

Don't hesitate to contact the project info@lucoex.eu if you are interested in participating either on-site or at one of the conferences.



Magnus (WP-manager) at the start of the drift after sealing

MPT-INSTALLATION SUCCESSFUL

The Multi-Purpose-Test (MPT) is a proof-of-concept installation for KBS-3H horizontal disposal in crystalline rock where multiple canisters containing spent nuclear fuel are emplaced in parallel, 100–300 m long, horizontal deposition drifts at a depth of about 400–500 m in the bedrock. The Proof-of-concept installation was successfully completed during the end of 2013 and the installation is currently being monitored.

All key steps of the MPT-installation have been executed and we have shown the ability to manufacture full scale components, assemble the super-container with sensors and carry out the installation according to the KBS-3H reference design DAWE. Most project objectives have been achieved and deliveries are being prepared for the dissemination.

One of the key achievements has been the development of a new buffer mould and the production of the full scale bentonite components required for the experiment. New challenges were identified during this phase when some of the components produced developed superficial cracks making them hard to handle with the vacuum tools. This proves the importance of a controlled environment when handling the buffer components. The component assembly also gave a lot of experiences and suggestions for design optimizations with respect to water content which will be presented in the final reporting.

Another achievement has been the consistent depositions with the horizontal deposition machine which proved to be a challenge which required both software and hardware updates to ensure reliable and repeatable deposition work. Thanks to the upgrades made, we were able to perform the MPT-installation without any interruptions and the monitoring of the MPT has just been initiated.

Initially the MPT was planned to run for approximately 400 days but research shows this being far too short as the swelling processes after the artificial water filling seems to be slower than previously expected. Since the operational time is now deemed to be longer than planned, these parts of the MPT will be removed from the project scope.

TEST-PREPARATIONS IN ONKALO

The KBS-3V emplacement test in Onkalo is a proof-of-concept emplacement for vertical disposal in crystalline rock where individual canisters containing the spent nuclear fuel are emplaced in vertical disposal holes at a depth of about 400–500 m in the bedrock. The technique for the emplacement test has been updated based on feedback from other work packages and the test is now being prepared.

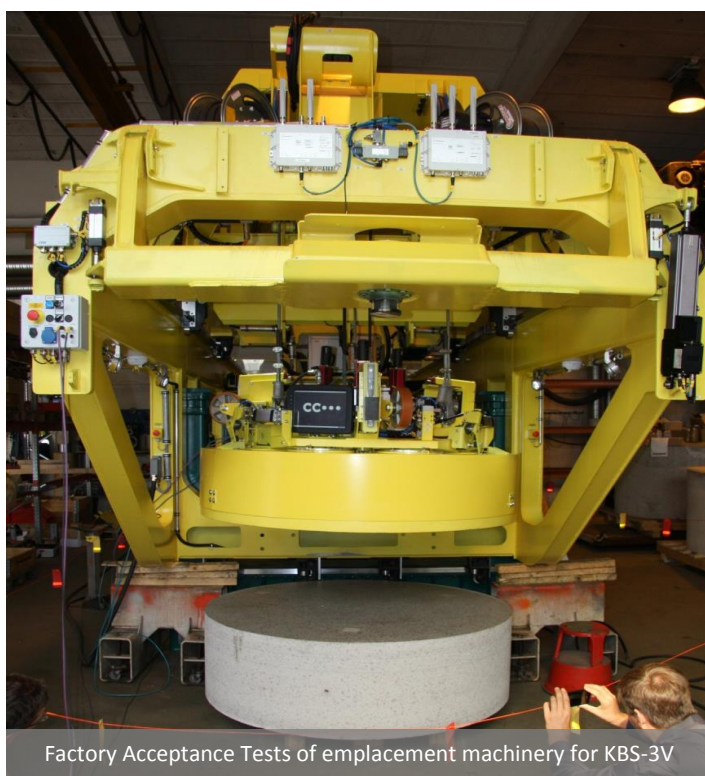
The KBS-3V Emplacement test in Onkalo is going to be based on an updated technique for placement and installation of the buffer components for vertical disposal in crystalline rock. The technique developed is based on (1) an environmental protection containers for buffer and pellets, (2) the installation machinery, and (3) the positioning system used for installation.

We have manufactured two environmental protection containers and successfully verified both their function and the function of the gripper/lifting system for the installation machinery with a 20% overload.

The design and manufacturing of the buffer installation machinery is almost finalized and the factory acceptance tests were successfully performed during the autumn of 2013.

By combining the work that is being done within the emplacement proof-of-concept test in Onkalo with Posiva's work at the Onkalo rock characterization facility we are showing that we are able to: (1) construct the disposal galleries, (2) produce the necessary buffer components, (3) perform the emplacement and (4) backfill and seal the galleries.

The remaining work in WP5 includes the above- and underground Proof-of-concept emplacement tests where the goal is to verify the concepts, the equipment manufactured and finally the methods and tools for problem handling.



Factory Acceptance Tests of emplacement machinery for KBS-3V



Full-scale-tests to verify design parameters and buffer density

NEW MACHINE IN SWITZERLAND

The Full-Scale Emplacement Experiment in Mont Terri is a proof-of-concept installation for the Swiss SF/HLW disposal concept with the goal to optimize the bentonite buffer material production and emplacement procedures during realistic conditions.

NAGRA, who is the leading party for this work package, has so far completed the excavation and gallery construction (3x50 meters) in accordance with reference model and started the instrumentation of the experiment. They have also finalized the far-field instrumentation for the experiment and are now focusing on completing the near-field instrumentation.

In parallel with the instrumentation-work they have also worked actively with full-scale mock-up tests to optimize the emplacement density. These tests are also used for verifying requirements and design decisions for the last part of the work package which is the design and manufacturing of the prototype machine to be used for backfilling of the horizontal FE tunnel. The prototype machine being developed will transport, emplace and compress the buffer material using five simultaneous auger conveyors.

Recent research and laboratory testing confirms that the bentonite backfill should consist of highly compacted bentonite granules (e.g. pellets) with a very broad grain size distribution, ideally a so-called Fuller-type distribution (Fuller and Thomson, 1907) in order to achieve an overall bulk dry emplacement density of at least 1450 kg/m^3 . This density will ensure a low porosity within the bentonite buffer and a low hydraulic conductivity as well as a sufficient swelling pressure.

The focus for 2014 will be the finalization of instrumentation and the verifying tests with the machine before performing the full scale installation. Key activities will also include the manufacturing of highly compressed buffer components for the creation of a pedestal upon which the heaters (simulated fuel canisters) will be placed before final backfilling and sealing of the drift.

MONITORING PHASE INITIATED IN BURE

The first work package to complete their technical work within the LUCOEX-project is the Proof-of-Concept installation performed in Bure where ANDRA successfully performed the excavation, component manufacturing, installation and sealing of the galleries. As

The test of the cell head casing digging was carried out in June 2011, as reported in the submitted deliverable D3.1. Experience of this test was used to finalize the detailed design of the ALC full scale experiment. The test plan of the ALC experiment has been described in the submitted deliverable D3.2 which is available on the Lucoex web-page.

The design of the instrumentation and heaters was sequentially finalized and preliminary surface tests (compatibility between casing instrumentation and heaters, installation methods) were then successfully conducted. The excavation of the ALC full-scale cell was completed in October 2012. The excavation went almost according to plan with the exception of the last 50 cm where the drilling rig semi-seized forcing us to finalize the excavation by reverse rotation of the drill head. The next step was the instrumentation of the casing and heaters followed by an uneventful installation.

The heating phase which is to simulate the heat induced by the waste packages, was finally started on 18 April 2013, with the goal to reach 90°C at the rock/casing interface in about 2 years. Monitoring is now on-going. The installation phase, as well as the first results (from the excavation impact and heating phase start), has been presented in the submitted deliverable D3.3 available on the LUCOEX Homepage.



Installation of the heaters in the ALC-experiment in Bure

EVENTS

13-14th / MAY (2014)

THEME WORKSHOP – ÄSPÖ SWEDEN

The final LUCOEX Workshop will take place at the Äspö Underground Research Laboratory in Sweden where we will finally focus on the experiences from the installation phases. In two cases, however, we judge that finalizing all the goals within the time scope of the project isn't possible requiring us to initiate a dialogue with the EC in regards to Work Package 2 (NAGRA) and Work Package 5 (Posiva).

24-27th / JUNE (2014)

IGD-TP GEODISPOSAL 2014 - Manchester

LUCOEX will participate in the IGD-TP GEODISPOSAL in Manchester presenting the state-of-art within geological disposal and the status within our individual Proof-of-concept installations.

The conference is arranged by the 'Implementing Geological Disposal – Technology Platform (IGD-TP)' consists of a group of waste-management organisations from several European countries.

19-20th / MAY (2014)

DEMO WORKSHOP – GRONO SWITZERLAND

The granular bentonite emplacement machine for the FE/LUCOEX Project at Mont Terri Rock Laboratory has been built and we are now inviting to a visit to the workshop with a demonstration with granular bentonite material and a meeting with presentations and discussions. The demonstration will take place in Grono, close to CH 6500 Bellinzona, southern Switzerland.

Contact the coordinator (info@lucoex.eu) for additional information.

March / 2015

INTERNATIONAL LUCOEX WORKSHOP

The final workshop of the LUCOEX project will be held at one of the underground research facilities participating in the Proof-of-concept installations. We will at this conference present the lessons learned from the project coupled with relevant external speakers with the goal to present a comprehensive technical status report on where we are standing today in regards to the concepts and technical systems used for geological disposal.

FINAL CHANCE TO PARTICIPATE

The final Proof-Of-Concept installations within the LUCOEX project will be performed during the spring of 2014 in Finland where we will perform the emplacement tests for vertical disposal in crystalline rock; and during the fall/end of 2014 in Switzerland where we will do the proof-of-concept installation for the Swiss concept.

If you are interested in visiting or participating in these activities we urge you to contact the coordinator at info@lucoex.eu as soon as possible to arrange the practical details.