





# TRANSPORTATION OF VITRIFIED HIGH LEVEL WASTE FROM SELLAFIELD TO SWITZERLAND

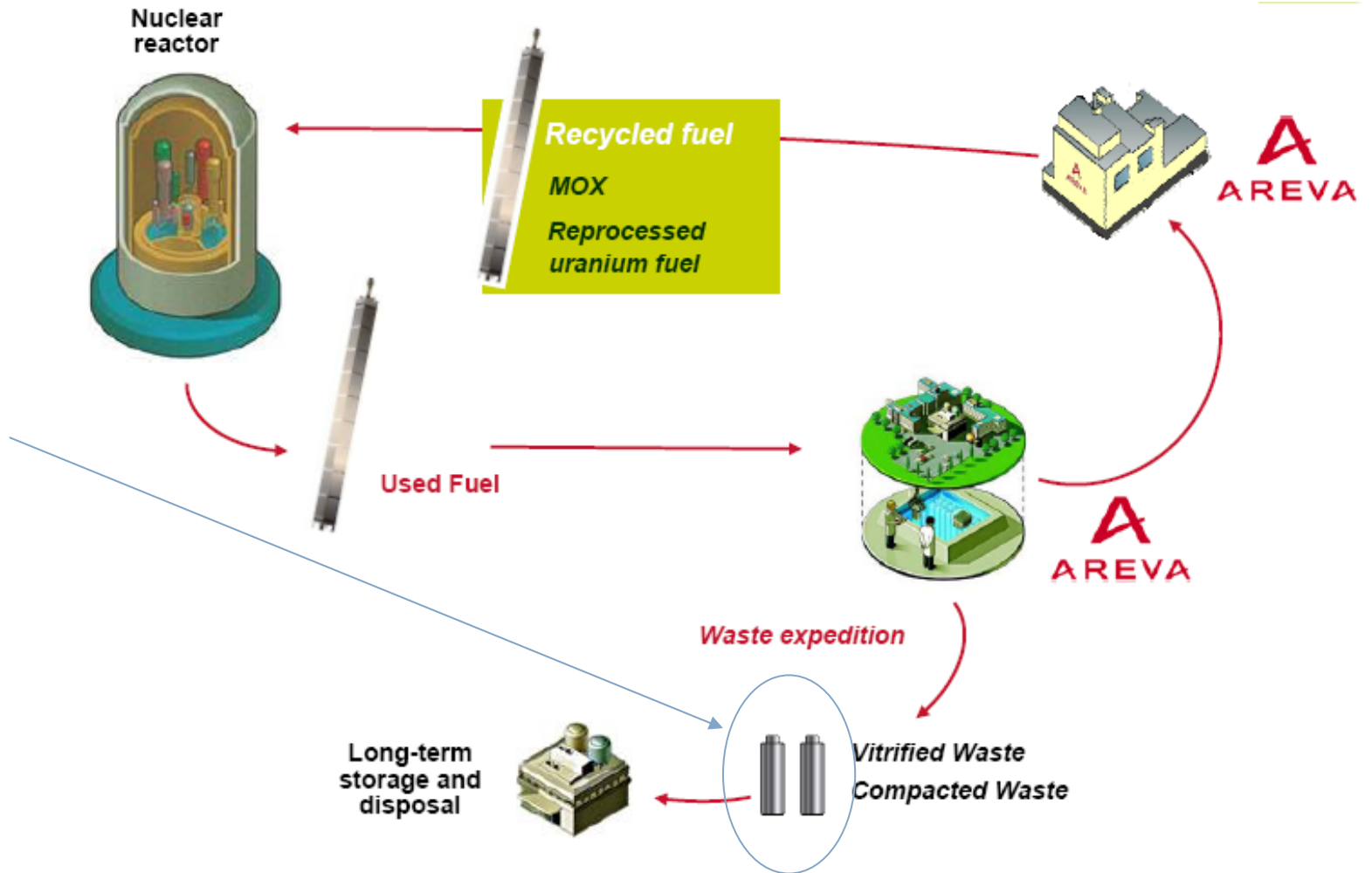
**Justo GARCIA**

**LOGISTICS**



# High Level Waste & Recycling Process

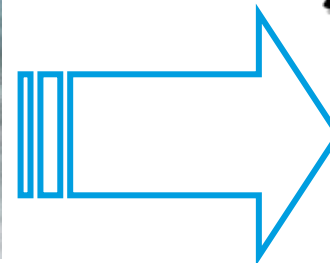
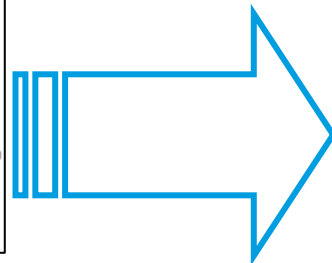
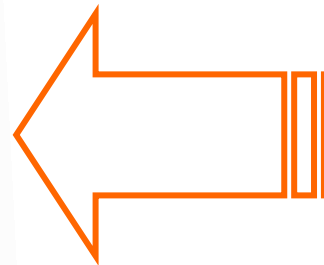
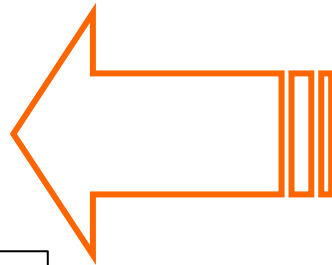
High Level Waste?



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# Transportation from Switzerland

Until 2006, transportation of used fuel from Switzerland



From 2004, transportation of universal canisters to Switzerland

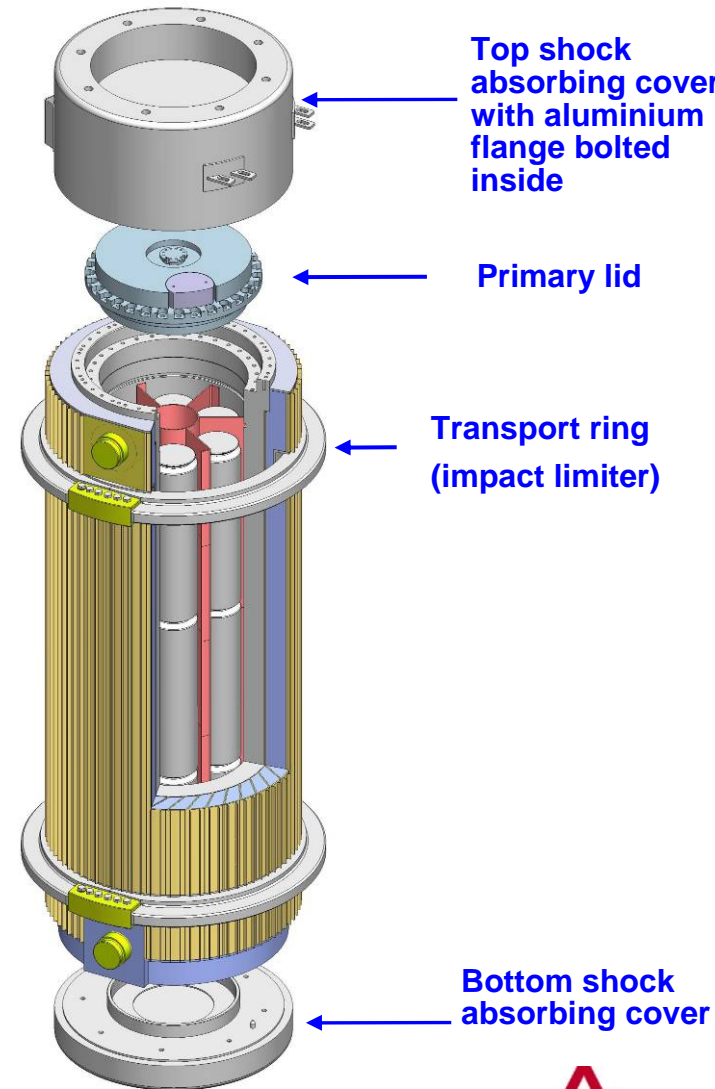
# Main characteristics of the TN<sup>®</sup> 81 cask for Transportation

## ► Transport configurations:

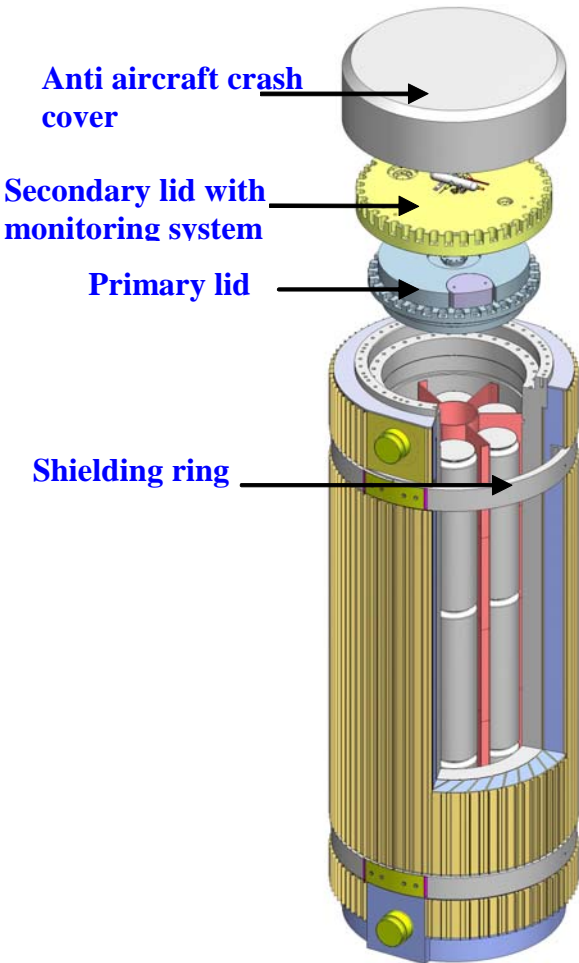
- ◆ cask equipped with 2 side shock absorbers & 2 lateral impact limiters
- ◆ 2 admissible configurations:
  - T1: only with primary lid
  - T2: with primary and secondary lids

## ► Main sizing of the cask

- ◆ Maximum weight: 115 t
- ◆ Overall length: 7 215 mm
- ◆ Overall diameter: 2 750 mm



# Main characteristics of the TN<sup>®</sup> 81 cask for Storage



## ► Storage configurations:

- ◆ TN 81 (CH): cask equipped with primary and secondary lids & 1 anti aircraft crash cover

## ► Main sizing of the cask

- ◆ Maximum weight: 118 t
- ◆ Overall length: 6 454mm
- ◆ Overall diameter: 2 780 mm

# TN<sup>®</sup> 81 Licensing

## ► Current Transportation

- ◆ F/366/B(U)F-96 (Be) in France
- ◆ CH/5071/B(U)F-96 (Rev.1) in Switzerland



## ► Storage

- ◆ TN<sup>®</sup> 81 licensed in Switzerland



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# Main characteristics of the TN<sup>®</sup> 81 cask

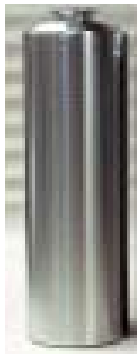
## ► Admissible Contents

### ◆ Content #1: **28 Vitrified waste canisters (UC-V)**

- in accordance with COGEMA 300 AQ 016  
“Specifications of vitrified residues produced from Reprocessing at UP2 or UP3-A La Hague plants”
- Thermal power up to 56 kW (corresponding to 2 kW per canister)
- CSD-V : Ø=435 mm - h=1335 mm - W = 550 kg

### ◆ Content #2: **20 Compacted waste canisters (UC-C)**

- in accordance with specification COGEMA 300 AQ 055 Rév. 03 – “Spécification du colis standard de déchets compactés”
- CSD-C : Ø=430 mm - h=1335 mm - W = 850 kg





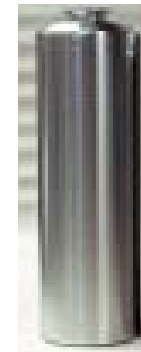
# Adaptation of the TN<sup>®</sup> 81 cask for UK vitrified waste

## ► New Content

- ◆ **Content #3: 28 Vitrified waste canisters (UC-V\*)**
  - in accordance with Sellafield Ltd specification HLWP SD 02459 Issue 1 “SL VR Characteristics for TN<sup>®</sup> 81 Licensing”
  - Thermal power up to 56 kW (corresponding to 2 kW per canister)
  - CSD-V : Ø=430 mm - h=1338 mm - W = 550 kg

## ➔ New package approval required

- ◆ Package approval extension in France
- ◆ Its validation in Switzerland and in the United Kingdom



# Adaptation of the TN<sup>®</sup> 81 cask for UK vitrified waste

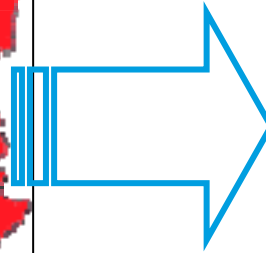
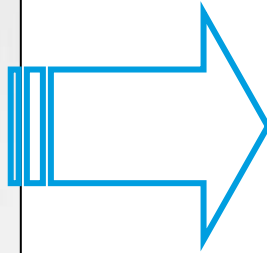
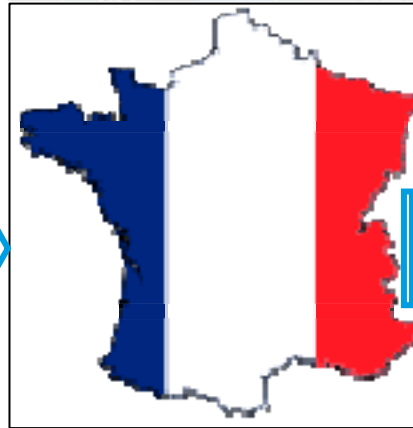
## ▶ Specific site requirement

- ◆ Absorbing stool for the loading operations (bottom shock absorbing cover)
- ◆ New shielding on the primary lid

## ▶ New content

- ◆ Mechanical evaluation of the cask
- ◆ Shielding calculation around the cask
- ◆ Thermal evaluation of the cask
- ◆ Criticality evaluation of the cask content
  
- ◆ Optimized cask loading pattern

# Transportation of the TN<sup>®</sup> 81 casks from UK to Switzerland



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# Conclusion

▶ **TN International working with International Nuclear Services (INS) and Sellafield Ltd proposed to its customer KKG a global service for the return of vitrified residue from the United Kingdom to Switzerland**