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## Experience in Site Characterization and Cleanup at the CEA Centre of Fontenay-aux-Roses

### Contents

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- Cleanup methodology
- The Mobile Laboratory for Site Cleanup
- Examples of waste retrieval and cleanup operations
  - 'Building 53' area
  - Cleanup of West Moats
- The Mobile Containment Working Area

## Presentation of the CEA Center of Fontenay-aux-Roses

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- Birthplace of french nuclear programs

- ~2 500 employees

- 13,8 hectares



- **Urban site** : ~600 000 people living in a 5 km neighbourhood



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## Cleanup methodology

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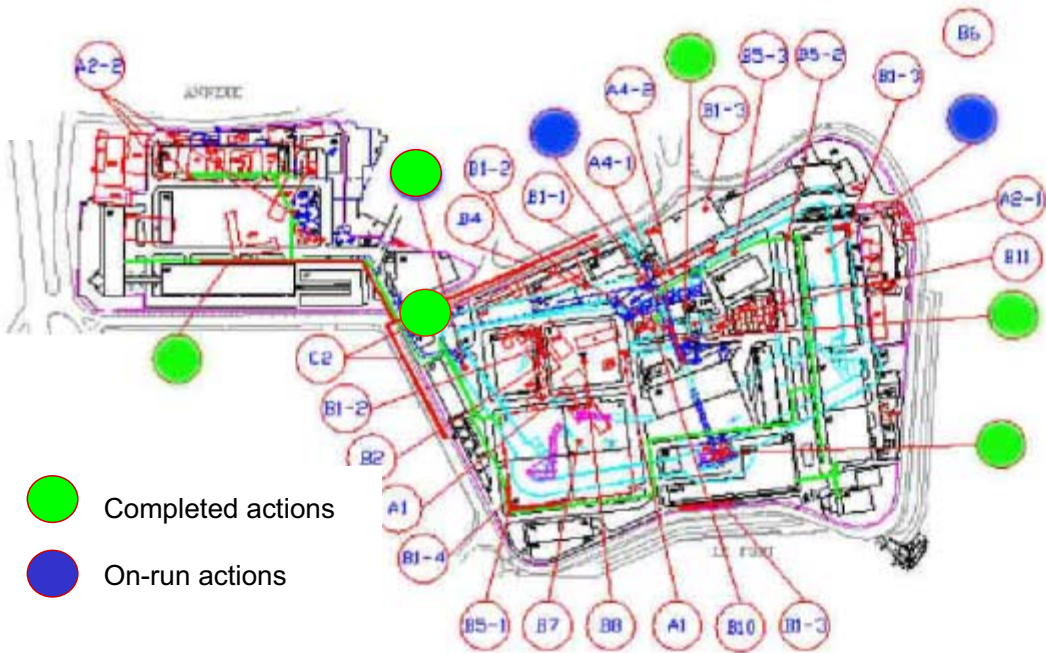


- 🔑 Site history 
- 🔑 Local and national archives (construction, operation, incidents..)
- 🔑 Collection of evidences (retired employees of CEA/FAR as witnesses)
- 🔑 **Drillings, georadar techniques, samplings and measurements** 

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## Cleanup methodology



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## Cleanup methodology



→ CEA/FAR expects to keep future responsibility for this site

→ Current installations will be replaced by labs and offices

🚫 **Maximum impact due to residual activity after cleanup operations should not exceed 10  $\mu$ Sv per year**

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## Cleanup methodology

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### Cleanup is a three step process

- A – RADIOLOGICAL EVALUATION FILE → zoning for waste
- B – CLEANUP FOLLOW-UP FILE
- C – CLEANUP OPERATION RADIOLOGICAL REPORT

➔ provides full traceability of the cleanup operations

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## Mobile Laboratory for Site Cleanup

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Comprehensive tool for site characterization, environment and cleanup operations monitoring.



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## Mobile Laboratory for Site Cleanup



Meteo station

- Gamma spectrometry on samples
- In situ measurements (work areas, waste packages)



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## Mobile Laboratory for Site Cleanup



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## Mobile Laboratory for Site Cleanup



In situ gamma spectrometry for soil/site characterization

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## Mobile Laboratory for Site Cleanup ; alpha measurement on samples



Chemical preparation of samples

Alpha measurement (U, Pu):  
liquid scintillation counting



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## 'Building 53' Cleanup Work

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## 'Building 53' Cleanup Work

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## 'Building 53' Cleanup Work

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## 'Building 53' Cleanup Work

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**Cleaned in 1998**  
**residual activity 0,03 Bq/g  $\alpha$  and  $\beta$**

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## ‘Building 53’ Cleanup Work

January 1999



October 1999



## ‘Building 53’ Cleanup Work

### WASTE GENERATED

	LLW	VLLW	ORDINARY
<b>Scheduled</b>	<b>10 m<sup>3</sup></b>	<b>180 m<sup>3</sup></b>	<b>250 m<sup>3</sup></b>
<b>Generated</b>	<b>8 m<sup>3</sup></b>	<b>170 m<sup>3</sup></b>	<b>251 m<sup>3</sup></b>



## Cleanup of West Moats



1956

1961



Cleanup of west moats has been based on an evidence from a retired employee :  
« a waste drum has fallen out in the moats and hasn't been retrieved »



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## Cleanup of West Moats



→ Preliminary investigation : ~ 800 Bq/g  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$   
dose rate between 0,8 and 10  $\mu\text{Gy/h}$

→ Confirmation by drilling and georadar



→ Decision to cleanup this place



Design and implementation of a Mobile Containment Working Area, with nuclear ventilation.



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## Cleanup of West Moats



Cleanup operations inside MOCA

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## Cleanup of West Moats



LLW drum was removed...

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## Cleanup of West Moats



Cleanup operations inside MOCA

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## Cleanup of West Moats : results



Removal of 400 kg LLW, 1700 kg VLLW (soil)

Average residual  $^{137}\text{Cs}$  activity : **0,014 Bq/g**

→ radiological impact : **0,2  $\mu\text{Sv}/\text{year}$**

*Radiological impact goal has been achieved for medium and long term*

*Traceability of cleanup operations is ensured*

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## SITE CHARACTERIZATION : GEORADAR EXPLORATION



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## Mobile Containment Working Area



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## Mobile Containment Working Area

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## Mobile Containment Working Area

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