Relying on its wide-ranging competences in the field of waste management and disposal, Andra offers multiple solutions, from consultancy and document review, to technology transfer and turnkey projects - to all countries and organizations concerned by the safety and the efficiency of their radwaste management.

Andra

The surface disposal concept for VLL waste

- Over 10 years of experience
- A reference concept and facility for such waste

Disposal facilities for very-low-level (VLL) waste have been designed to accommodate both residues originating from the decommissioning of nuclear facilities and used components. These residues have very low specific-activity levels that lie below a few hundreds of becquerels per gram (Bq/g). As for the average activity found in any disposal facility, it never exceeds more than a few tens of becquerels per gram. In that case, waste disposal involves no special processing or conditioning, except for handling requirements or volume-gain purposes.

Waste management policies
› Development of framework for radioactive waste management
› Waste management organization implementation

Waste management strategies
› National strategy and waste management plans
› National, corporate & site waste inventories
› Waste characterization and tracking
› Waste compliance verification
› Data archiving and site memory

Communication & public relations
› Stakeholder engagement and communication strategy
› Communications resources: web, edition, video, public debates and consultations

Research and Development
› Geology, geophysics, rock mechanics, geochemistry, sensors & networks...
› R&D program design & management

Training
› Specific or generic waste management courses
› Training program design
› Extensive use of Andra facilities and R&D resources

Site remediation
› Site characterization
› Site clean-up
› Waste management

Disposal facility design: VLLW, LLW, ILW, HLW & Spent Fuel
› Conceptual to detailed design: waste treatment, conditioning and disposal
› Site of facilities: early bibliographical studies to site characterization management
› Safety analysis: modeling, simulation, studies

Disposal facility licensing
› Environmental and safety reviews
› Site and waste disposal licence preparation

Disposal facility construction
› Construction management
› Project owner support

Disposal facility operation
› Waste treatment and packaging facilities design
› Operations and quality reviews and improvements assessment

Disposal facility closure
› Site closure planning
› Safety reviews
› Final site capping design

“Small scale nuclear activities” waste producers
› Collection, sorting, treatment, packaging and disposal of radioactive waste
› Environmental monitoring

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The design and construction provisions allow for the optimal operation of the disposal facility without any risk of altering the required safety level. They also ensure a satisfactory containment level for several centuries at the end of the operating lifetime. Hence, the natural materials in their original context constitute a particular advantage for the safety demonstration over the long term.

The main barrier against radionuclide dispersion is provided by the geological formation being used for waste disposal.

With due account of the nature of VLL waste, their containment envelope (drums, big bags, etc.) has no role in confining radioactivity, but rather in facilitating handling and disposal operations, while protecting operators.

Approximately 30% of all waste received at the CSTFA undergo a specific treatment before disposal. Low-density residues (plastics, thermal-insulation materials, etc.) are first compacted by a baling press, then strapped and wrapped in clear plastic sheet. Another bundle press is used to reduce the volume of scrap metal. Some waste, such as the polluted waters generated on site or the sludges sent by producers, are processed in the solidification and stabilisation unit.

Disposal cells are excavated progressively, as needed, directly in the clay formation down to a depth of 8 m and are operated in sequence. Cell design has evolved to maximize the disposal volume, and now offers 25,000 m³ in a 26 m wide by 174 m long and up to 8.5 m deep structure. Cells are filled up in successive waste packages layers (about 10 on average), while void spaces between waste packages are gradually backfilled with sand.

A containment envelope made up of natural clay-based materials. The lower part of the envelope corresponds to the first 5 m of the clay layer located immediately under the geomembrane and characterized by a very low permeability (at least $10^{-9}$ m/s). The upper part is made of clay-based materials that were removed during cell excavation and consists of a layer measuring 1 to 5 m in thickness, shaped and compacted mechanically in order to restore its initial low permeability (at least $10^{-9}$ m/s).

Ultimately, a clay backfill, approximately 2.5 m in thickness, will isolate the clay-based containment layer from: - weathering (frost, draught); - burrowing animals, and - erosion.

Lastly, a permanent 30-cm-thick layer of grass-covered topsoil will be laid over the entire structure.