

All-round safety

Comprehensive solutions for final disposal of radioactive waste



Final disposal in deep geological formations

Safe isolation of radioactive waste from the biosphere is global consensus for responsible radioactive waste management.

In particular for highly active waste, this can be achieved through final disposal in deep geological formations. This protection concept provides the advantage of a secondary geological barrier complementing the primary barrier provided by the waste container. The secondary barrier in the host rock is formed by the isolating rock zone. As this final disposal concept requires the construction and operation of a mine, developing optimally safe solutions for final disposal in this way presents an interdisciplinary task that requires close synchronization among the geosciences, radiation protection and waste management as well as mining.



Fig. left:
Assembly of a shaft bottom
frame in the Göttelborn mine

Fig. right:
Drilling preparations during the
research program "Faktenerhe-
bung" at the Asse II mine

Expertise for practical solutions

We deliver safety-oriented, interdisciplinary solutions for final disposal mining based on our long-term and diverse experience in the exploration, design, construction, operation and closure of mines. Our projects start with first conceptual studies and span to the development of detailed solutions.



Mining

With its company history spanning more than a century, DMT has all the experience required for the construction and operation of mines. A special focus of our current work as well as the work of DMT's predecessor companies was always the improvement of the safety of mining projects without disregarding economic aspects. Fire and explosion protection, ventilation engineering as well as shaft hoist engineering can be cited as examples of our activities in this field.

Active engagement in multiple current projects in international production mining, including many highly challenging reservoirs, guarantees the continuous availability of up-to-date mining know-how, e.g. in ground control. We can provide a final repository design and the related construction plan for all topical host rocks (clay, crystalline, salt) even when depth and geotechnical stress pose difficult conditions, while still maintaining and protecting the isolating rock zone.

Radiation protection and waste management

Safe final disposal of radioactive waste requires complete documentation of the entire disposal chain. Acceptance criteria of final disposal sites are developed on the basis of exact knowledge of the waste material, the treatment methods and the available disposal containers. These acceptance criteria in combination with the geological characteristics of the host rock are the main considerations for ensuring the long-term safety of a disposal site. All activities carried out must focus on optimal protection of the biosphere in view of radiation protection.

As a subsidiary of the TÜV NORD GROUP, DMT can utilize numerous experts with long-term professional experience in various nuclear projects for such tasks.

Exploration and design



DMT vibros during seismic exploration

A combination of careful site exploration and selection plus an intelligent and future-oriented design for the final repository form the basis of a successful long-term safety assessment.

With numerous large-scale projects in the fields of bedrock exploration, final disposal mining and production mining under our belts, we can assist you in all matters ranging from first feasibility assessments to detailed considerations for final design.

In equal measure we consider the requirements of the waste products to be disposed of, the suitability of the existing host rock as well as the mining technology related aspects for the safe operation of the disposal mine.

- Feasibility study
- Selection criteria
- Site selection
- Site investigation
- Material prognosis
- Waste management concept
- Acceptance criteria
- Barrier concept
- Safety and approval concept / Calculation of scenarios
- Mine planning
- Waste management planning
- Environmental review
- Licence planning

Construction

Successful construction of deep geological disposal facilities can only be achieved with the guidance of a highly specialized and experienced consultancy during the extensive planning phase. Necessary adjustments to address any changes in underground conditions need to be planned and realized in a timely manner without any reduction in long-term safety.

DMT's extremely long-term experience in mining can help realize the construction of a final disposal mine according to plan – from the sinking of the first shaft to rock-saving excavation of all underground workings. Other aspects to be considered may result, for example, from specific requirements of a divided mine ventilation system (supervised/controlled area) or from the erection of the infrastructure. As well as successfully realizing your plans, our practical know-how enables flexible adaptation of measures, e.g. to changed geological conditions.

- Concept planning
- Waste treatment
- Radiation protection
- Ground control
- Mine ventilation
- Infrastructure
- Disposal concept
- Licence planning
- Construction supervision
- Start-up
- Documentation



Peer check during construction of a ventilation installation



Construction of a pit eye with spray lay-up concrete support

Operation

The operation of a final disposal facility starts with the commencement of test operations and ends with the decommissioning of the surface installations. Safe operation means both safe handling of the waste products and realization of the imperative goal of long-term site safety.



Drawing on our comprehensive experience in nuclear installations, we support the safe operation of disposal sites and contribute to optimizing the protection of all involved.

The interdisciplinary nature of DMT's work results in the frictionless organization of excavating new underground caverns parallel to the placing of waste products in existing caverns. Both processes have to be arranged safely, but also have to be monitored and controlled.

Our experience in automation as well as instrumentation and control technologies aids these activities.

- Process design
- Control room systems
- Process controlling
- Documentation
- Area monitoring
- Radiation protection
- Fire protection
- Mine ventilation
- Logistics
- Process engineering for back-fill materials

Closure

Safe closure of a disposal site represents an essential step for the long-term isolation of radioactive material from the biosphere – a step which requires strict adherence to nuclear and mining legislation as well as the applicable licences.



Underground drift with air doors



Mobile unit of a back-fill material supply plant

All activities for the closure of the disposal site are particularly sensitive and should be given careful consideration, especially regarding supervision.

Execution methods and the quality of the work are of key importance for long-term safety, because there are no means of any corrective action after completion of the closure. Closure of the disposal caverns by back-filling of selected drifts and mine workings and the tight sealing of the shafts are just some of the tasks involved in ensuring the safe closure of the disposal site.

Our goal is to support the site operator in ensuring the integrity of the embedding rock formations and the protection of the biosphere against ionizing radiation on a long-term basis.

- Back-fill concept
- Recipe development
- Process engineering for back-fill materials
- Analysis of consequences
- Licence planning
- Construction supervision
- Start-up
- Monitoring
- Documentation

References



Excerpts from our list of clients:

- Federal Office for Radiation Protection (Bfs), Germany
- Deutsche Gesellschaft zum Bau und Betrieb von Endlagern mbH (DBE), Germany
- Asse GmbH, Germany
- European Union, EuropeAid
- IAEA, Vietnam and Thailand
- Nagra, Switzerland
- ANDRA, France
- SKB, Sweden
- Bátaapáti, Hungary



Essener Fachgespräch Endlagerbergbau:

Annual German symposium for the exchange of information and experience in final disposal mining, organized by DMT in collaboration with renowned partners.

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