

NUCLEAR WASTE MANAGEMENT

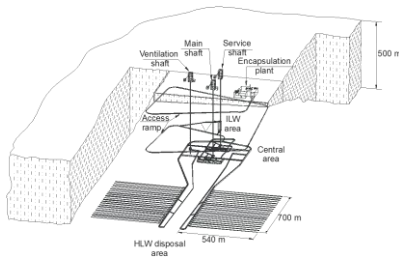
A Deep Geological Repository (DGR) is the facility intended to store the nuclear waste (Intermediate Level Waste or High-Level Waste) inside a stable geological formation.

The DGR is based on the "multibarrier principle" that comprises a series of artificial and natural barriers to isolate the waste from biosphere.

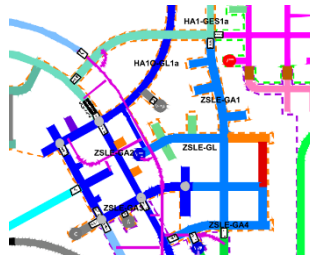
Such a unique facility, which is built in a few countries at a depth >500m, will involve the excavation of a network of tunnels in the suitable host rock. Also shafts and ramps will be required to connect with the surface facilities.

Due to the underground conditions and the nature of the waste, complex Thermo-Hydro-Mechanical and Chemical (THCM) processes will take place. Main objective of the DGR is to safely contain the highly pollutant waste for thousands of years.

We gained valuable experience by completing successful projects during last 25 years. We support our clients with distinctive specialisation as well as in-depth knowledge in this field. Together, we develop the best solutions.



Repository design



Tunnel network optimisation



Research experiments



Buried data transmission underground

Our Services

Research activities and studies related to the definition of future underground repositories

- Conceptual, basic and detailed studies
- Tailored laboratory or mock-up experiments
- Tailored in-situ experiments in URLs comprising:
 - EBS Components made from clays, cementitious materials or mixtures
 - Monitoring systems, including novelty sensors or data transmission systems
 - Tailored heating systems to reproduce the heat released by the nuclear waste.
 - Plugs made of clay, cementitious materials or mixtures.
- Follow-up (maintenance and reporting) of long-term experiments
- Dismantling of experiments, analysis of components and reporting

Pre-design of the repository

- Characterisation and exploration of the potential repository locations
- Geotechnical studies
- Planning and site location analysis
- Preliminary repository design (underground structures, plugs, civil works, BIM & ventilation)

Design of the repository

- Detailed design and determination of the base line at the final repository location
- Final repository design (underground structures, plugs, civil works, BIM & ventilation)
- Development (design, procurement, installation and maintenance) of the environmental monitoring systems to be implemented at the site.
- Recording, managing and reporting of produced data.

Implementation of the repository

- Planning & tendering
- Site supervision, management & consultancy during construction (mining phase).
- The required services include 3D design of the ventilation (due to the required separation of circuits when the emplacement of the waste is started), logistic modelling and the related improvement of planned operations.

Operation of the underground storage facility

- Monitoring of the performance of the EBS, adjustment of the ventilation and logistics improvement.
- Application of Building Information Modelling (BIM) logistics to support to QA and QC processes.
- Additionally, the recording, managing and reporting of produced data.

Our Competence

- Broad expertise
- Integral, innovative solutions
- Experience with solving complex non-standard problems
- Over 25 years of experience worldwide
- Active involvement in international research and development projects

Your Benefits

- Fewer interfaces thanks to our multidisciplinary team
- Integration of BIM Modelling with geotechnical analysis and support design
- Optimisation of complex underground structures
- Reduction of construction cost
- Determination of specific monitoring concepts.



Selected References

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| Project | HotBENT experiment GTS, Bern, Switzerland | Project | MoDeRn & Modern2020 Europe |
| Services | Design, procurement & installation | Services | Design of future monitoring system of the repository |
| Client | Nagra, RWM, NUMO, NWMO, SURAO, USDoe, BGR, ENRESA & Obayashi | Client | EU Framework Program of the EC Project, EURATOM & Horizon 2020 program. |
| Project | PROTOTYPE REPOSITORY experiment Äspö URL, Sweden | Project | SANDWICH Mont Terri URL, Switzerland |
| Services | Design, procurement, installation and long-term follow-up of FO instrumentation. | Services | Design, procurement & installation. |
| Client | ENRESA & SKB | Client | Mont Terri Consortium (ENRESA, GRS y BGR) |
| Project | GDF Monitoring Arrangements for Construction and Operational Phases UK | Project | MPT (Multipurpose Test) Äspö URL, Sweden |
| Services | Technical support for DGR monitoring definition. | Services | Design, procurement & installation |
| Client | Galson Sciences Limited | Client | B + Tech OY (Finland) |
| Project | ALC1605 Bure URL, France | Project | VSEAL Tournemire URL, France |
| Services | Design, supply, installation and maintenance of heating system | Services | Design, procurement, installation & long-term follow-up. |
| Client | ANDRA | Client | IRSN |

**We are pleased to advise you in detail.
Contact us.**



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