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Objectives of the PRACLAY Heater test and the importance for the R&D programme on geological disposal

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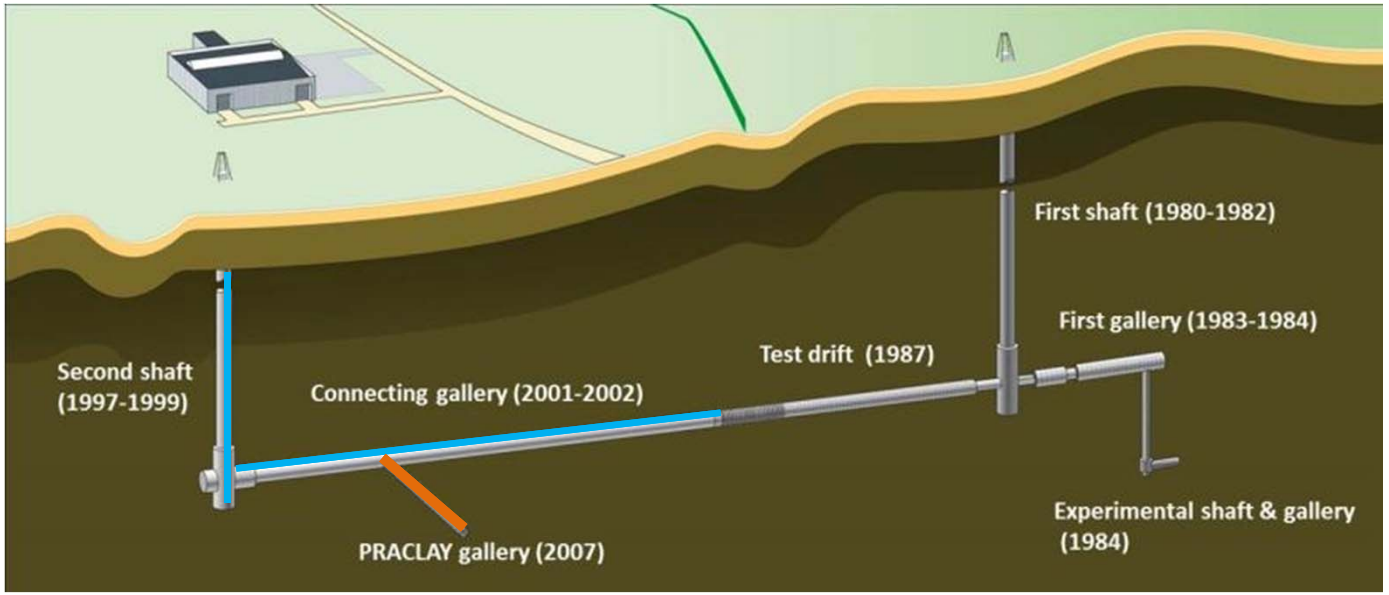
The PRACLAY Heater test – First results after one and a half year of heating
Mol, 4 May 2016

Belgian Agency for Radioactive Waste and Enriched Fissile Materials

The PRACLAY project

Demonstrating the feasibility of geological disposal of high-level radioactive waste in clay formations



The PRACLAY In-Situ Experiment

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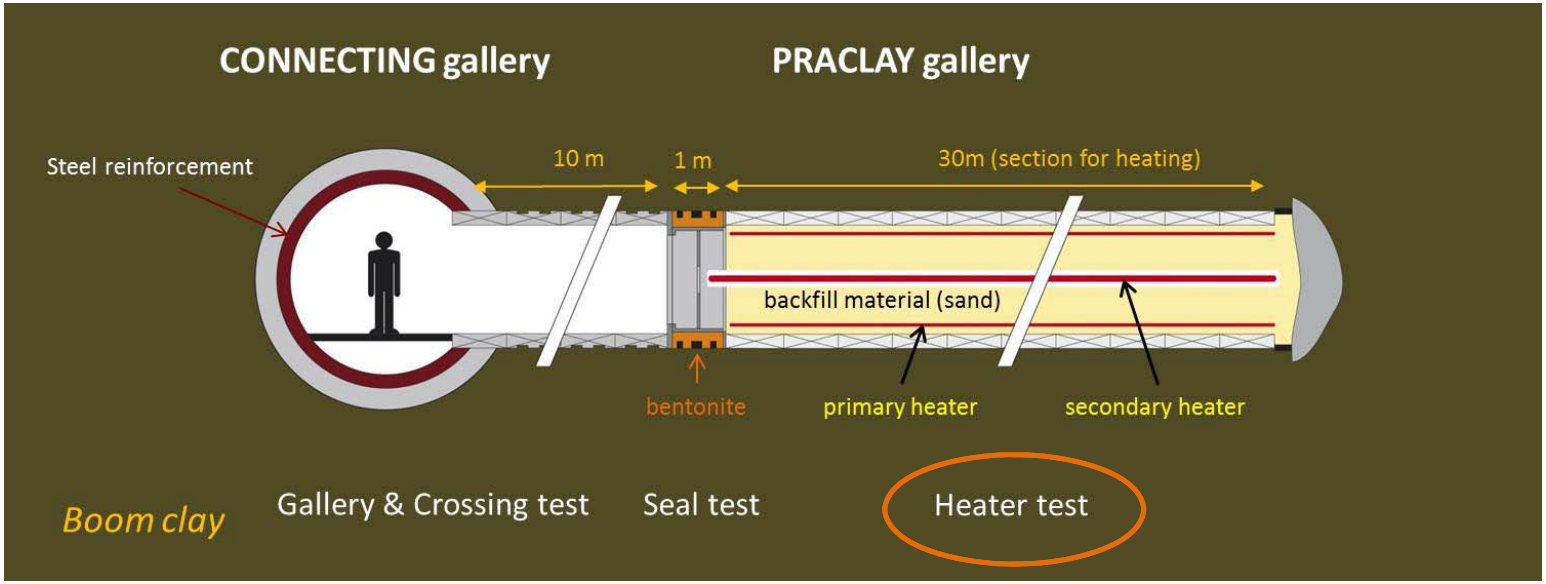
The PRACLAY In-Situ Experiment



The PRACLAY Heater test

- 30m long section, closed off by a seal
- 10 years of heating
- 80° C on the contact of the lining with the Boom Clay

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The PRACLAY Heater test – general objective

- **Examine the combined impact of hydro-mechanical disturbances caused by gallery construction and a large-scale thermal load on the Boom Clay due to heat-emitting high-level waste**
  - Design independent
  - Conditions that are representative for a real repository

  ⇒ **Assess the impact of a thermal stress on the repository system originating from heat emitting waste**

- **To be sure that poorly indurated clay like Boom Clay retains its ability to contain radioactive waste when it is heated**

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Success criteria (1)

- ***Capability to assess the heat dissipation from a repository containing heat-emitting waste***
  - Mainly confirm the thermal properties of the Boom Clay
  - Can have a direct influence on the geometry of the repository layout
- ***Capability to assess the consequences of a THM impact on the damaged/disturbed zone of the host rock***
  - Major focus on the confinement safety function
  - Allow describing the evolution of the damaged and disturbed zone
  - Multiple lines of evidence gathered and remaining uncertainties identified
- ***Demonstrating the absence of liquefaction of Boom Clay***
  - Based on our current knowledge, this will not occur, but PRACLAY will enable confirmation at large scale

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Success criteria (2)

- ***Capability to assess the stability of concrete lining under thermal stress***
  - Opportunity to study the properties of compressive materials
- ***Increase capabilities to substantiate the limited influence of thermal loading on RN transport-related parameters***
  - Understanding of the effects on Boom Clay characteristics after a thermal pulse with main focus on retention safety function
  - Confinement ➔ no RN release during thermal phase
  - Post-mortem analyses
  - No first priority and should not jeopardise achievement of other objectives
- ***Progress in monitoring in realistic conditions to help elaborating a monitoring strategy***
  - Increasing the capability to provide an effective range of reliable and validated systems to monitor disturbances within the clay as a result of gallery excavation and heat-emitting waste emplacement
  - Input to the development of a monitoring plan and monitoring objectives

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Success criteria (3)

- ***Incorporate the PRACLAY experiment in the general communication strategy***
  - The underground research laboratory HADES plays an important role in informing the public
  - PRACLAY experiment, being a major experience within the HADES URL

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Importance for the R&D programme - consequences of failure

Failure	PRACLAY Heater test	Belgian R&D programme
Liquefaction occurs	Stop	Showstopper
Unexpected heat dissipation	Major objective not obtained	Large uncertainties
Unexpected THM impact	Major objective not obtained	Large uncertainties
Instability of lining	Dismantling more difficult	Retrievability excluded for this design
Major effect on RN transport	None	Large uncertainties
General failure monitoring system	Re-installation	Important input
Communication	Missed opportunity	Missed opportunity

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