

A unique array of skills and services

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

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
- › Siting 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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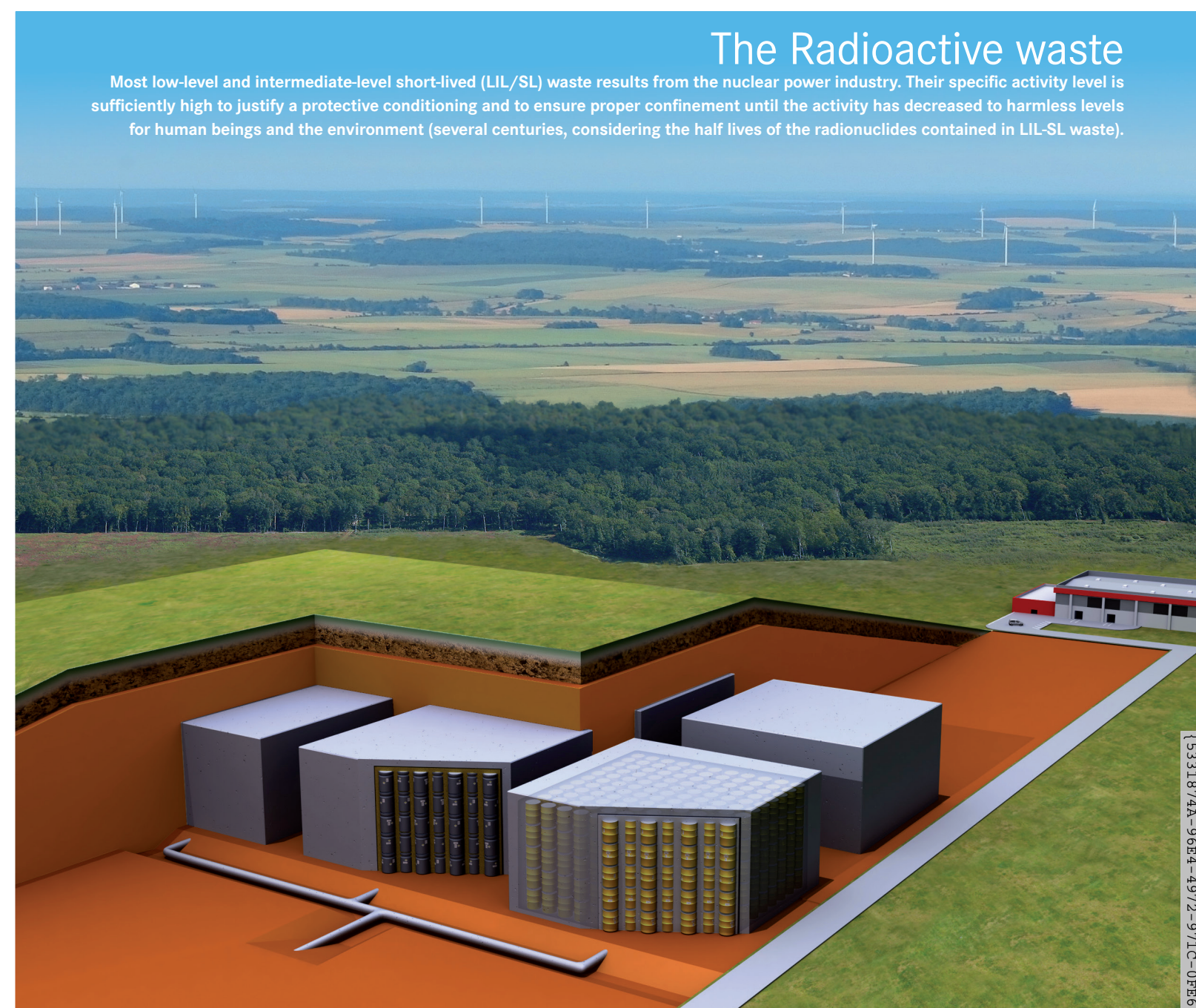
Andra

The surface disposal concept for LIL-SL waste

- Over 40 years of experience in disposal concept development, repository design / construction / operation / closure to post-closure monitoring

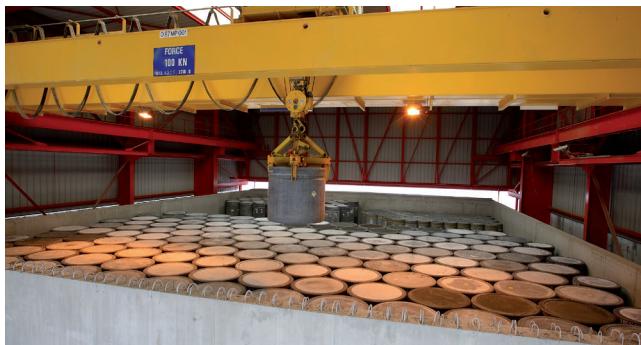
The Radioactive waste

Most low-level and intermediate-level short-lived (LIL/SL) waste results from the nuclear power industry. Their specific activity level is sufficiently high to justify a protective conditioning and to ensure proper confinement until the activity has decreased to harmless levels for human beings and the environment (several centuries, considering the half lives of the radionuclides contained in LIL-SL waste).



The disposal design

The disposal concept for such waste relies on a multi-barrier protection system, each barrier being designed to fulfil different or redundant functions in order to delay or mitigate radionuclide transfers first into the environment and onwards to the population.



The originality of the concept pertains to its flexibility, since:

- it is adaptable to various geological environments, and its overall performance can be guaranteed by modulating that of the engineered barriers;
- it is suitable for the disposal of waste packages of different types and sizes, as long as their characteristics are consistent with the acceptance criteria, which are de facto specific to each case.

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Containment



The safety of the disposal facility is guaranteed by the combination of the package, the concrete vaults, the backfill materials between the packages, and the watertight clay cap that will be installed

at the end of the operational period of the facility. Such design configuration also takes all natural risks into account. Last, all disposal structures are built away from any potential flood zones and from the highest possible level of the groundwater table.

Disposal

The vaults for concrete and metal packages have a slightly different configuration. Once a vault is full, the concrete

packages are immobilised with gravel backfill, whereas the metal packages are blocked in place by the concrete that is poured between them. Once a disposal is filled, it is sealed by a reinforced concrete slab, covered by an impervious plastic membrane in order to ensure the water-tightness of the disposal vault. Ultimately, a final cap will be put in place in order to protect disposal structures against external aggressions.

Monitoring

A network of underground galleries has been built under the disposal structures. The first piping network collects rainwater from empty vaults that are not yet in service, and directs them towards the on site storm basin. The second piping network constitutes the so-called “separative gravity-assisted network”, collects any seepage water that may migrate through the disposal structures and directs it towards an external treatment plant, in case of contamination.

The French disposal facility for low- and intermediate-level short-lived waste (CSFMA-CSA)

The disposal concept developed by Andra consists in isolating radioactive materials from the environment for the period required for their radioactive content to decay, until the impact of the disposal facility reaches a level comparable to the impact of naturally-occurring radiation.

In order to prevent the dispersion of radioactive elements into the environment, the three following barriers have been designed to isolate the waste :

- the waste package **1** into which the waste is embedded within a concrete, polymer or bitumen matrix ;
- the disposal structures; the network of underground galleries and the final capping; **2**
- and the geological environment of the site: **3** an impermeable clay layer covered by a draining layer of sand (on which the disposal structures are built) constitutes a natural barrier to protect the environment in case of accidental releases of radioactive elements towards the groundwater table.

