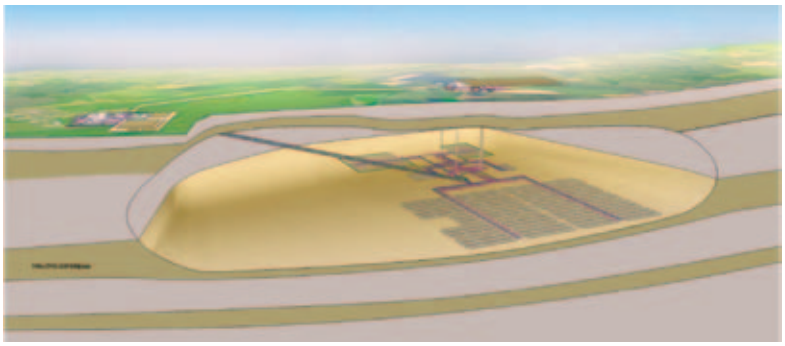
ADS · Geological
Andra Disposal Solutions

Deep Geological Repository

Deep geological disposal of spent fuel and of high-level (HL) and intermediate level long-lived (IL-LL) waste.



The planned lay-out of the deep geological disposal facility

Once unloaded from nuclear reactors, spent fuel may be either considered as waste to be disposed of or processed in order to retrieve its recyclable content. In the second case, the residues are in the form of HL or IL-LL waste and include on the one hand fission products and minor actinides, and on the other hand process-induced salts and waste produced by the structures of the nuclear fuel assembly (as hulls and end-caps). Many countries have already selected deep geological disposal as the reference solution for the management of HL and IL-LL waste. In fact, the remarkable characteristics of certain deep geological formations make them suitable for confining the hazardous substances present in such waste during the radioactive-decay period until they represent no more risk for human beings and the environment.

Methodology

- Identification of preliminary disposal concepts: search for adapted solutions based on the characteristics of the waste and geological conditions;
- Search for potential host sites for the siting of deep geological repository;
- Communication and relations with stakeholders in the framework of the decision-making process at the national, regional and local levels.
- Geological-survey programmes;
- Scientific-research, modeling and simulation programmes;
- Construction and operations of an Underground Research Laboratory (including the conducting of experiments);
- Design of the waste repository and of its structures;
- Technological development programmes and construction of technological demonstrators.
- Safety studies and assessments, preparation of regulatory licensing applications;
- Definition of waste-package acceptance criteria, disposal specifications and control modalities;
- Specific studies on operating conditions, reversibility options, long-term monitoring, etc.;
- Cost evaluation for such a facility.

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Andra Disposal Solutions

Andra is responsible for managing all radioactive waste produced in France. It benefits from 20 years' experience in the preparation of projects for the implementation of a repository

> The research carried out notably at the URL (Underground Research Laboratory) led to the publication of the Dossier 2005 in which Andra demonstrated the basic feasibility of deep geological disposal for HL and IL-LL waste, including a reversibility rationale.

> Andra has demonstrated its capability to design and to lead the required scientific R&D program to justify its proposed options and to demonstrate the safety of its solutions, thus ensuring a high added value to its projects. Similarly, it also develops various construction and handling methods and processes, for which demonstrators and pilot models were built and tested and are now displayed at the Andra Technological Exhibition Centre.

> The Research Program carried out in preparation for the implementation of disposal facilities relies on a rigorous knowledge of the waste and of the sites involved, and uses an iterative design approach. The performance of the disposal facility and the safety it provides are constantly re-assessed via a series of methods developed by Andra and are designed to integrate both the existing knowledge and system analysis.

> The Agency has developped a methodology for the phenomenological analysis of repository situations in order to describe and analyse any phenomenon likely to occur throughout the evolution of the repository, including over the long-term.


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1• Before being emplaced in disposal cells, HL radioactive-waste packages are conditioned in disposal containers

2• Aerial view of Andra's Meuse/Haute-Marne URL, where the Agency is studying a suitable clay-rock formation for siting the future repository for HL and IL-LL waste at a depth of 500 m

3• The Technological Exhibition Facility showing the demonstrators of waste packages and handling robots

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Mastering radioactive waste

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