ONDRAF/NIRAS

BELGOPROCESS

Storage of radioactive waste

BVS–ABR E&T event
Radioactive Waste '*from cradle to grave*'
23/09/2022

François Migeot (ONDRAF/NIRAS)

Contents

- **Typical waste**
- **Storage of CWP**
- **Storage of non-CWP**
- **Future challenges**

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Typical waste

Examples of standard combustible non-CWP

PPE

shredded combustible waste

liquids

dead animals

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BELGO PROCESS

Typical waste

Examples of standard compactable non-CWP

metal

concrete

glass

mix

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BELGPROCESS

Typical waste

Others examples of non-CWP

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BELGOPROCESS

Typical waste
Standard production of CWP

- **Production of CWP at Belgoprocess**

Reduction

Combustible waste is incinerated.

Compressible waste is compressed.

Supercompaction

200-litre drums filled with compressible or combustible waste are compacted into 25 cm to 40 cm thick pellets under a 2000-tonne press. They are then placed in a 400-litre drum.

Conditioning

400 l + = stable package

Cement is added to the 400-litre drums. This results in a conditioned waste package of about one tonne.

Non-compressible waste is placed in bulk in 400-litre drums.

- **Others productions in NPP (concentraten, resins, varia)**

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Typical Waste
CWP

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Overview of storage buildings

- **Storage buildings are**
  - All located on site Belgoprocess
  - Owned by ONDRAF/NIRAS
  - Operated by Belgoprocess
  - Based on proven, simple & robust technologies

LLW	ILW	HLW
150	127	136 Zone C
151	129	
155	136 Zone D	

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Overview of storage buildings

- **Type Conditionned Waste Package**

Building	Main type CWP	Secondary types CWP
150 (LLW)	400-l	600-l, 1000-l, 1500-l, 1600-l, 2200-l
151 (LLW)	400-l	220-l, 1000-l, 1500-l, 1600-l
155 (LLW)	400-l	Overpacks (400-l, 700-l)
127 (ILW)	220-l	400-l
129 (ILW)	60-l	-
136 –zone D (ILW)	180-l	560-l, 400-l
136 – zone C (HLW)	150-l	-

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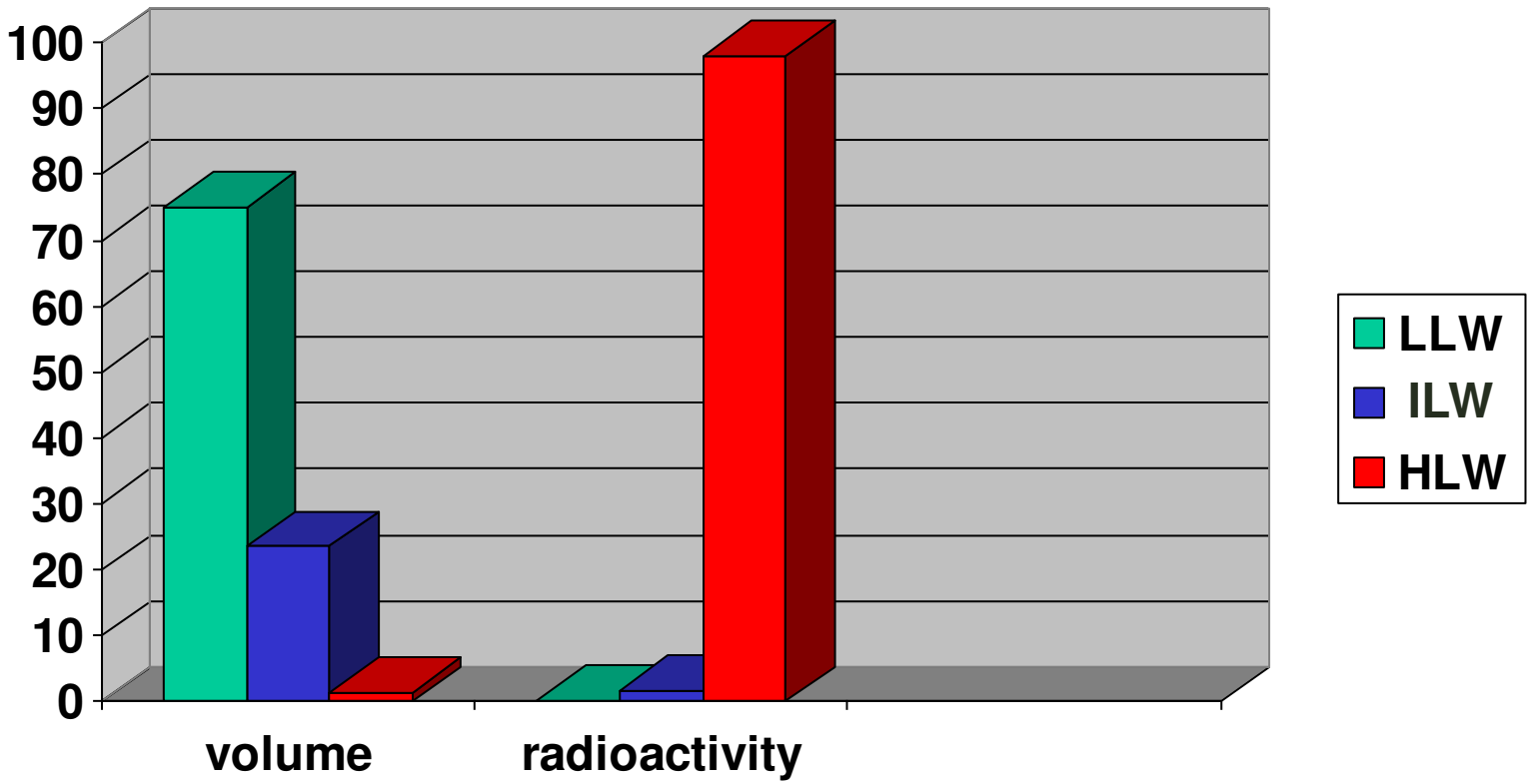
Overview of storage buildings

- **Volume vs radioactivity**



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Overview of storage buildings

- **End 2021 : 69856 CWP**
  (about 50 % accepted)
- **Main type CWP : 400-l drum**
  (about ~70% stock)

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Management within storage buildings

- **Inspection of CWP**
  - Inspection of every new CWP
  - Follow-up inspections on witness accepted CWP
    - Choosen at the moment of the Acceptance
    - First after 3 years, than every 10 years during storage
    - Between 200 and 500 inspections / year
  - Follow-up inspections on non-accepted CWP (dedicated programma's, witness CWP, global inspections)

- **Monitoring of storage buildings**
  - T° , humidity, specific measurements (sulfate, chloride, radon…)
  - Periodical routines inspections (electrical equipments, cranes, structure,…)

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ONDRAF/NIRAS BELGO PROCESS

Overview of storage buildings non-CWP

- **Storage buildings are**
  - All located on site Belgoprocess
  - Owned by ONDRAF/NIRAS
  - Operated by Belgoprocess
  - Standard lifetime of 50 years (extension possible by approval of regulator after safety studies)

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Overview of storage buildings non-CWP

- **Dose rate limits**

Building		Type
153		LLW (Low α content)
110		LLW(α content)
125		ILW
156		Spent fuel in CASTOR containers
250 B		Liquid waste
250 C		Waste containing:Ra-, Th-, Kr-, U- en H3-
270 E		LLW (including Ra isotopes)
270 G		ILW and HLW (including Ra isotopes) stored in shielded containers

Overview of Waste package

- **Types of Waste Package**

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Storage of non-CWP

- **Total amount of stored non-CWP: between 2000 and 3000 m³**
- **Most non-CWP short time on site before processing**
- **Still a fraction legacy waste**
- **Specific waste streams require specific approach (Ra, Na, Pu-scraps)**
- **Inspection and follow-up**
  - Control at reception of non-CWP
  - Each year inspection of fraction of non-CWP older then 5 years
  - Specific inspection program for legacy waste

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Future challenges
Storage CWP and non-CWP

- **Start surface disposal (2027)**
  - IPM almost clear (2023/2024)
  - Destockage LLW for alimentation of IPM (2023/2024) and final surface disposal (2027) => manipulation of CWP, NDT/DT…
  - Dedicated NDT/DT installation (2029) (in between temporary solution)
  - ROC for reception of LLW/ILW (controles, sorting...) (2026/2027)
  - Exploitation up to 2060

- **Decommissiong nuclear installations (NPP)**
  - Increase waste productions
  - (possibly) New routes

- **Capacity for LLW ok up to 2029 ~2032**

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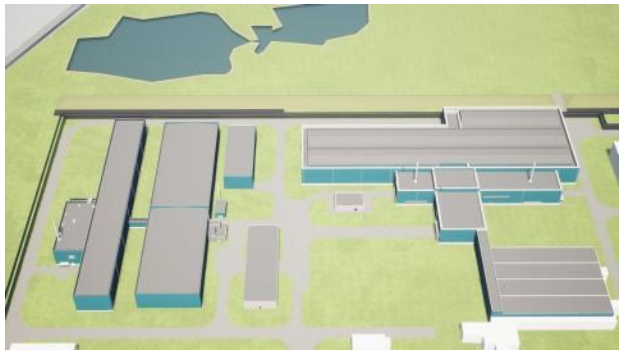
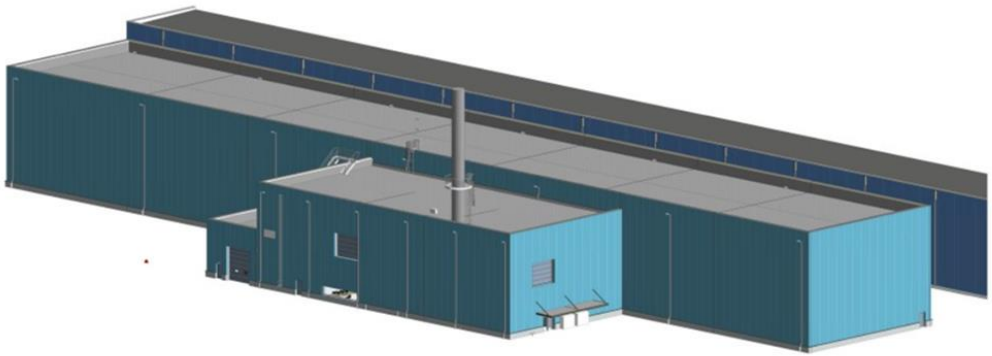
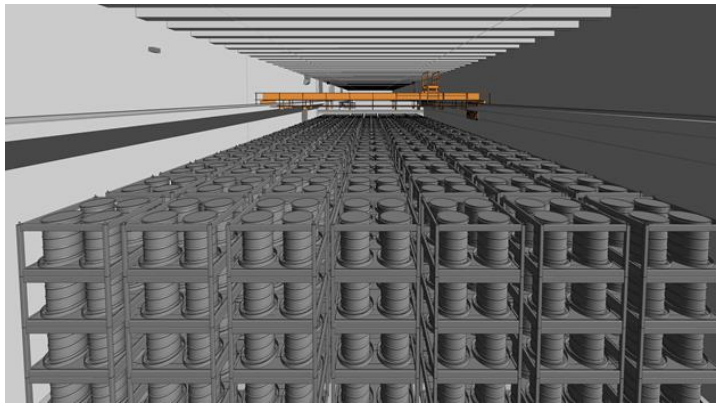
Future challenges
Storage CWP and non-CWP

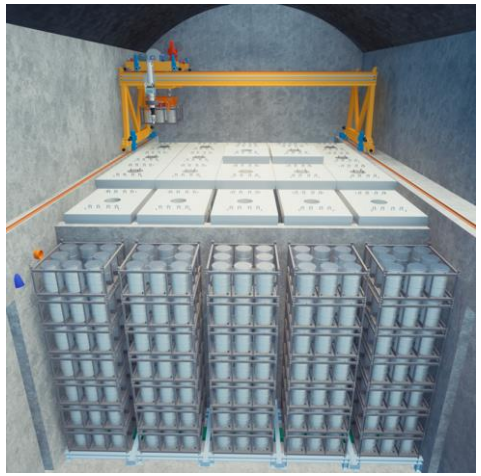


- **Others new buildings**
  - B167 for LLW CWP with gel production form NPP Doel (2024)





  - B168 for ILW bitumes (< EOL building 2037)
    - Specific measurements /samples
    - Individual inspections and global inspection
  - MESSINA for others ILW stored in B127-4
  - Extensions of B136 for ILW coming from NPP



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Future challenges
Storage non-CWP

- **Long term surveillance**
  - Ageing of CWP
    - For LLW that will not be compatible with surface disposal
  - Ageing of buildings

- **New/future facility for reception of non-CWP**

- **Develop new routes for non-CWP without actual solution**

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Comments / Questions?

Thank you for your attention !

Need more :
https://www.ondraf.be/
https://www.belgoprocess.be
https://tabloo.com

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