

Context

SCK•CEN's expert group EURIDICE provides the scientific and technical team to the Economic Interest Grouping between SCK•CEN and the Belgian Agency for Management of Radioactive Waste and Enriched Fissile Materials ONDRAF/NIRAS. EURIDICE carries out research, development and demonstration activities related to geological disposal and manages the underground research facility HADES, 225 m under the SCK•CEN site.

Objectives

One of the tasks of EURIDICE is the operational and scientific exploitation of the HADES laboratory. Research performed by EURIDICE focuses mainly on supporting ONDRAF/NIRAS to build the assessment basis for Safety and Feasibility Case 1 (SFC-1), which deals with the feasibility of constructing a repository in Boom Clay and investigating the thermo-hydromechanical (THM) behaviour of the Boom Clay and its THM response due to the construction and presence of the repository.

In particular, research is performed on:

- The characterisation of the THM properties of the Boom Clay by in-situ and laboratory experiments.
- The evaluation of the THM perturbations on the safety function of the Boom Clay in the safety assessment of SFC-1.
- The contribution to the technological development of the repository design including the feasibility to construct the supercontainer.

Finally, EURIDICE communicates its activities to a broad audience and makes the underground laboratory accessible to visitors.

Main activities

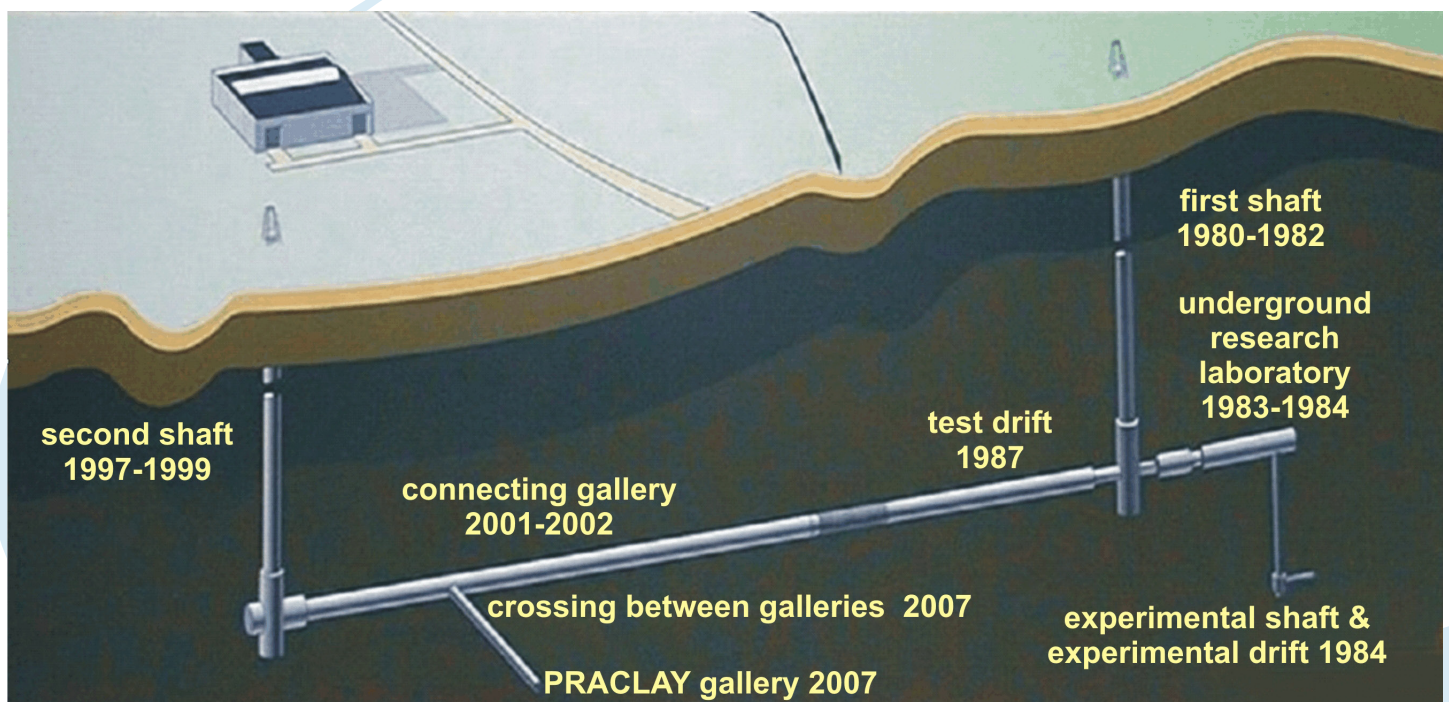
Operational and scientific exploitation of the underground research facility HADES

EURIDICE is responsible for the operational and scientific exploitation of the HADES underground research facility. This involves guaranteeing the safe operation of the facility by performing regular controls of the installation and ensuring that the permit regulation for the exploitation of the facility are complied with.

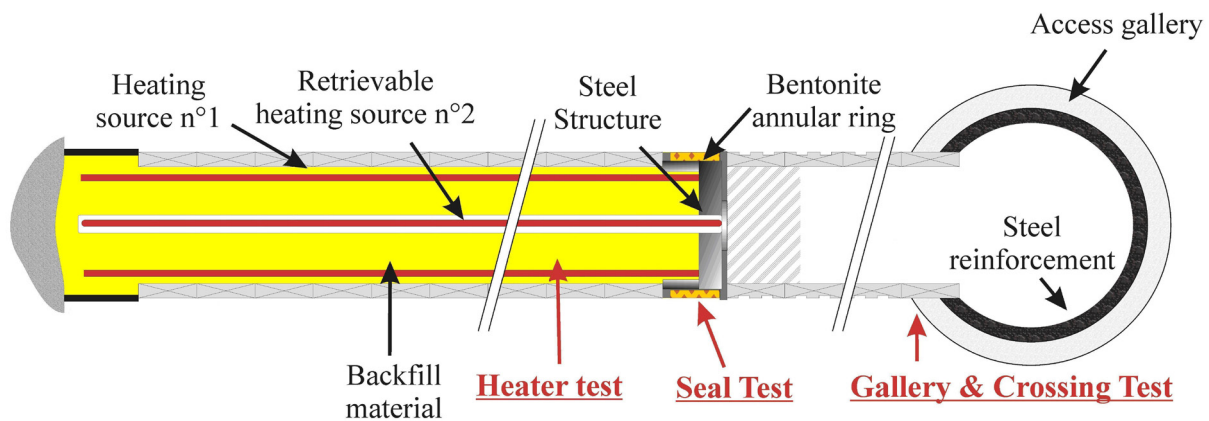
EURIDICE performs in-situ experiments in HADES and provides assistance to other groups wishing to perform their own experiments in the underground facility.

Examples include:

- The PRACLAY Experiment discussed further
- CORALUS, an experiment set up by the unit R&D Waste Colli to study the effect of radiation and thermal load on the glass matrix of vitrified waste.



Layout and construction history of the underground research facility HADES.



The PRACLAY In-Situ Experiment in HADES.

THM behaviour of Boom Clay and the PRACLAY Experiment

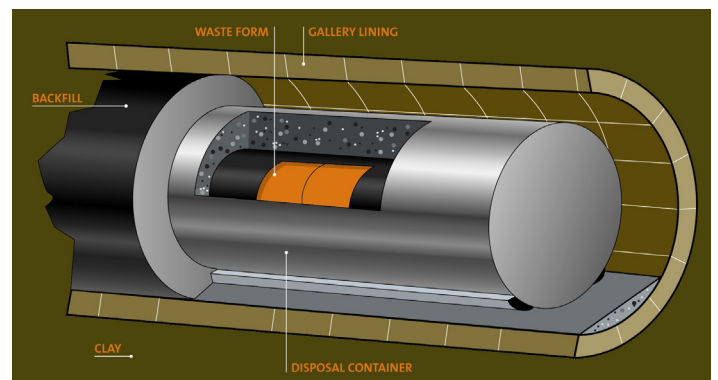
EURIDICE contributes to the research programme for the disposal of long-lived waste by using its expertise on the thermo-hydromechanical behaviour of the Boom Clay. Current research activities focus mainly on the effect of heat generated by a fraction of the radioactive waste over a long period of time (hundreds of years) that will heat the clay host rock around the repository up to a temperature of 70 °C.

To examine the impact of the thermal perturbation on the clay, EURIDICE designed and set up the PRACLAY Experiment. In this large scale test, a 30 m long section of the PRACLAY gallery will be installed with electrical heaters and backfilled with sand to simulate the underground repository. The heaters will heat the clay around the gallery up to 80 °C during 10 years. Instrumentation placed in the gallery as well as the support lining and the clay will monitor pore water pressure, temperature and other parameters during the test. The start of this large scale test is foreseen for 2011.

Study on the construction feasibility of a supercontainer

EURIDICE is also involved in the technological development of the repository design. Part of the involvement entitles running surface tests to examine the feasibility of the current repository design. In the reference design for the disposal of the long-lived waste, the waste canisters are placed in a so-called supercontainer. The supercontainer includes a 30 mm carbon steel overpack. The overpack is confined by a 700 mm concrete buffer and a 6 mm stainless steel envelope.

To test the feasibility to construct such a supercontainer, a model is built at half the scale of a typical supercontainer. We aim to evaluate the construction feasibility of all components of the supercontainer, to demonstrate that no fundamental flaws exist in assembling all components, to test the operational aspects to install the filler and concrete lid - including installation under elevated temperatures -, and to select and test concrete and filler materials with special emphasis on compatibility with long-term safety, construction integrity and related aspects.



Supercontainer placed in a disposal gallery as considered in the reference design for a repository for category C waste.

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