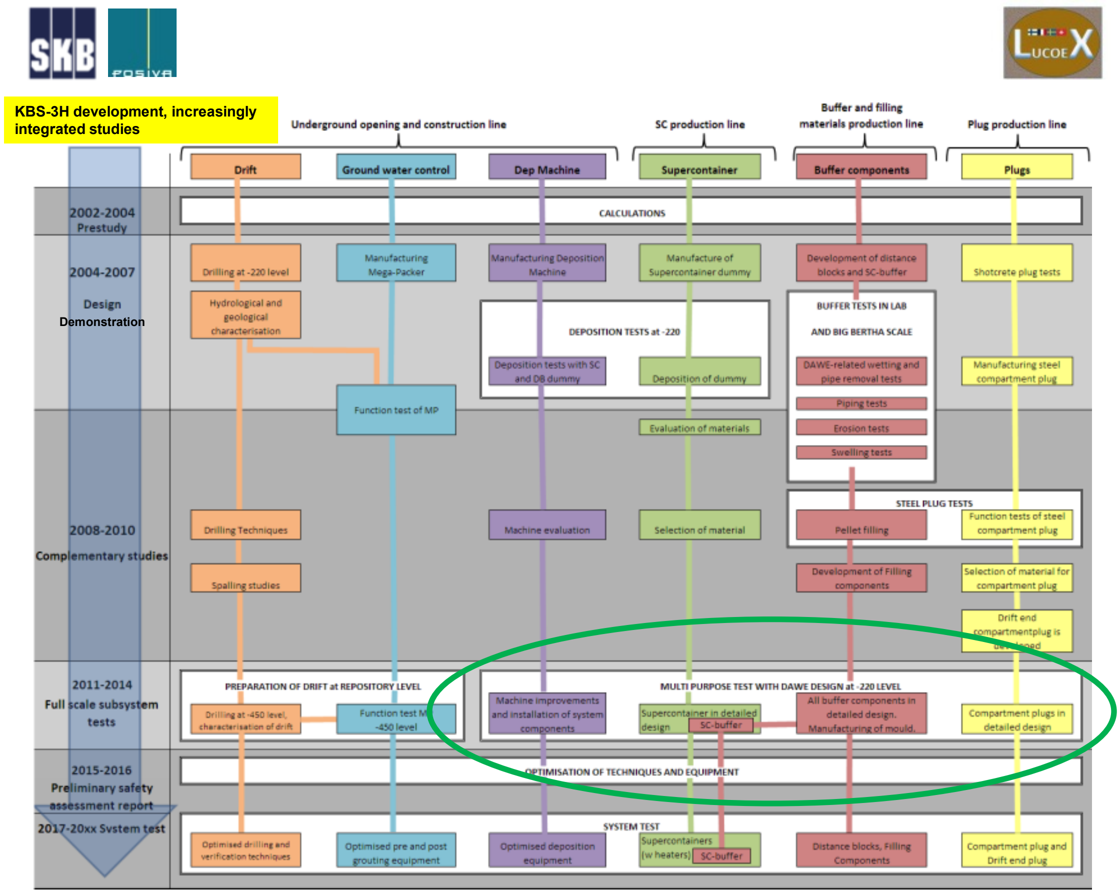
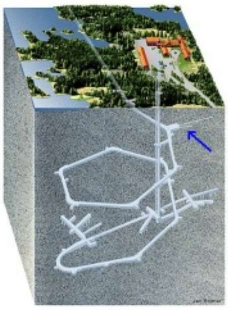


LucoeX WP 4, Multi Purpose Test (MPT)

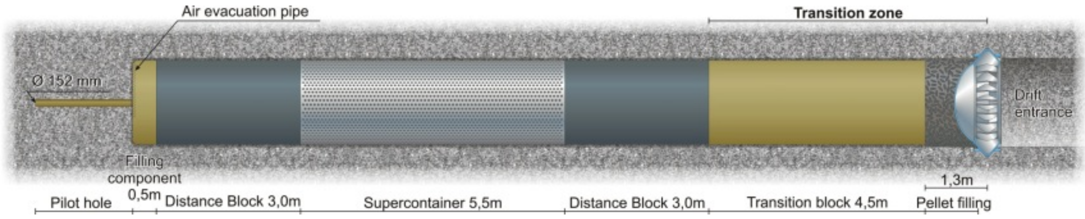
- Äspö HRL, KBS-3H test site at the -220 m level
  - Deposition drift DA1619A02, 95 m long
  - Deposition equipment is located at the site



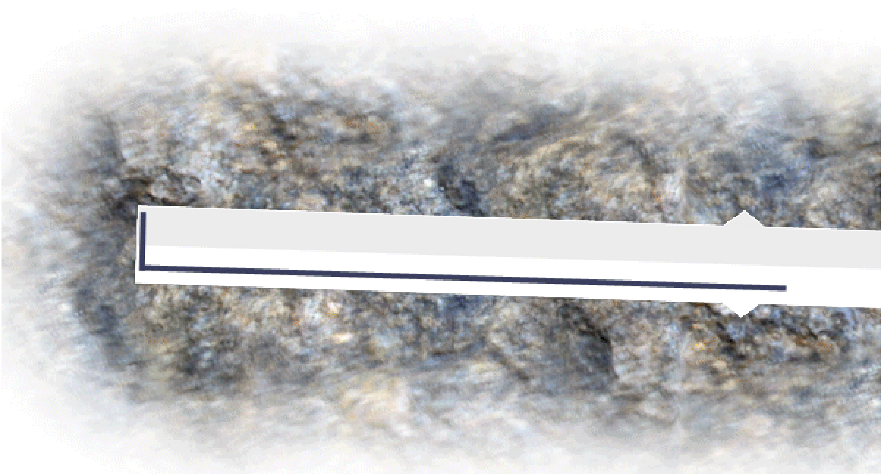
LucoeX WP 4, Multi Purpose Test (MPT)

Objectives:

- Test the system components in full scale and in combination with each other to verify the design
- This includes the ability to manufacture full scale components, carry out installation and monitor the initial system



LucoeX WP 4, Multi Purpose Test (MPT)



Schematic illustration of the MPT (only the main components included, animation is not made to scale)

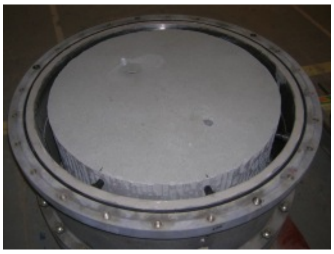
LucoeX WP 4, Multi Purpose Test (MPT)

1. *Test design*
   a) *Test layout/design*
   b) *Modeling, first based on previous lab-test, then based on the test design (not included in the LucoeX-project)*
2. *Pre-characterisation of DA1619A02.*
3. *Deposition machine upgrading, tests and planning for the MPT installation*
4. *Production of the buffer/filling components, including production of a new buffer mould*
5. *Production of a Drift End Compartment Plug (DECP)/Compartment plug*
6. *Drift preparation*
7. *Supercontainer assembly and transportation*
8. *Test installation*
9. *Monitoring*
10. *Dismantling and sampling*
11. *Evaluation of the results and reporting*
12. *Dissemination*

Test design

a) *Test layout/design*
   - *Test design including instrumentation and possible boreholes for access to extra water.*
   - *Plan for instrumentation: pore pressure, pressure at rock and plug, RH and temperature, plug leakage, inflow to drift and neighboring boreholes*

b) *Modeling (not included in the LucoeX-project)*
   - *Based on the Big Bertha –tests (BB-tests)*
   - *Based on the test design*

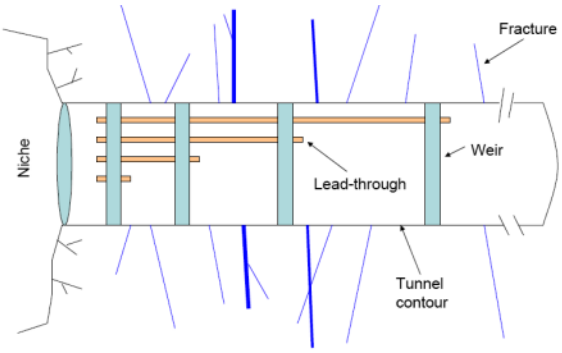


BB-tests: Bentonite block centred in the steel "tunnel"

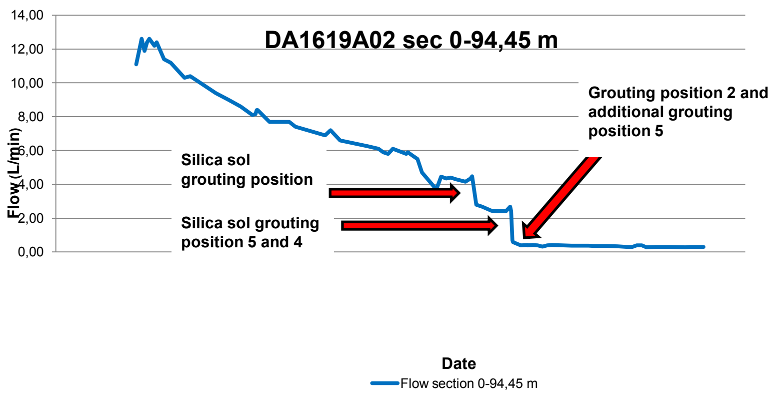
Completed installation of radial water uptake test. DAWE-concept.

Pre- characterization of DA1619A02

- Documenting the starting conditions in DA1619A02 prior to the Multi Purpose Test
  - Geological characterisation including scanning, defining roughness/steps of the wall surface, previous work shall be used as basis
  - Inflow measurements, using small weirs



Situation after post grouting



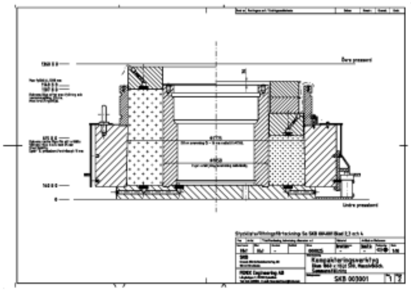
Total inflow	5 grouted zones	95 m drift total	15 m drift
Before grouting	4.5 l/min	4.4 l/min	0.07 l/min
After grouting	**0.05 l/min**	**0.4 l/min**	**0.29 l/min**

Deposition machine upgrading, tests and planning for the MPT installation

- Revise/develop the requirement specification for the deposition machine and deposition work so it is in line with the updated design premises/design requirements.
- Upgrade soft- and hardware of the horizontal deposition machine so robust operation can be achieved before the test programme below is initiated. Ensure that the developed/updated design fulfils the requirement specification in the end.
- Set up and run a test programme for the horizontal deposition machine including control programs that shows how it can be implemented and controlled so that the requirement specification of the machine and deposition work is fulfilled.
- Devised a plan for implementation including control programs that shows how the deposition can be implemented and controlled so that the requirement specification is fulfilled.
- Devise a programme for safe operation that ensures that the qualitative and quantitative demands that are set concerning the operational safety can be fulfilled.
- A risk assessment of both design and plan for implementation with control programs shall be carried out.
- Devise a plan for the installation of the Multi Purpose Test including a control programme and risk assessment. Taking care of DAWE procedure and pipe removal as well
- Tests of passing over the DECP-fastening ring (will follow after initial drift preparation).

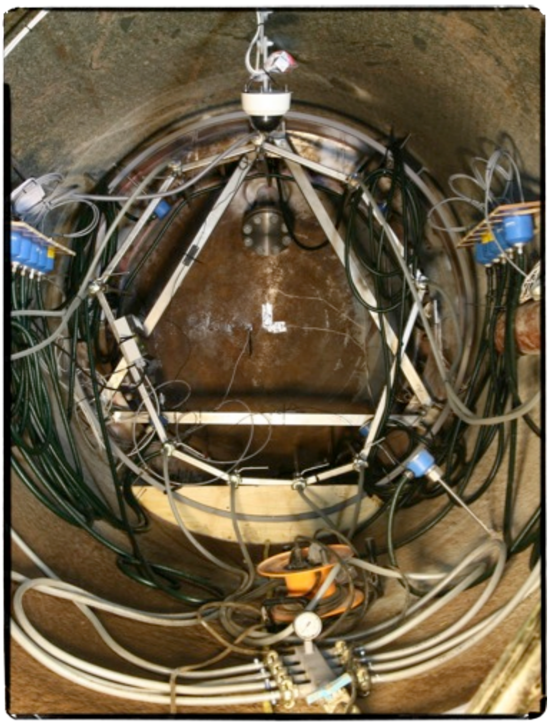
Production of the buffer/filling components, including production of a new buffer mould.

- Review of buffer mould drawings (in process)
- Purchase Buffer Mould
- Devise a plan for production including control programs + Risk assessment
- Production of buffer components including machining and montage of feet
  - Quality assurance of the components



Production of a DECP/Compartment Plug

- Evaluation whether to use DECP or Compartment plug
- Evaluation of titanium/steel alternative and a material decision
- Produce manufacturing drawings (for steel or titanium)
- Devise a plan for production including control programs
- Purchase process, DECP/CP
- Production of the plug
  - Quality assurance of the component



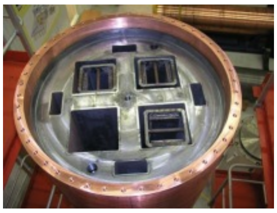
Drift preparation

- Sawing of the DECP/CP slot
- Installation of the DECP/CP fastening ring, including preparation so that the deposition machine can pass over it.
  - Tests of the deposition machine passing over the fastening ring
- Installation of packers in possible boreholes
- Installation of sensors and cables
- Installation of DAWE air evacuation pipe (supports on the wall)

Supercontainer assembly and transportation

- Devise a plan for the assembly including control procedures
- Removal of the canister from the dummy used in testing.
- Preparation of the canister (cleaning, measuring, scanning?)
- Modification of the vertical lifting device so that a supercontainer including canister and buffer components can be assembled and handled without buffer degradation
- Test programme for the buffer lifting device to verify operational feasibility + Risk assessment
- Installation of sensors inside the components.
- Assembly of the supercontainer at Äspö using a crane and the lifting device
- Transportation of the supercontainer to the test location, the Multi Purpose Vehicle (MPV) ordered by SKB will be used.

Supercontainer assembly and transportation



PWR canister with three fuel dummies (BWR also available)

SF Canister transport cradle

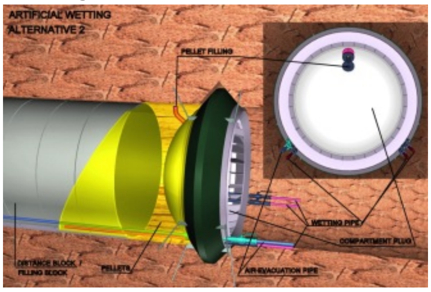
Supecontainer shell (carbon and stainless steel available)

Assembly (concrete rings)

Supercontainer inside transport tube.

Test installation

- A plan for installation including a control program and risk assessment is devised during the deposition tests.
- Component installation (FC, DB, SC, DB, TB, pellets)
  - Quality checking routine for each step
- Compartment plug installation
  - Plug grouting with silica sol
- Water filling according to DAWE
- Pipe removal



Monitoring

- The plan for instrumentation will state logging intervals, calibrations, maintenance etc.
- The measurement equipment will be connected to Äspös HMS (Hydro Monitoring System)

Dismantling and sampling

- Test dismantling and sampling will be carried out 2014
- Sampling procedures will be detailed later but will be similar to those carried out at SKBs-Prototype (excavation is currently ongoing at Äspö HRL

Evaluation of the results and reporting

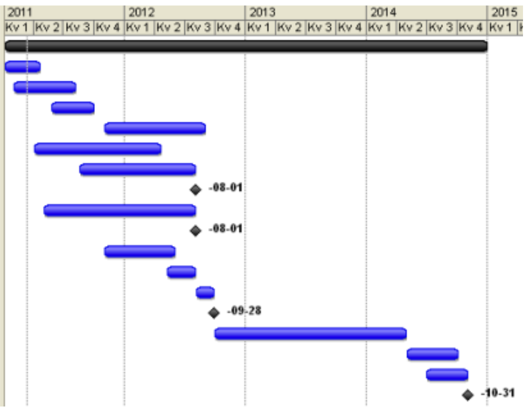
- D 4.1 Working report that presents manufacturing of distance blocks and blocks for the supercontainer
- D 4.2 Working report that presents the upgrades done to the deposition machine
- D4.3 Working report on the MPT. Description of the installation process, operation and analyses.
- D 4.4 Final report of WP 4

Dissemination

- Expert advice on the Work Plan from other WP:s.
- Participation at meetings and at Äspö HRL during assembly, installation and operation.
- Review of WP 4 final report

Preliminary time schedule

	Aktivitet	Varaktighet	Start	Slut
1	Multi Purpose Test	1042 dagar	ti 11-01-04	ti 14-12-30
2	Test plan	80 dagar	må 11-01-03	fr 11-04-22
3	Test design	134 dagar	ti 11-02-01	fr 11-08-05
4	Pre-characterisation DA1619A02	95 dagar	må 11-05-23	fr 11-09-30
5	BB/Test modelling	220 dagar	må 11-10-31	fr 12-08-31
6	Buffer	275 dagar	må 11-04-04	fr 12-04-20
7	Super Container	250 dagar	to 11-08-18	on 12-08-01
8	All components for MPT manufactured	1 dag	on 12-08-01	on 12-08-01
9	Deposit machine preparation	327 dagar	ti 11-05-03	on 12-08-01
10	Deposition machine upgrade compleate	1 dag	on 12-08-01	on 12-08-01
11	Plug (DECP/CP)	153 dagar	ti 11-11-01	to 12-05-31
12	Drift preparation	62 dagar	ti 12-05-08	on 12-08-01
13	Installation	43 dagar	to 12-08-02	fr 12-09-28
14	Initial stage of MPT reached	1 dag	fr 12-09-28	fr 12-09-28
15	Monitoring/Operational Phase	415 dagar	fr 12-09-28	to 14-05-01
16	Dissmantling and sampling	111 dagar	to 14-05-01	to 14-10-02
17	Evaluation and reporting	90 dagar	må 14-06-30	fr 14-10-31
18	Final reportcompleted	1 dag	fr 14-10-31	fr 14-10-31



End of presentation

Any questions?

Appendix 6

LUCOEX
Project Progress Meeting 01
14-15.3.2011

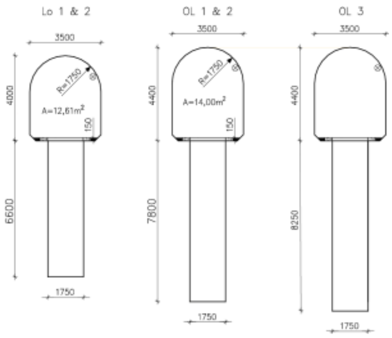
WP5: KBS-3V Emplacement tests in ONKALO

Keijo Haapala

POSIVA

WP 5, GENERAL

- 5 tasks:
  - 5.1. Detailed WP planning
  - 5.2. Demonstration of buffer components emplacement
  - 5.3. Quality assurance and problem handling
  - 5.4. Final reporting of WP5
  - 5.5. Integration



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WP 5 AT THE PRESENT MOMENT

- The task 5.1 has been started in January 2011 by preparing a detailed schedule for Posiva’s activities in the WP5.
- The work of tasks 5.2 and 5.3 has been started in January 2011 by method and equipment design tendering process

POSIVA 14.3.2011 Haapala Keijo 3

Task 5.2 Demonstration of buffer components emplacement

- Main activities
  - Main aim is to test the feasibility of the emplacement method for KBS- 3V buffer blocks
  - Full scale concrete blocks in first tests, full scale bentonite blocks in the final tests
  - First indoor demonstration with the artificial deposition hole, then testing in whole-scale deposition hole in ONKALO
  - A dummy “canister” will be emplaced in the tests
  - Tolerances and accuracies will be studied

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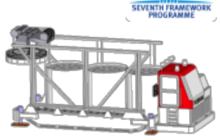
Task 5.2 Demonstration of buffer components emplacement



- Method development principles
  - The methods will be developed so that it will be possible to carry out the emplacement with the needed speed and accuracy.
  - Designing the actual deposition vehicle is not included in this work, but a vehicle frame will be constructed and the installation machinery will be fixed to it for the demonstrations

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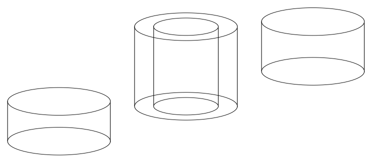
The test materials



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The test place in ONKALO

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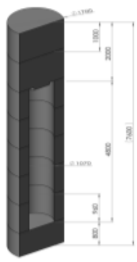
Task 5.2: Demonstration of buffer components emplacement



- The buffer block installation automatics and remote controlling of the machinery will be developed
  - required installation speed and tolerances
  - uncertainty factors and installation safety
- Activities:
  - Development of the electrical lifts, suction lifter and positioning instruments
  - Development of the steering automatics
  - Tests indoors and in Onkalo

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Task 5.2: Demonstration of buffer components emplacement

- Development of the suction lifter
  - The suction lifter manufactured at earlier stages will be developed further and equipped with installation and positioning automatics
- Activities:
  - The grip of the suction cups on bentonite will be improved for continuous use
  - Development of the vacuum system's functioning and reliability.

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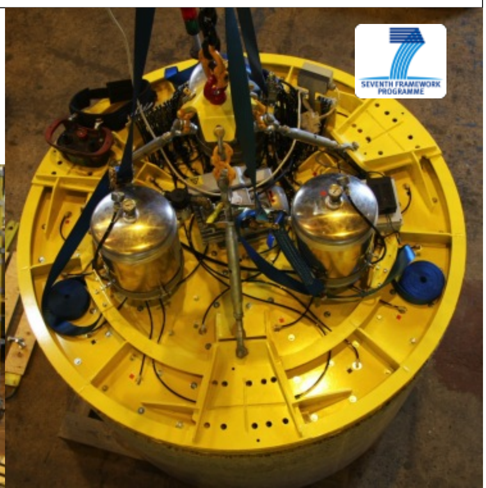
The suction lifter



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Sub-task 5.2.1. Development of the tool for filling the gap between the buffer and host rock

- The gap between the buffer blocks and the deposition hole wall will be filled with bentonite pellets
- Activities:
  - Developing and testing the method and suitable tool for filling the gap in indoor premises and Onkalo
  - Studying the realization of filling during the block emplacement

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Task 5.3 Quality assurance and problem handling

- The quality assurance procedures to ensure the overall quality of buffer during the disposal process
- 3 subtasks; development of:
  - 5.3.1. Quality requirements and quality assurance methods
  - 5.3.2. Equipments
  - 5.3.3. Problem handling methods

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Sub-task 5.3.1. Development of the quality requirements and quality assurance methods

- The emplacement work and gap filling quality requirements will be defined
- Activities:
  - Elaboration of a description on the quality assurance
  - Defining the needed quality assurance methods

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Sub-task 5.3.3. Development of problem handling methods

- The problem handling methods will be developed for exceptional situations
- Need for the readiness to remove damaged parts from the deposition hole
- Activities:
  - Composing a process description for handling the different problems and fault situations
  - Developing methods for the removal of damaged parts

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Task 5.1. Detailed WP planning

- Timetable 2011-03-14

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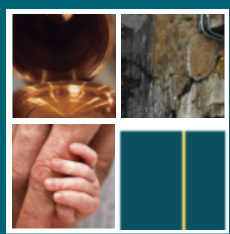

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