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LUCOEX

NEWLETTERS

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LUCOEX Conference

One of the final activities of the LUCOEX-project will be the "LUCOEX Conference and workshop" which will focus on all aspects of how to accomplish full-scale demonstration tests of repository concepts for the disposal of radioactive waste. Based on the experiences and challenges of the LUCOEX project it will focus on planning, excavation of tunnels/drifts, manufacturing of components and installation equipment, installation techniques, instrumentation/monitoring and workers safety.

The conference has five main topics based on the experiences and challenges from the LUCOEX project.

1. National SF/HLW disposal programmes for geological disposal
2. Planning and installation activities of full-scale demonstrators
3. Excavation in crystalline hard rock and clay formations
4. Production techniques for bentonite blocks and granulates
5. Exchange of views and discussions between an expert panel with experiences from Lucoex and representatives from other programmes around questions related to concept development.

A visit to SKB's Äspö Hard Rock Laboratory will be arranged, on June 4th, 2015.

LUCOEX – final 6 months

The LUCOEX project was initiated in 2010 with the goal to prove the technical feasibility for a safe and reliable gallery construction, manufacturing and emplacement of buffer components, emplacement of waste packages and finally backfilling and sealing of galleries for four different repository concepts.

We are now completing the final activities and our focus is now shifting from our technical challenges to disseminating our findings and results including evaluating how other organizations throughout Europe can benefit from the work performed within the LUCOEX project.

Project Management Office Status Report

The LUCOEX-project has received an extension of 8 months to ensure that all proof of concept installations will be finalized before the end of the project. This extension will also enable the project to present the findings during the Clay Conference in Brussels and other conferences and meetings which is important from a dissemination point-of view.

LUCOEX is in phase with our updated time schedule and has submitted 38 out of the 68 Deliverables being due during the project and achieved 57 out of 68 Milestones. The remaining Deliverables and Milestones are being produced during the final months of the project. The goal is that all deliverables will be finalized by September 2015.

The focus of the project management office is now to ensure the finalization of the project deliverables and the planning and execution of the LUCOEX end conference June 2nd – 4th 2015 in Sweden.



Mounting of the guide plate and the following Case Drilling

STEERED CORE DRILLING 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 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. The work package is in addition to the MPT-test verifying the state of art within Steered Core Drilling.

The MPT has been successfully monitored since installation, December 2013. There is no leakage from the plug and the sensor system indicate that the test is starting to homogenise and the swelling pressures are starting to build up in some areas inside the drift, currently being highest in the drift front where the installed component is the closest to the drift walls at test start. A first data report is currently being compiled and will be published during 2015.

In addition to MPT-test SKB has performed a 94 meter long steered core drilling which was carried out in June 2014. Lots of efforts was put in establishing a correct starting direction and a new equipment was developed to allow for accurate drilling of the casing hole. The casing hole was drilled at a 1.99 degree angle, and the casing eventually casted at 2.18 degrees aiming at 2.0 degrees. With further optimisation the casting is expected to be even better as this was a first test.

During the steered core drilling of the 94 meters a total of 45 deviation measurements were made, 24 gyro (in/out =2x12) and 21 magnetic measurements. The data was evaluated on site and the steering strategy resulted in two steering actions which were carried out at 64 and 73 m.

Evaluation of the data from the test shows that the maximum deviating from the theoretical line is 13 cm. The end of the hole deviated less than 4 cm from the 'bulls eye' at 94 meter mark.

A report presenting the drilling operation and the preparations will be published during 2015.

TESTS ABOVE GROUND DONE IN ONKALO

The KBS-3V emplacement test in Onkalo is a proof-of-concept emplacement for key components for the vertical disposal in crystalline rock. A special test hall has been designed for the verifying tests of the

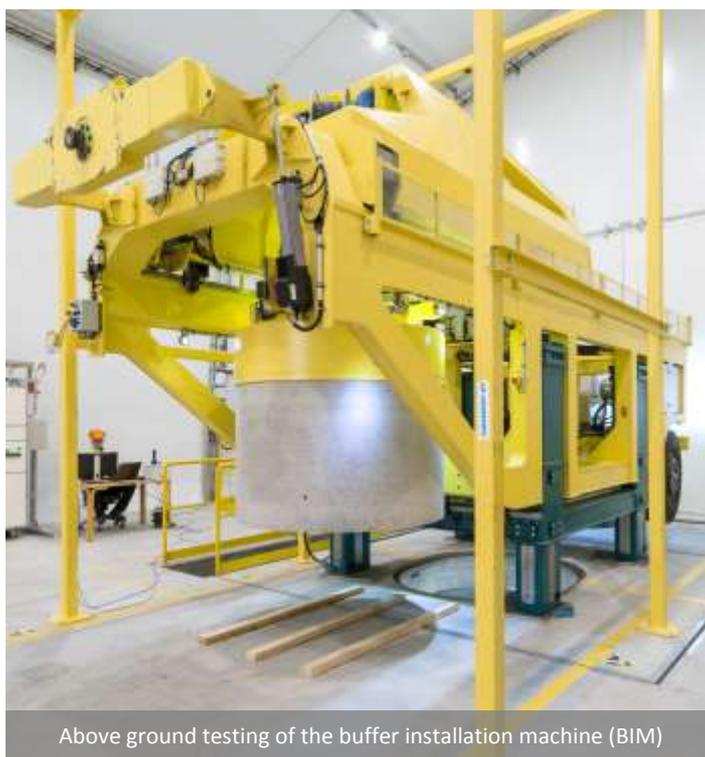
Since early in the year 2014 the buffer installation machine (BIM) and buffer transfer machine (BTD) has been in the storage waiting for accomplishment of the test hall in Onkalo site. The test hall was completed in the end of March and the implementation of an automation system for the BIM and BTD continued.

The testing of buffer block installation in the test hall at the Onkalo site began in September. The testing gave a good experience of machine functions and finishing needs for the testing in Onkalo underground facility. The operation of the machine was introduced for the LUCOEX partners and expert group 14th October.

The finalizing of above ground tests in the test hall was done during the start of 2015 after reinforcements had been introduced to the polycarbonate disposal hole, which was originally too weak.

In parallel to the work with the buffer handling equipment, POSIVA has worked actively with developing tools for the solving of buffer installation problems. The tools have now been manufactured and the first tests have been performed with a debris removal system and a water jet cutting system. According the results obtained, small modifications will be done to the tools before the tests in Onkalo demonstration tunnels below ground.

LUCOEX WP5 main activities in 2015 will be the testing of the installation machine and problem handling tools in demonstration tunnels in Onkalo underground facility, and the reporting and presentation of the performed work.



Above ground testing of the buffer installation machine (BIM)



Heavily instrumented heater (with erectable sensor holders) and the backfilling machine in the background © COMET

NAGRA FINALIZING INSTALLATION

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

NAGRA, which 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 finalized the instrumentation of the experiment.

The first heater "H1" was installed and backfilled in October 2014 followed by "H2" during November. The first (deepest) heater "H1" was then turned on for "full-scale calibration reasons" just before Christmas on a low power level. The final heater H3 was installed and backfilled in mid-January 2015.

The construction of the permanent retaining wall was started following the heater installations. This retaining wall is constructed from concrete segments to allow for a step-by-step completion during backfilling.

The next step is the routing of the hundreds of sensor cables that need to pass through the retaining wall. Following the finalization of that work the final activity will be the plug construction and switching on the heaters to full power which is planned for March 2015.

The focus for 2015 will be finishing up the installation and making sure that no sensors/cables are damaged during the retaining wall and plug construction. After this Nagra will change to focus of the experiment to a long-term monitoring mode and start looking into the data in greater detail and increase the reporting efforts.

MONITORING PHASE INITIATED IN BURE

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

The test of the cell head casing digging was carried out in June 2011, as was reported in the submitted deliverable D3.1. Experiences from this test were 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, heaters and 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 almost 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 to simulate the heat induced by the waste packages, was finally started April 18th 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