

Developments of new radioactive transport packages  
of Type B within the current EMBAL Plan in CEA

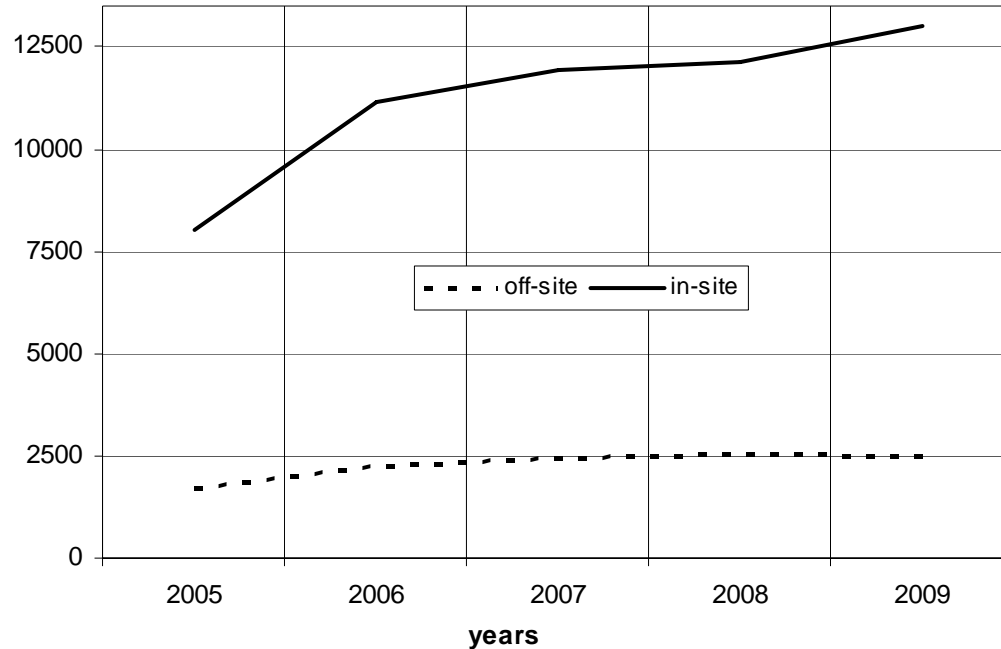
- Introduction
- Needs
- Roadmap of the EMBAL plan
- Complexity of the design process  
arisen during the assessment
- Conclusion // Discussion



Increase both of the in-Site and off-Site transports of radioactive material

Figure 3:

Overview in CEA of the total transports of radioactive materials in-site and off-site for the 5 last years



Mode of transport in CEA : 90% by road, and about 10% by mixte mode (road/rail or road/air)

Off-site transport: distribution by package type



Consignee

Receipt of radioactive materials



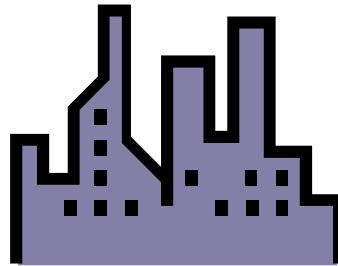
Fresh and fissile materials

Nuclear sources

Radionuclides

Operational activities

Research programmes



- various types of installations : laboratoires, waste facilities, treatment units, research nuclear reactors...

- various natures of content

- various conditions of handling, loading and ability to use the packagings

Consignor

Expedition



Irradiated fuels

Radioactive Waste : liquids, solids, organics...

Nuclear sources, radionuclides for medical researches

Define, establish and maintain a fleet of transport packagings for radioactive materials in the CEA

- initiated in 2001 for the renewal of CEA's packages
- about 30 projects have been analyzed since 2001 referring to Type B package design
- a few modifications on existing packagings
- in 2010 : 6 new packages have been manufactured under the plan's roadmap and are licensing by the national nuclear safety authority
- for the next 5 years, 12 more packages are expected, most of the design are still engaged and under assessment

10 years of safety developpement process with a large feedback on conceptual design studies

Packages for the transport of radioactive materials in CEA	Past	EMBAL plan	Manufactured and used	Under conception
For fresh fuels or fresh fissile materials	8	5	2	3
For irradiated fuels or fissile used materials	14	6	4 <i>(IR800)</i>	2 <i>(1 off)</i>
For radioactive solid wastes	8	4	1	3 <i>(DE25, TIRADE)</i>
For radioactive liquid wastes	2	3	2 <i>(LR144, SORG)</i>	1
For nuclear sources or radionuclides	3	2	0	1
<b>TOTAL</b>	<b>35</b>	<b>20</b>	<b>9</b>	<b>10</b>

**Deadline and costs**

**Options such as mass,  
nature of the contents,  
loading conditions...**

**Trad-off to be found**

**Assessment and requirements : design but also prove**

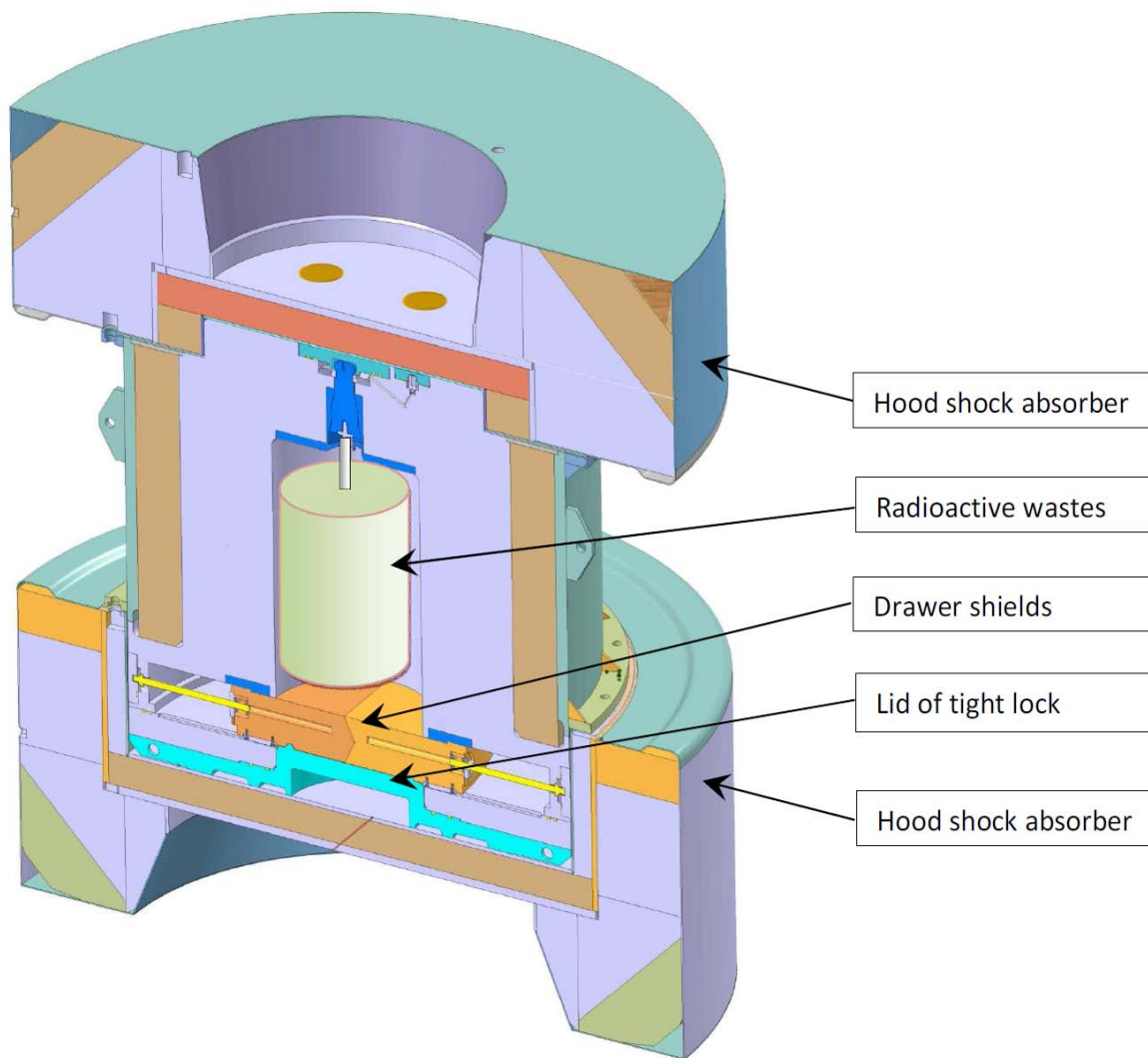


The content : to be well-defined

The methods : to be a common reference between the experts of the National competent authority and the Applicant

## DE25 packaging

A concept with two tungsten alloy drawer systems at the bottom



- 9 t empty weight, radioactive materials

## LR144 tank

A concept of tank made with URANUS stainless steel to prevent the risk of corrosion with the contents



- 24 t, 1 m<sup>3</sup> of radioactive liquid waste, 23 W max.



## SORG tank

- 9 t, 400 l of organic effluents

Meets the requirement for the Type-B model except for « the proof of the qualification of the method for testing the thermal stability of the contents transported » (certificate of approval under a special arrangement transport operation F/816/X)



- transport of the package operated with the compensatory measures: an additional vehicle with fire extinguishers and fire training people.

- ✿ a debate was engaged during the assessment on the specified contents between the CEA's specialists and the experts of the national competent authority.
- ✿ the trade off could not be fined on the qualified method used to demonstrate the thermal stability of the organic effluents
- ✿ the experimental methods are : the thermal screening unit (TSU) used on the CEA facilities with a respond on pressure and temperature ; the calorimetric method based on the respond in high temperature (DCS)
- ✿ design but also prove : the qualified method TSU is not a “common reference” as the DCS shared by the Applicant, the Designer and the Regulator; That is to say : if TSU became a common reference for transportation, SORG'tank should be a Type-B model with an approval

## ✿ The EMBAL plan in CEA:

6 new packages manufactured in 2010

7 packages modified from ancient concepts

decrease from **35 to 20 operating type-B packages**

## ✿ Conservative approaches in accordance with the Regulation

## ✿ Design but also prove, with common references and approaches

....the risk management of the licensing process of a radioactive container project with the example of SORG tank....