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Legal framework

Radioactive materials and waste management

- Directive 2011/70/Euratom
- Environment Code (June 2006 act)
- PNGMDR
- PNGMDR Decree
- Other Decrees (November 2007)
- PNGMDR order (project)
- BNI Order (February 2012)
- ASN Resolution
  Waste management, processing (project)...
Article L. 542-1-2 defines the content of the National Plan for Management of Radioactive Materials and Waste (PNGMDR)

- Produces an inventory of management modes
- Identifies the foreseeable disposal and storage facility requirements
- Determines the targets to be achieved for waste for which there is as yet no final management solution
- Cost estimation

Every 3 years, the Government submits a PNGMDR to Parliament

The prescriptions of the Plan are set by decree:

Decree of 27 December 2013 for the 2013-2015 PNGMDR (transmitted to Parliament at end of 2012)
The PNGMDR is drawn up according to the following principles:

Reduction in the quantity and harmfulness of the wastes by
- prevention
- reprocessing (spent fuels reprocessing policy)
- packaging

Materials pending reprocessing and radioactive waste awaiting disposal are stored in special facilities.

After storage, radioactive waste not liable to be placed in a surface or sub-surface disposal facility are sent for deep geological disposal.

The PNGMDR draws on the national radioactive waste inventory produced by ANDRA.
## Classification of waste and associated management modes

<table>
<thead>
<tr>
<th>Level</th>
<th>“Very short lived” waste containing radionuclides with a half-life &lt; 100 days</th>
<th>“Short-lived” waste in which the radioactivity comes mainly from radionuclides with a half-life of ≤ 31 years</th>
<th>“Long-lived” waste mainly containing radionuclides with a half-life of &gt;31 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low level (VLL)</td>
<td>Management by radioactive decay on the production site then transfer to disposal routes dedicated to conventional waste</td>
<td>Dedicated surface disposal or recycling (disposal facility in the Aube Waste collection, storage and disposal centre)</td>
<td></td>
</tr>
<tr>
<td>Low Level (LL)</td>
<td></td>
<td></td>
<td>Near-surface disposal (being examined within the framework of the 28 June 2006 Act)</td>
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<tr>
<td>Intermediate Level (IL)</td>
<td></td>
<td>Surface disposal (Aube waste disposal centre)</td>
<td></td>
</tr>
<tr>
<td>High Level (HL)</td>
<td>Not applicable</td>
<td></td>
<td>Deep geological disposal (planned under the 28 June 2006 Act)</td>
</tr>
</tbody>
</table>
Radioactive waste in figures

Waste stock as at end 2013:
HLW: 3,200 m³
ILW-LL: 44,000 m³
LLW-LL: 91,000 m³
LLW/ILW-SL: 880,000 m³
VLLW: 440,000 m³
Waste with no disposal route: ~3,700 m³

Breakdown of volume of waste per activity sector

<table>
<thead>
<tr>
<th>CATÉGORIE</th>
<th>STOCKS À FIN 2013</th>
<th>PRÉVISIONS À FIN 2020</th>
<th>PRÉVISIONS À FIN 2030</th>
<th>PRÉVISIONS À TERMINAISON</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA</td>
<td>3 200</td>
<td>4 100</td>
<td>5 500</td>
<td>10 000</td>
</tr>
<tr>
<td>MA-VL</td>
<td>44 000</td>
<td>48 000</td>
<td>53 000</td>
<td>72 000</td>
</tr>
<tr>
<td>FA-VL</td>
<td>91 000</td>
<td>92 000</td>
<td>120 000</td>
<td>180 000</td>
</tr>
<tr>
<td>FMA-VC</td>
<td>880 000</td>
<td>1 000 000</td>
<td>1 200 000</td>
<td>1 900 000</td>
</tr>
<tr>
<td>TFA</td>
<td>440 000</td>
<td>650 000</td>
<td>1 100 000</td>
<td>2 200 000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>~1 460 000</td>
<td>~1 800 000</td>
<td>~2 500 000</td>
<td>~4 300 000</td>
</tr>
</tbody>
</table>

Source: Andra national inventory (2015)
The Morvilliers VLLW disposal facility (650,000 m³) has been operational since 2003 and implements French doctrine based on the absence of waste clearance levels.

Future nuclear facility decommissioning work will generate large quantities of VLL waste, which could saturate the Morvilliers facility as of 2025.

Work is being done in accordance with the PNGMDR to ensure that future VLL waste can continue to be managed for the long-term in appropriate conditions of safety.
BNI operated by ANDRA since 1992

Capacity: 1 million m$^3$ of LLW/ILW-short lived waste

Waste management optimisation work means that operation of this facility could continue until about 2060
Planned LLW-LL disposal routes

The near-surface disposal facility

radium-bearing waste, rare earths, Zirconium metallurgy...) and GCR graphite waste (sleeves, stacks...)

Search for site initiated by the Minister in summer of 2008, dossier assessment in 2015.

ASN opinion (2016): potentially suitable site but second site needed to contain all the waste
Planned HLW/ILW-LL disposal routes

HLW/ILW-LL waste disposal routes: transmutation, long-term storage, deep disposal

Reversible geological disposal

Safety option dossier: April 2016

Creation authorisation application: Postponed from 2015 to mid-2018

Pilot industrial phase started with reception of first radioactive packages 4 years later: 2025
A process that involves all the stakeholders:

- A pluralistic working group comprising: the waste producers and Andra, representatives of environmental protection associations, the various Ministries involved, experts such as IRSN and ASN.
- 4 to 5 meetings per year at which the progress made by the studies is presented
- A plan whose contents are submitted to the members of the WG

Innovations in 2016:

- Strategic environmental assessment submitted to the environmental authority
- Public consultation regarding the draft plan

The PNGMDR: a key element in the oversight of radioactive waste management in France
The 2016-2018 PNGMDR reinforces the approach based on management routes, by requiring the creation or updating of overall industrial systems for VLLW, LLW-LL and HLW/ILW-LL wastes.

It aims to consolidate the forecast inventory of waste, by requiring that:

- the VLLW waste linked to remediation of structures and soils be included in the forecasts
- the possibilities of reusing certain radioactive materials be substantiated in greater detail
- the future waste from Malvési be integrated into the existing disposal routes

It asks for improved early identification of capacity requirements (reprocessing, storage, disposal)
The main conclusions of the 2016-2018 PNGMDR

Radioactive materials

→ Improve substantiation of the reusability of certain materials
→ Study the feasibility of a disposal concept for depleted uranium and reprocessed uranium

VLLW waste

→ The management principle based on “zoning” is not called into question
→ Make use of optimisation margins for management of VLLW waste (densification, waste zoning, recycling of rubble in repository, etc.)
→ Continue with studies into feasibility of recycling of metal materials, with presentation of technical and safety options for a processing facility for SGs and diffusers from GB1
→ Study the feasibility of “small-scale” disposal facilities
LLW-LL

→ Continue with geological investigations on the Soulaines site then submit technical and safety options for a repository on this site and propose a prudent commissioning date for this facility

→ Continue with studies for characterisation and processing of graphite and, as applicable, of bituminised waste

→ Present the methodology concerning the search for a 2nd LLW-LL disposal facility, in compliance with the recommendations of the HCTISN
The main conclusions of the 2016-2018 PNGMDR

HLW/ILW-LL

→ Update the Cigéo calendar; revise the requirements and the calendar for the “upstream” part (storage, delivery) with inclusion of robust margins
→ Define a preliminary version of the acceptance specifications; analyse the acceptability of existing packages with respect to these specifications
→ Continue studies into the packaging of certain ILW-LL waste
→ Focus the pilot industrial phase on the acquisition of data to confirm the repository’s nuclear safety case
→ Evaluate the cost of direct disposal of spent fuels
Waste requiring specific work

→ Continue the search for an appropriate disposal route for tritiated waste, in particular from the small producers
→ Monitor the deployment of used sealed source management routes
→ Continue work to take charge of waste with no disposal route, more specifically mercury and organic waste and activated parts from small producers
→ Search for and implement a final management solution for the waste stored in the ECRIN BNI
Thank you for your attention