



DE LA RECHERCHE À L'INDUSTRIE

The ATALANTE facility: a unique facility for the analysis of High and Medium activity samples

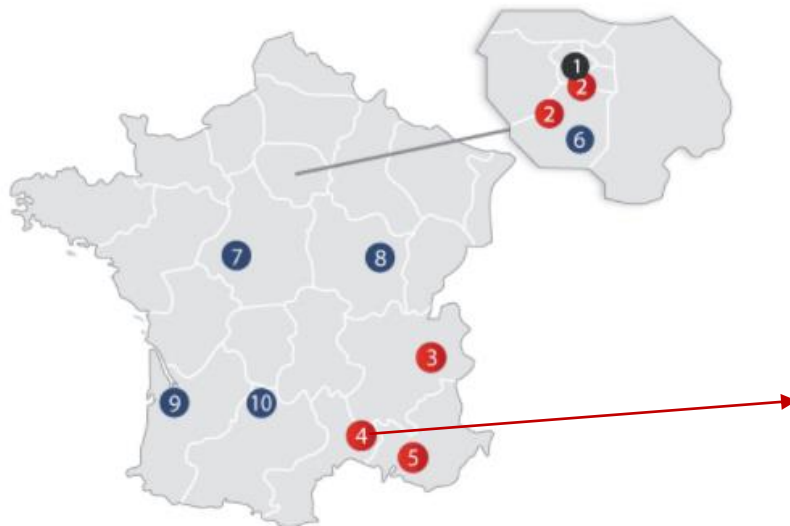
C. Rivier, S. Jan, E. Buravand, E. Excoffier, S. Peuket, P. Sarrat

NDF's 6th International Forum on the Decommissioning of the Fukushima Daiichi Nuclear Power Station

29 August 2022



1- Atalante facility presentation



DES
Division of energies

ISEC
Institute of Science and Technologies for the circular
economy of low-carbon energies

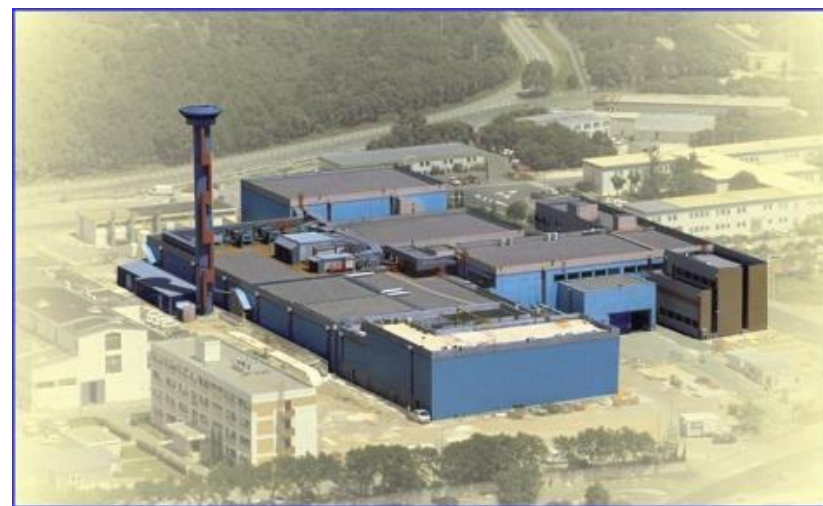
DE2D
Research Department of Enrichment
Decommissioning and Waste

DMRC
Research Department of Mining and
Fuel Recycling Processes

CETAMA
Commission for Establishment of Analytical Methods



Marcoule center



Atalante facility

ATALANTE facility: some key figures

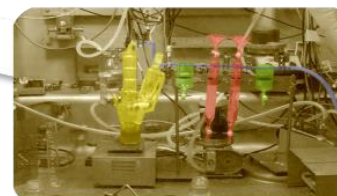
- ▶ 6 mains blocks, 26 000 m², 11 hot cells, 17 laboratories
- ▶ 200 staff researchers (~ 40 % engineers), 70 workers for the operation
- ▶ Building phases from 1985 to 1992, then 1995 to 2000.
- ▶ More than 25000 samples analyzed by the central analytical laboratory since 2008



Analyses



Chemistry of actinides



Spent fuel dissolution



Waste conditioning and long-term behaviour



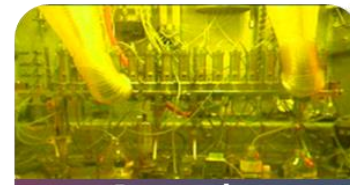
Extracting molecule design



Fabrication of MOX fuel



Conversion processes



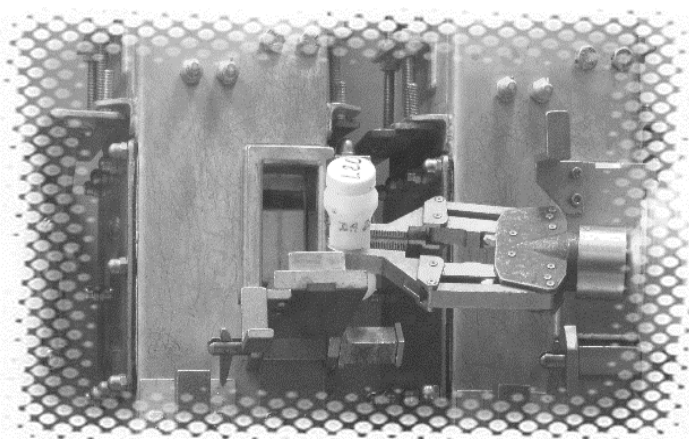
Separation processes

The ATALANTE facility: High activity analytical capabilities CBA: a hot cell dedicated to chemical and radiological analysis

- ▶ 2 shifts, 1000 samples per year, 7 analytical techniques
- ▶ Commissioned in 2001, Biological protection: 25cm steel, 5cm lead



Front Zone



Pneumatic transfer



Rear Zone



Ion Chromatography

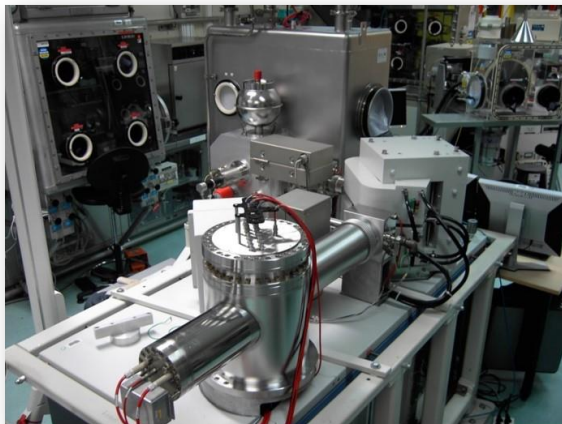


X-Ray and Gamma Ray
spectrometry

- ▶ Analysis laboratories: 2000 samples per year, 3 glove box laboratories dedicated to chemical and radiological analysis, 12 analytical techniques
- ▶ Metrology laboratory: production of actinide reference materials



ICP-MS spectrometer



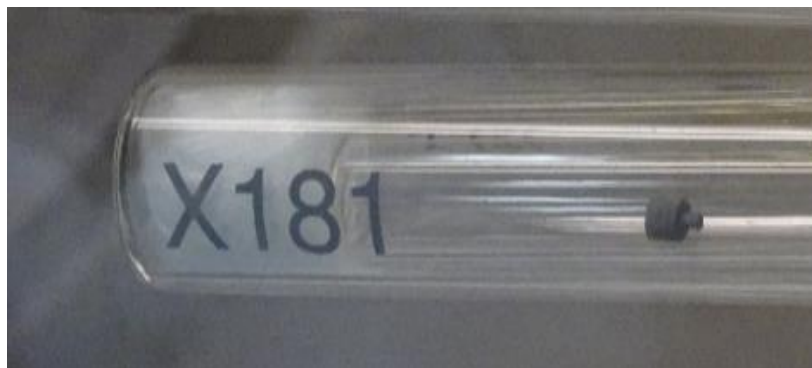
TIMS spectrometer



Preparation set up for Alpha spectrometry



Uranium reference solutions



Plutonium metal reference material

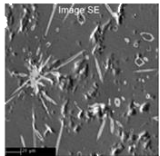
- ▶ 2 laboratories dedicated to solid characterization, 10 characterization techniques



SOLID CHARACTERIZATION LABORATORY

SEM-EDS mapping Prototypical Corium

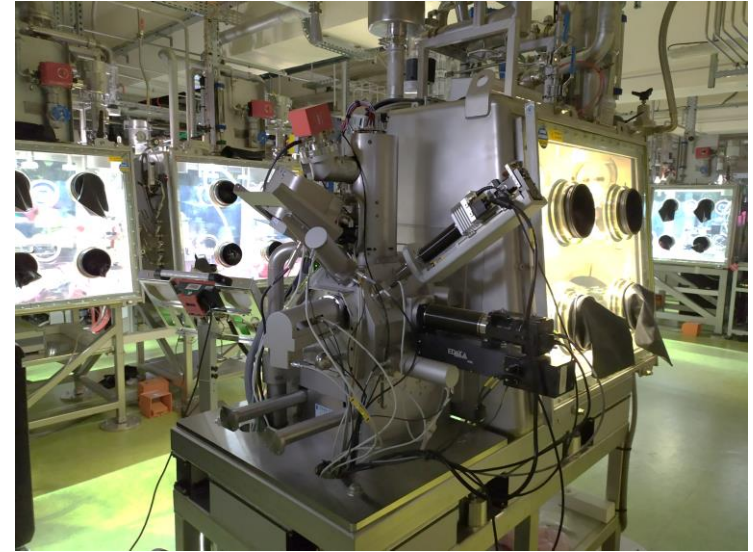
- X-Ray Diffraction
- Scanning Electron Microscope-EDS
- Electron Probe Micro-Analysis



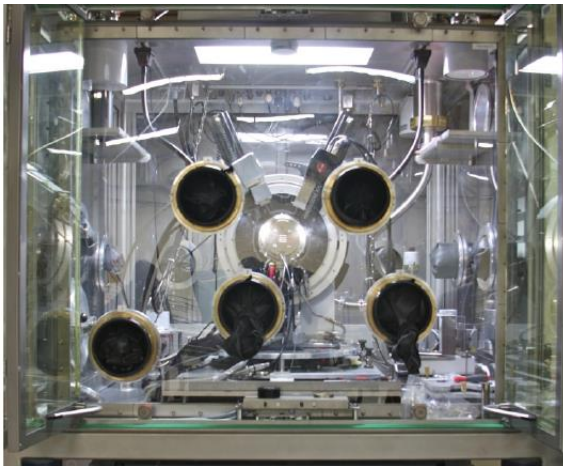
EPMA mapping Glass-ceramic



L29



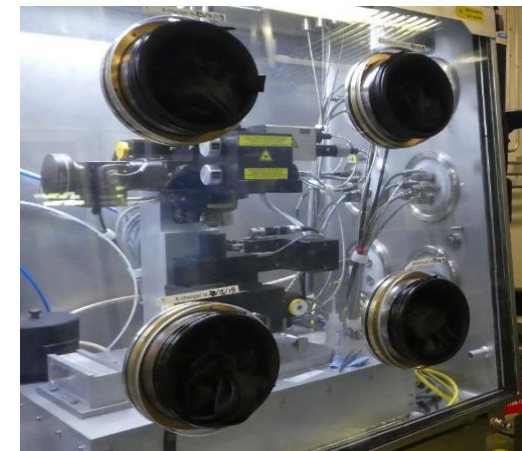
Scanning Electron Microscope



High Temperature X-Ray Diffraction



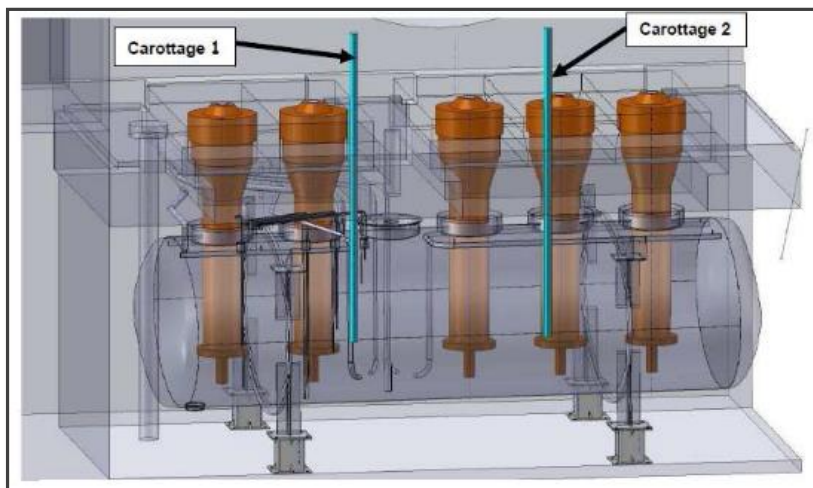
μ -probe



μ -Raman



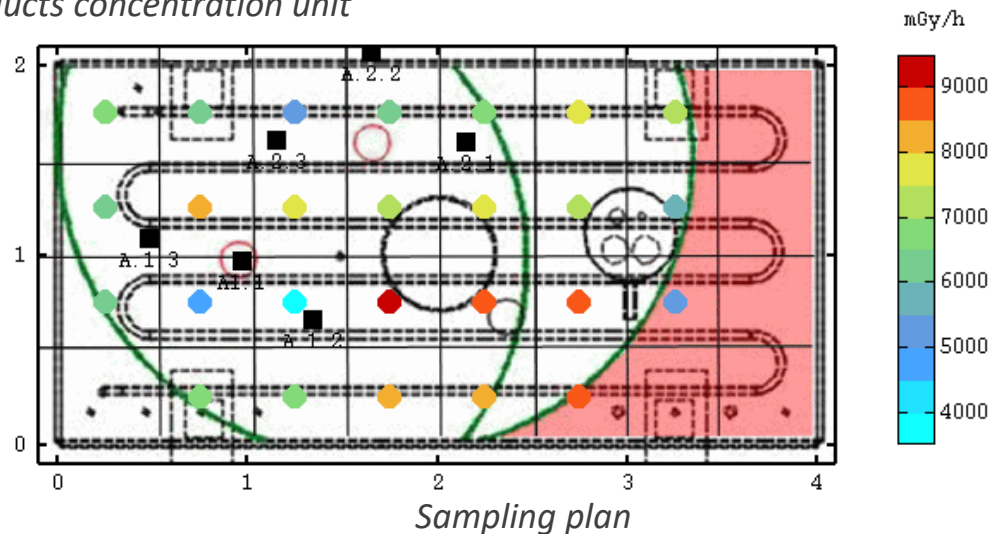
2- Example of high activity sample analysis



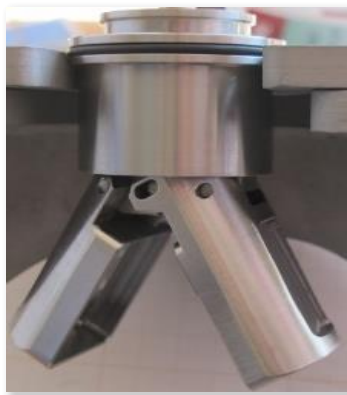
UP1 fission products concentration unit



Photos and dose rate measurements



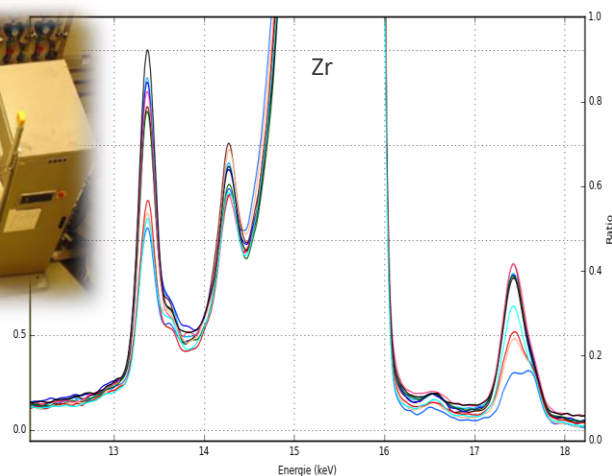
In situ measurements → Sampling plans → Sampling tools development → Samples intake → Laboratory analysis



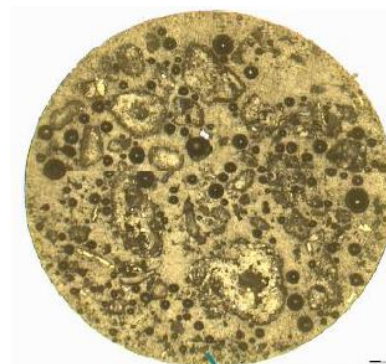
Samplers



Solid sample residue intake



Residue intakes X-Ray fluorescence spectra



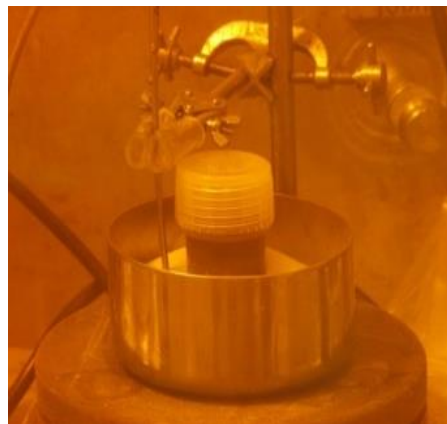
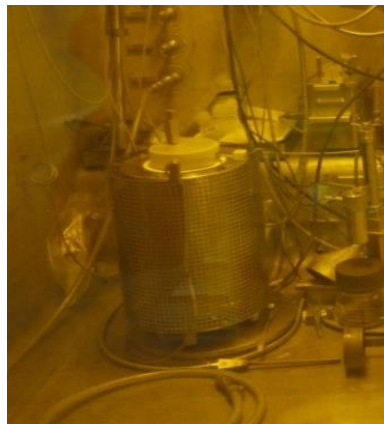
Optical microscopy and SEM characterization of the residues

In situ
measurements

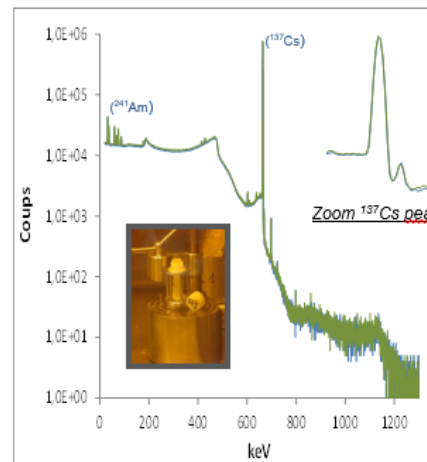
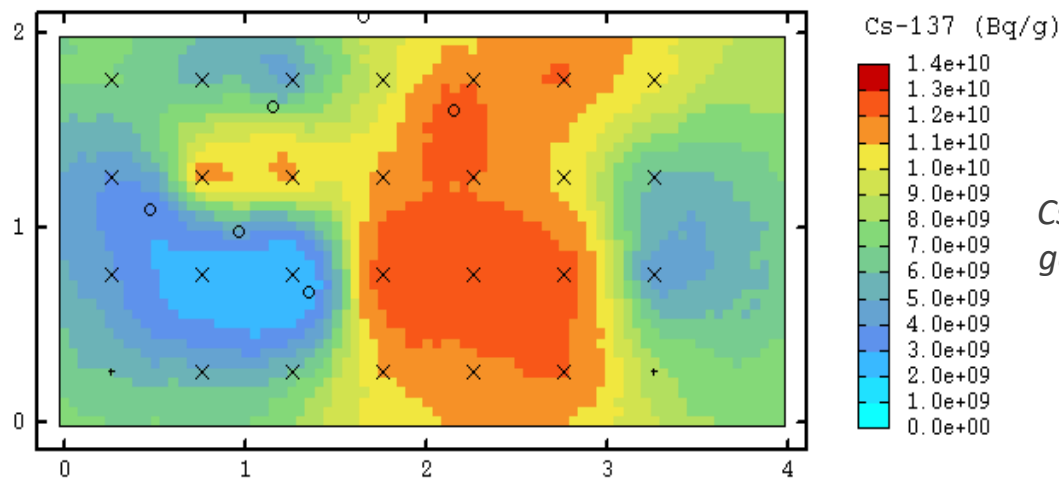
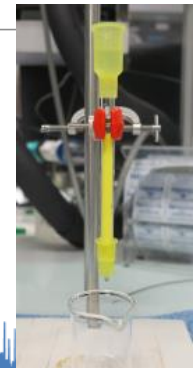
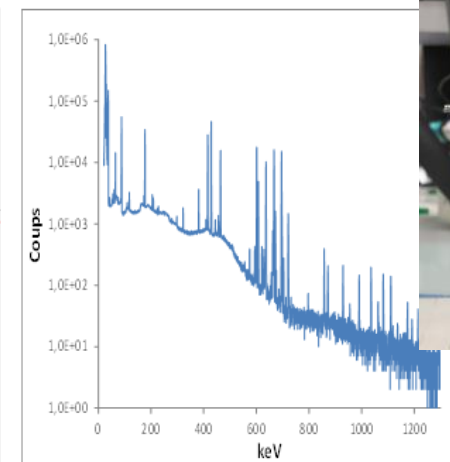
Sampling plans

Sampling tools
development

Samples intake

Laboratory
analysisDissolution in HNO₃ + HF
media in hot cell

Calcination furnace

Dissolution solution Gamma spectra without/with
Cesium decontaminationCs-137 cartography based on
geostatistics data processing



Thank you for your attention

Commissariat à l'énergie atomique et aux énergies alternatives - www.cea.fr