

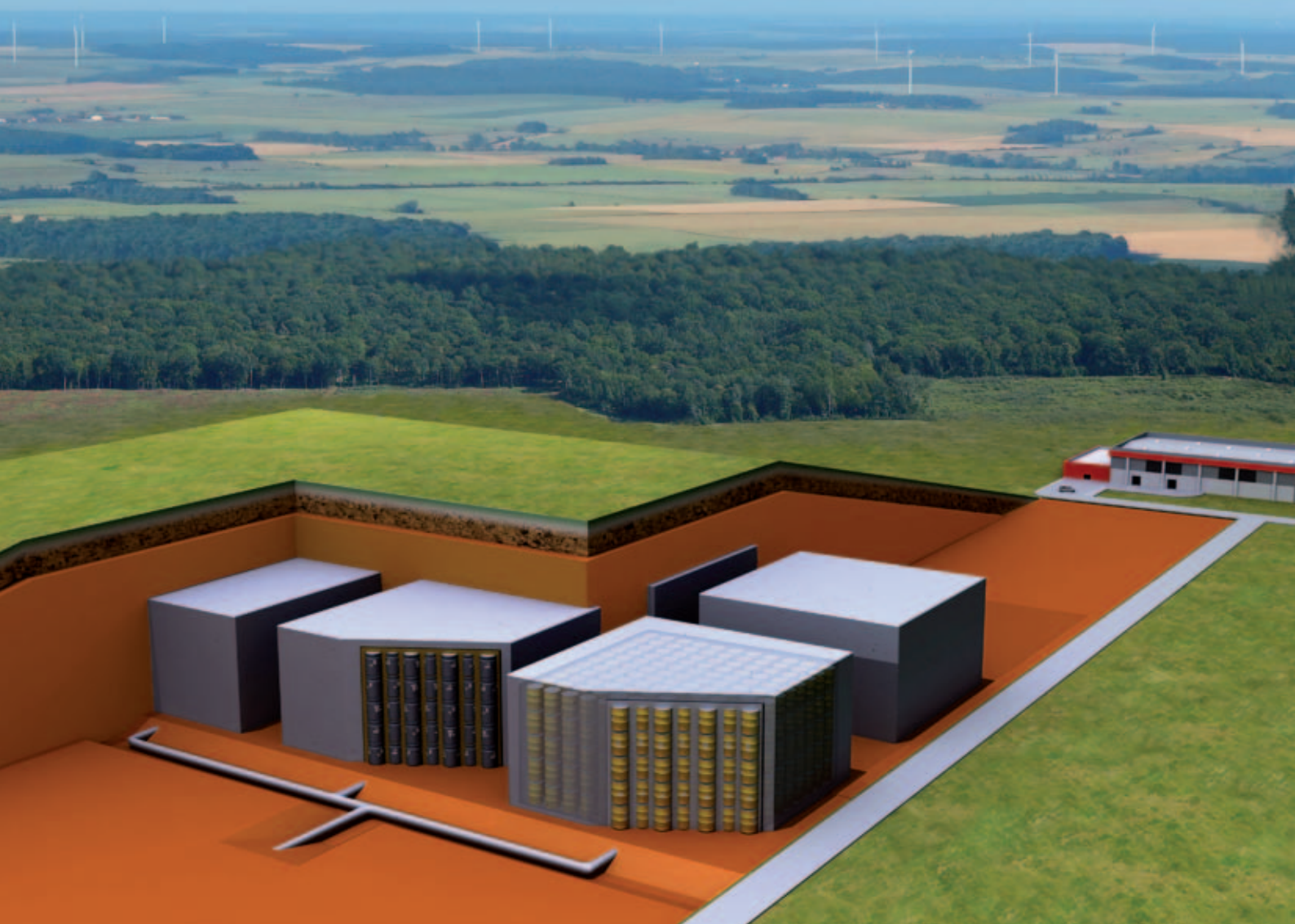
Andra

The surface disposal concept for LIL/SL waste

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

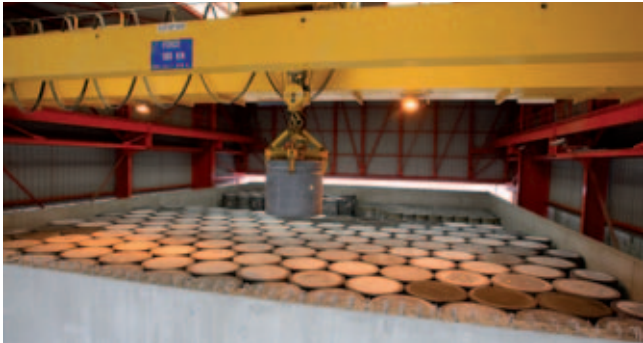
The waste

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



The basic disposal concept

The disposal concept for such residues relies on a multi-barrier protective 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 human beings.



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

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

To provide its wide-ranging competences in the field of waste management and disposal, Andra offers multiple solutions, from consultancy and documents reviewing, to technology transfer and turnkey projects

Containment



The safety of the disposal facility is guaranteed by the combination of the package, the concrete structures, the filling materials between

packages and the watertight clay cap that will be installed at the end of the operating lifetime of the facility. That layout also takes all natural risks into account. Lastly, all disposal structures are built away from any potential flood zones and from the highest possible level of the groundwater table.

Disposal

Concrete and metal packages are disposed of in slightly different structures. Once a structure is full,

concrete packages are immobilised with gravel, whereas metal packages are blocked in place by pouring concrete between them. Once a disposal structure is filled, it is closed by a reinforced concrete slab, overlaid by an impervious plastic membrane in order to ensure the water-tightness of the disposal facility. Ultimately, a final cap will be installed in order to protect disposal structures against external aggressions.

Monitoring

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

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

The disposal concept developed by Andra consists in isolating radioactive materials from the environment during the required time 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** in which the waste is embedded within a concrete, polymer or bitumen matrix;
- the disposal structures, the network of underground drifts and the final cap, **2** and
- the geological environment of the site: **3** an impermeable clay layer overlaid by a layer of draining sand (on which the disposal structures are built) constitutes a natural barrier in case of accidental releases of radioactive elements towards the groundwater table.



A unique array of skills and services

To provide its wide-ranging competences in the field of waste management and disposal, Andra offers multiple solutions, from consultancy and documents reviewing, to technology transfer and turnkey projects

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*



ANDRA
French National Radioactive
Waste Management Agency
1-7, rue Jean-Monnet
92298 Châtenay-Malabry cedex
Tel: (+33) 1 46 11 82 5 0
www.andra.fr

For further information or contact:
international@andra.fr
+ 33 1 46 11 82 99