Gesellschaft für Anlagen-
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Investigations on gas generation, release, and migration in the frame of FEBEX

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Preface

The Spanish reference concept for the disposal of radioactive waste in crystalline rock formations foresees to emplace the waste canisters in horizontal drifts surrounded by a clay barrier of high-compacted bentonite /ENR 95/. In order to demonstrate the technical feasibility and to study the behaviour of the near-field of a high-level waste repository the Spanish Empresa Nacional de Residuos Radiactivos (ENRESA) started the FEBEX project (Full-scale engineered barriers experiment for a deep geological repository for high-level radioactive waste in crystalline host rock) in the Grimsel Test Site in 1995, with the assistance of the Swiss Nationale Genossenschaft für die Lagerung radioaktiver Abfälle (NAGRA). The project had the three objectives:

- Demonstration of the construction of the engineered barrier system,
- Study of the thermo-hydro-mechanical (THM) processes in the near-field,
- Study of the thermo-hydro-chemical (THC) processes in the near-field.

The following organisations were additionally involved in the project with in-situ, laboratory and modelling investigations:

- CIEMAT, AITEMIN, UPC-DIT (CIMNE), ULC, CSIC-Zaidín, and UPM (Spain)
- ANDRA and G3S (France)
- GRS (Germany)

In addition to the organisations mentioned above, the following joined the project during the second operational phase:

- SKB, Clay Technology and SWECO VIAK (Sweden)
- POSIVA and VTT (Finland)
- CEG-CTU (Czech Republic)
- EURIDICE GIE (Belgium)
- BGR (Germany)
- PSI (Switzerland)
- INPL, Eurogeomat and BRGM (France)

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The project had initially been scheduled for a period of 7 years (1994 to 2001). However, in the view of the experience acquired after two years of heating (1999), the decision was taken to extend the project. In February 2002, heater 1 was switched off after 5 years of heating (since February 1997) and was dismantled, whereas the large-scale test with heater 2 was continued until December 2007.

Within the objective of thermo-hydro-chemical (THC) processes in the near-field GRS investigated the aspects of gas generation and migration in the test field and in an additional laboratory programme.

The GRS work was financed by the Spanish ENRESA from January 1995 to June 1999 and by the German “Bundesministerium für Wirtschaft und Technologie” (BMWi) from July 2000 to December 2007. During July 1999 to June 2000 there was no funding.

This report covers the whole work and the result from 1995 to 2007.

Table of Contents