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JOSÉ CABRERA NPP DISMANTLING AND DECOMMISSIONING PLAN

March 2010

CONTENT

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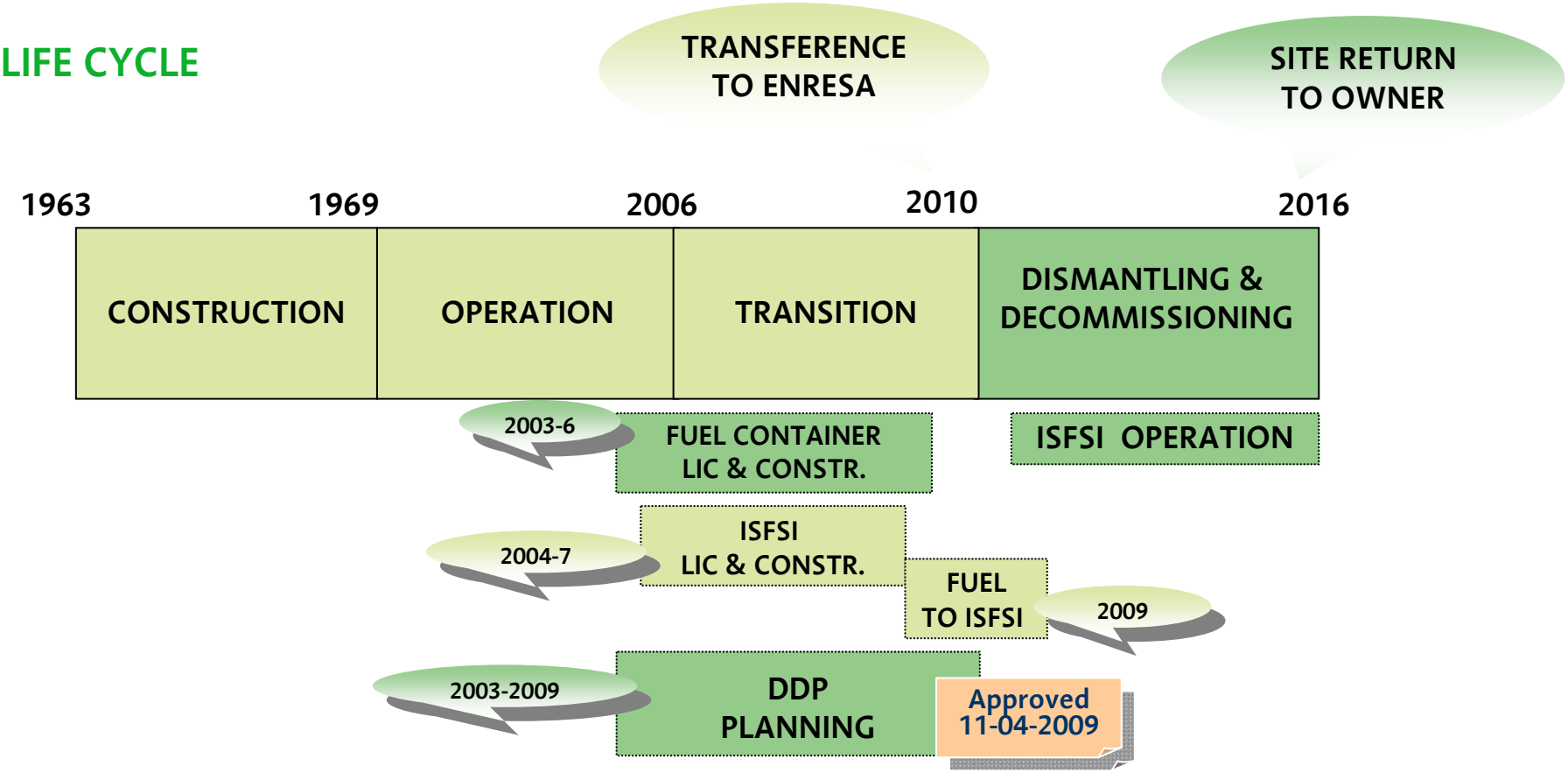
INTRODUCTION

LIFE CYCLE



INTRODUCTION

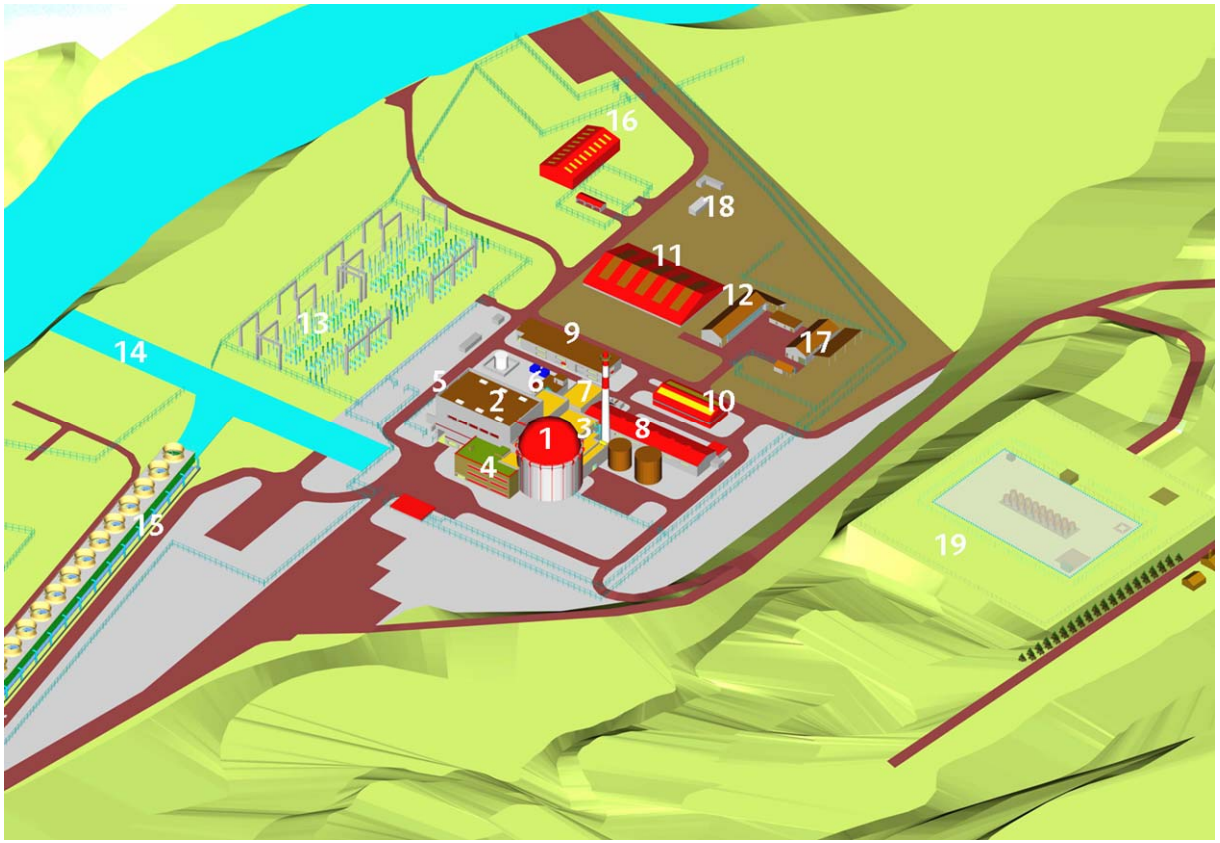
JOSÉ CABRERA NPP GENERAL DATA

- ✓ Westinghouse: 1-Loop PWR
- ✓ Gross Electrical Power: 160 Mw
- ✓ Total Thermal Power: 510 Mw
- ✓ Containment Type: Dry
- ✓ Containment Construction: Reinforced Concrete with Steel Dome
- ✓ Spent fuel Pool: Inside Containment
- ✓ Ultimate Heat Sink: Tajo River
- ✓ Gas Natural SDG (Utility Owner) Plans a New Fosil Fuel Power Plant on the Site After Decommissioning

INTRODUCTION

MAIN BUILDINGS

1 Reactor Building
2 Turbine Building
3 Auxiliary Building
4 & 9 Offices and Workshops
5 & 6 Transformer and Diesel
7 Liquid Effluent Treatment Building
8, 11 & 16 Radioactive Waste Stores
10, 12 & 17 Conventional Stores
13 Electric Park
14 Liquid Release Line
15 Cooling Towers
18 Radiological Control
19 ISFSI



INTRODUCTION

JOSÉ CABRERA NPP MAJOR COMMISSIONING LICENSING ACTIONS

✓ Previous Authorization:	27 March 1963
✓ Construction Authorization:	24 June 1964
✓ First Criticality:	30 June 1968
✓ Startup Authorization:	11 October 1968
✓ Commercial Operation:	13 August 1969
✓ Publication of Operation Cease:	14 October 2002
✓ Permanent Cease of Operation:	30 April 2006
✓ ISFSI Construction Authorization:	15 December 2006
✓ ISFSI Operation:	12 August 2007
✓ Approval for Dismantlement:	4 November 2009
✓ Dismantling Authorization:	1 February 2010

TRANSITION STAGE

Performance Activities (2003-2009)

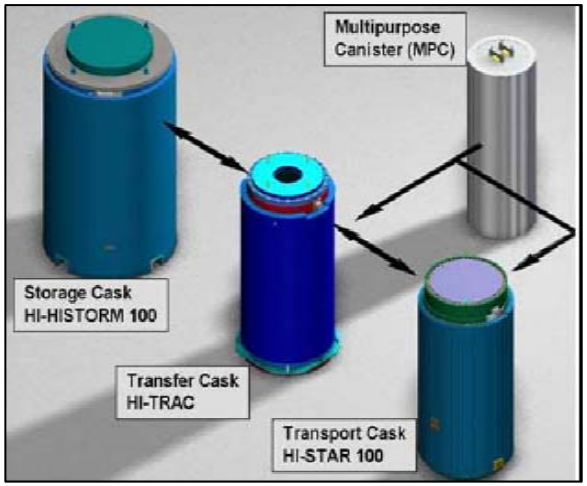
- New license for shutdown period (2006-2009)
- Decontamination of the primary system
- Radiological characterization of the plant
- Preparation of decommissioning plan and licensing documentation
- Licensing and fabrication of spent fuel cask
- Construction of on-site interim spent fuel storage (ISFSI)
- Transfer of spent fuel to ISFSI: 12 casks from 19 January to 3 September 2009

INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI) . ATI

TRANSITION STAGE

HI-STORM 100Z SYSTEM

Holtec International Storage and Transfer Operation Reinforced Module



AUXILIARY EQUIPMENTS

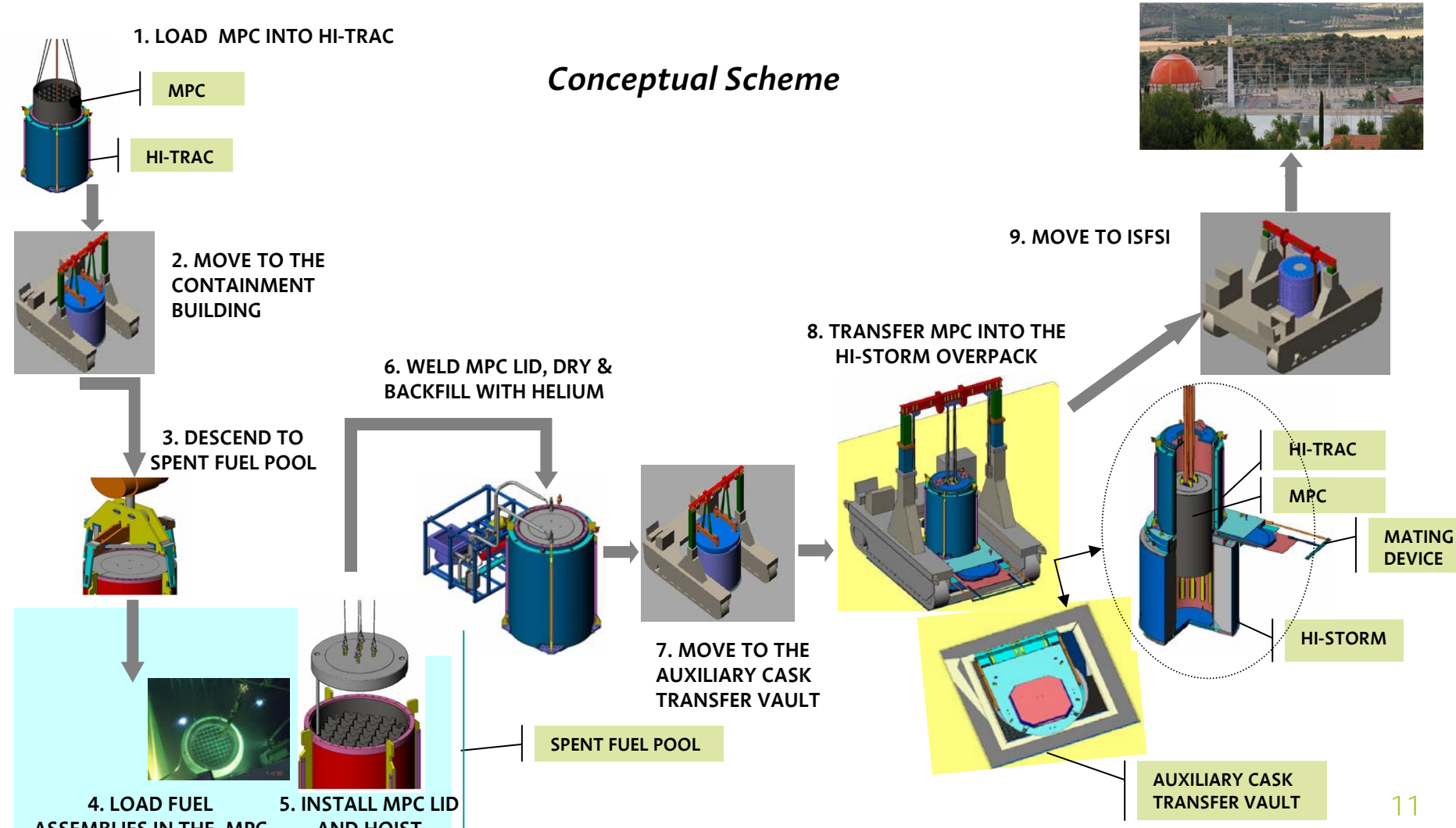
DOLLY: Move the HI-TRAC into and out from Primary Containment (Horizontal Position)

CRAWLER: Handle the HI-STORM&HI-TRAC (Vertical Position)

TRANSITION STAGE

OPERATIONS WITH THE HI-STORM 100Z SYSTEM

Conceptual Scheme

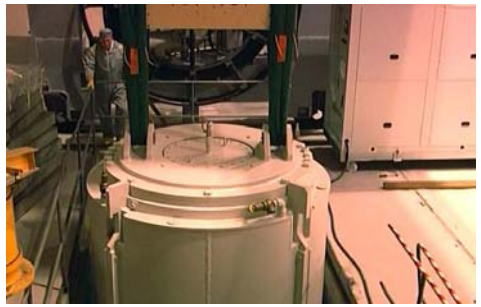


TRANSITION STAGE

OPERATIONS WITH THE HI-STORM 100Z SYSTEM

- **1. REMOVAL OF THE MPC& HI-TRAC TO THE CASK PREPARATION ZONE (Containment Building).**

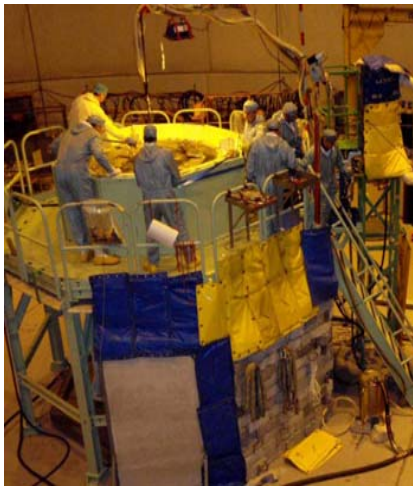
  - ✓ Insert the empty MPC into the HI-TRAC
  - ✓ Move with the CRAWLER to Auxiliary Building
  - ✓ Rotate the MPC&HI-TRAC to the horizontal position with DOLLY
  - ✓ Move and lift with the crane across the equipments hollow



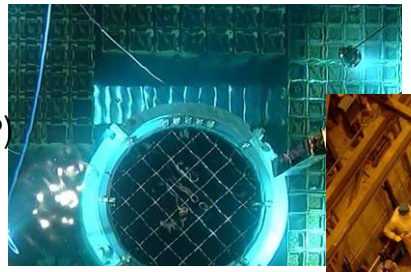
TRANSITION STAGE

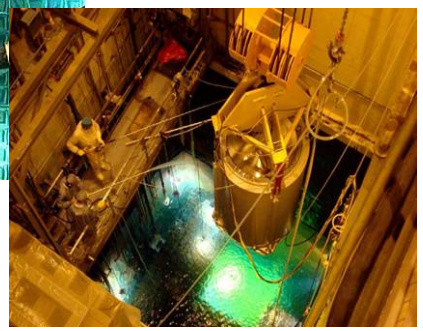
OPERATIONS WITH THE HI-STORM 100Z SYSTEM

- **2. PREPARATION OF THE MPC & HI-TRAC FOR THE IMMERSION IN THE SPENT FUEL POOL**
  - ✓ Fill the MPC of borated water and the annulus space of demineralizated water
  - ✓ Install and inflate the inflatable annulus seal
  - ✓ Immersion into the Spent Fuel Pool (SFP).



- **3. LOAD FUEL ASSEMBLIES**
  - ✓ Load fuel assemblies into the MPC according Loading Plan
  - ✓ Install the drain line to MPC lid & the lid (inside the SFP)
  - ✓ Remove the HI-TRAC and decontaminate





TRANSITION STAGE

OPERATIONS WITH THE HI-STORM 100Z SYSTEM

➢ **4. PREPARATION OF THE HI-TRAC**

✓ Finish Decontamination

✓ Cask Preparation Area:

- Weld MPC lid
- Drainage, dried & Backfilled of the MPC with Helium
- Remove connectors and close the MPC
- Install the HI-TRAC top lid.

➢ **5. MOVEMENT OF THE HI-TRAC LOADED TO THE AUXILIARY CASK VAULT**

✓ Descend the HI-TRAC across the equipments hollow and rotate to horizontal position with Dolly

✓ Movement on the Dolly to the Recharge Water Tank Esplanade

✓ Rotate with the Crawler

TRANSITION STAGE

OPERATIONS WITH THE HI-STORM 100Z SYSTEM

➢ **6. TRANSFER THE MPC FROM THE HI-TRAC TO THE HI-STORM**

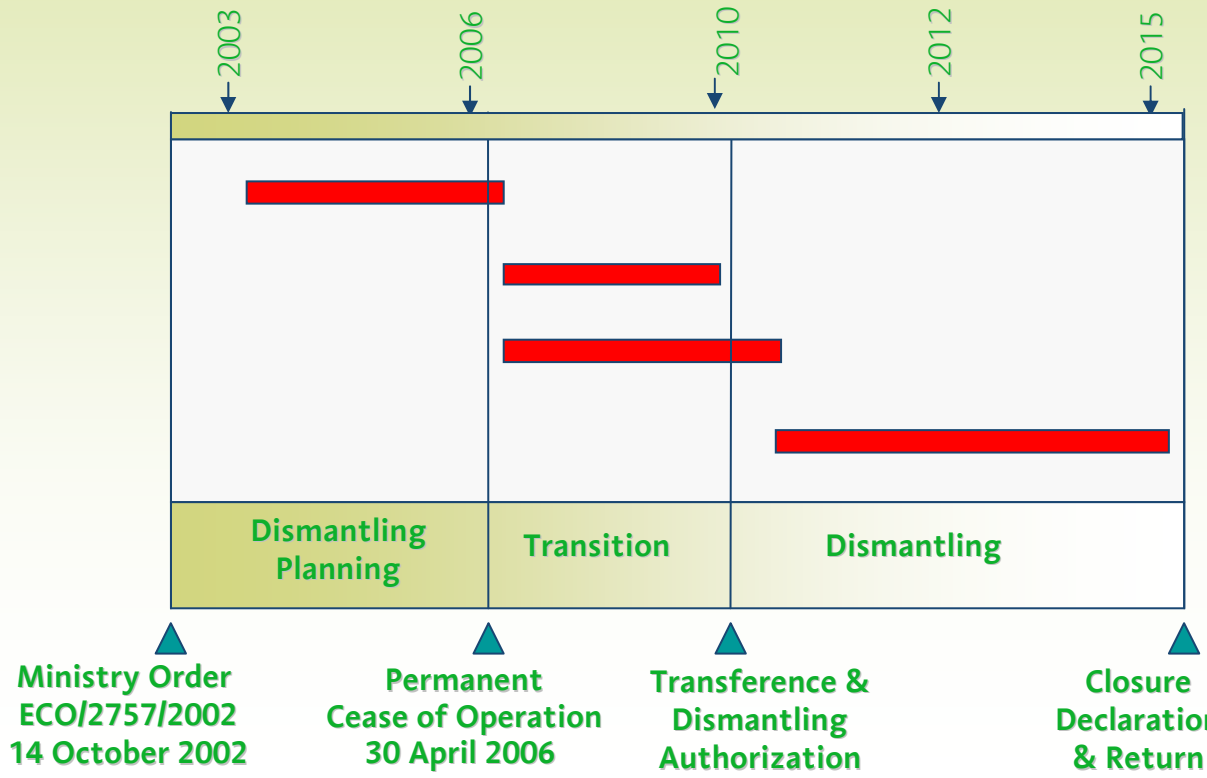
- ✓ HI-STORM Overpack and a mating device have been located into the Auxiliary Cask Vault
- ✓ Mate the HI-TRAC & the HI-STORM Overpack
- ✓ Load MPC into the HI-STORM
- ✓ Remove HI-TRAC & mating device
- ✓ Install the HI-STORM lid and the lid studs & nuts
- ✓ Remove the HI-STORM from the Auxiliary Cask Vault

➢ **7. TRANSPORT THE HI-STORM TO ISFSI**

PHASES OF THE PROJECT

➢Engineering activities in order to prepare and execute the Dismantling Plan are sequenced in the following phases:

- **Basic Engineering**
- **Detailed Engineering**
- **Site Preparation**
- **Dismantling**



PHASES OF THE PROJECT

- **Basic Engineering (completed) :**

  Basic Engineering works. Basic Plans and strategy analyses.
  PDC licensing documentation (RINR requirements).
  Physical and radiological inventory.

- **Detailed engineering (completed) :**

  Designed and detailed engineering activities. Bidding specification.
  Licensing process, and documentation review.
  Other licensing issues: Environmental Authorities, EURATOM, local and regional authorities.

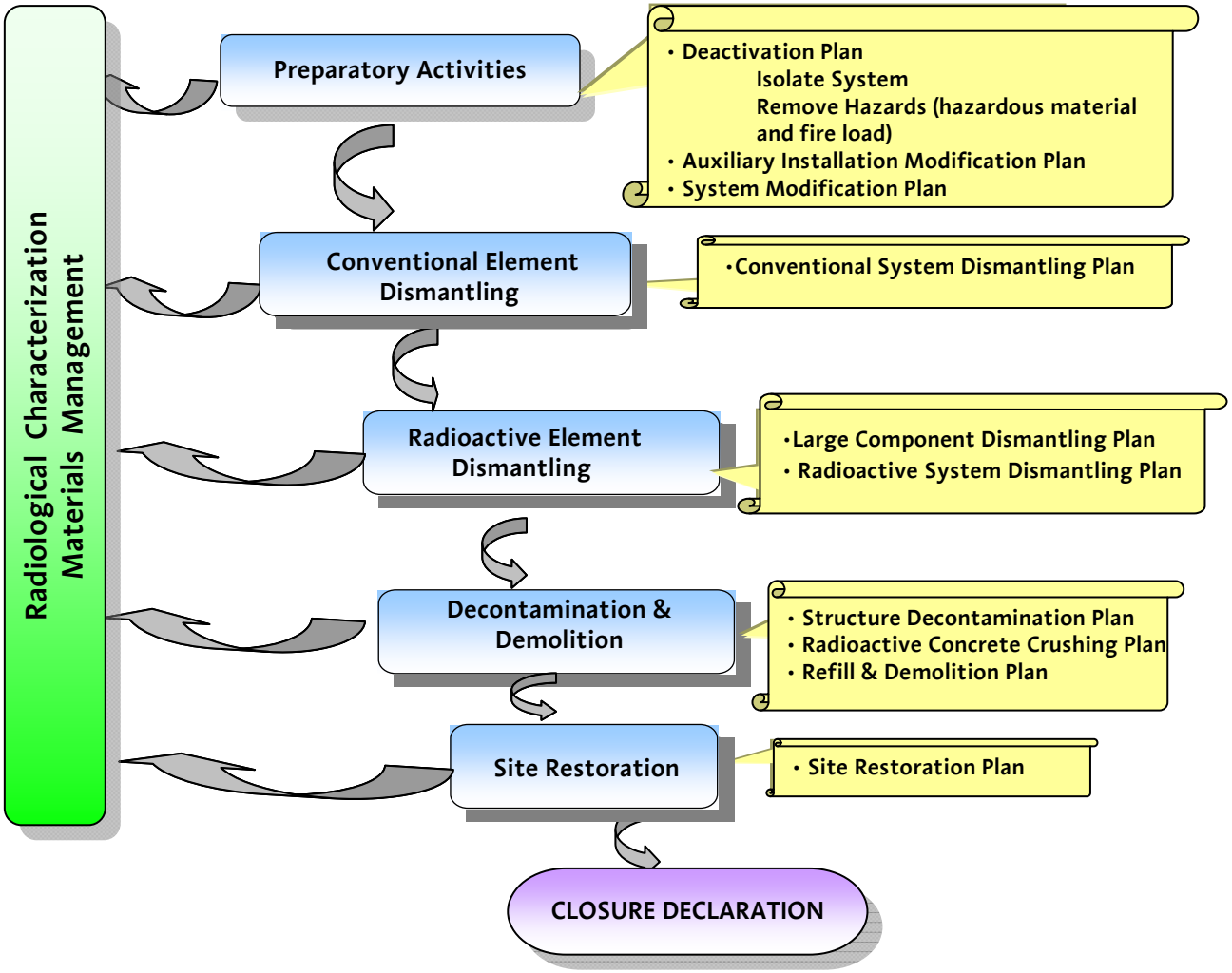
- **Site preparation (completed):**

  Primary system and main auxiliary system decontamination has been done.
  Decontamination Radiological Survey

- **Dismantling (on going):**

  After Transference and Dismantling Authorization.
  Closure Declaration.

DISMANTLING PERFORMANCE PLANS

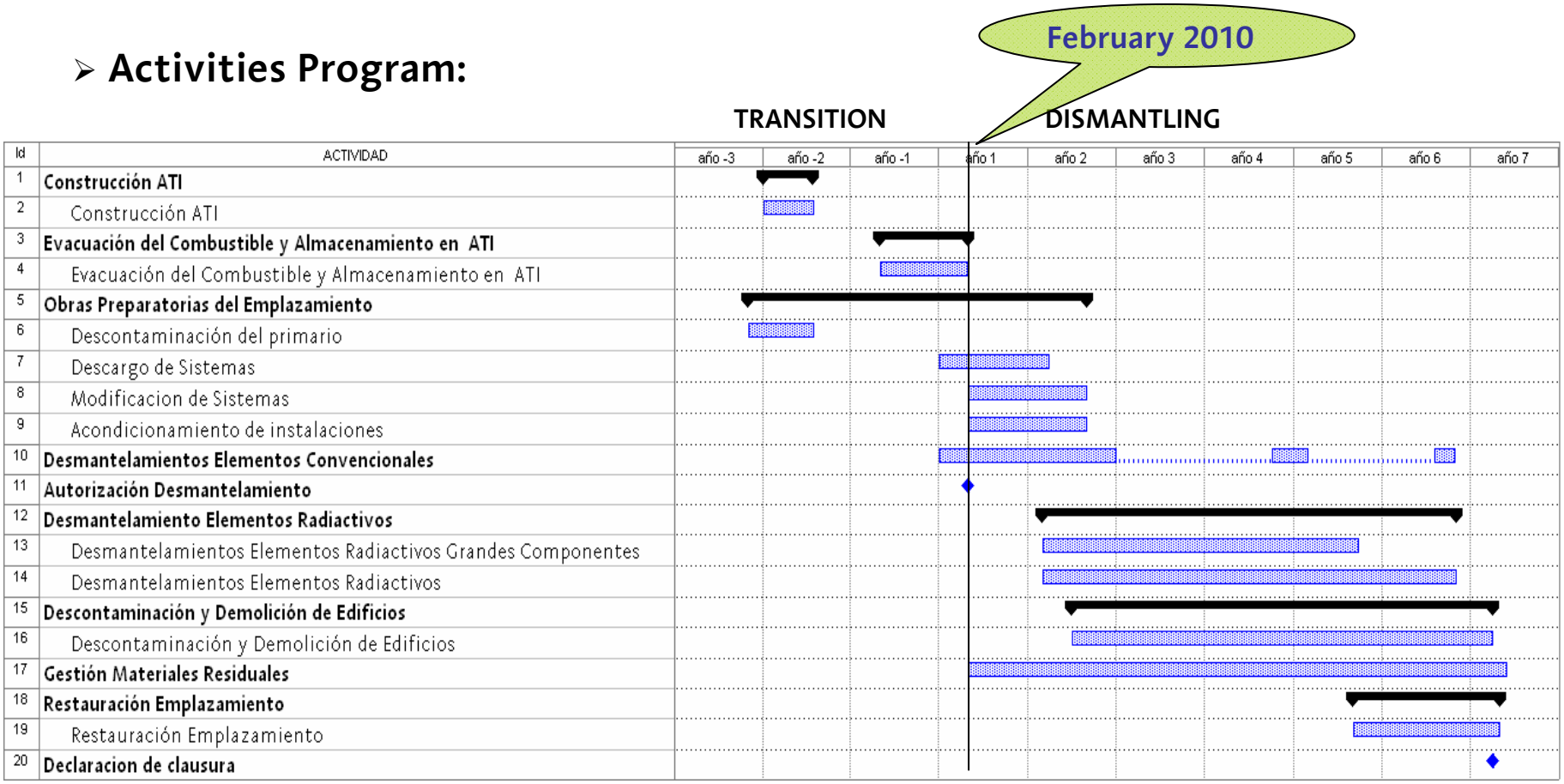


DISMANTLING PLANS

- **Dismantling plans establish:**
  - ✓ Main criteria, methodology and previous necessary analysis,
  - ✓ Available technical solutions and different options,
  - ✓ Works interferences and planning for the main activities.
- **Main Activities:**
  - ✓ Preparatory Activities
  - ✓ Conventional Element Dismantling
  - ✓ Radioactive Element Dismantling
  - ✓ Decontamination and Demolition
  - ✓ Site Restoration

DISMANTLING PLANS

- **Activities Program:**



PREPARATORY ACTIVITIES

- ✓ **Deactivation Plan**

System Isolation, Draining and De-energizing Specific Plans

Define boundary valves to control system-to-system isolations

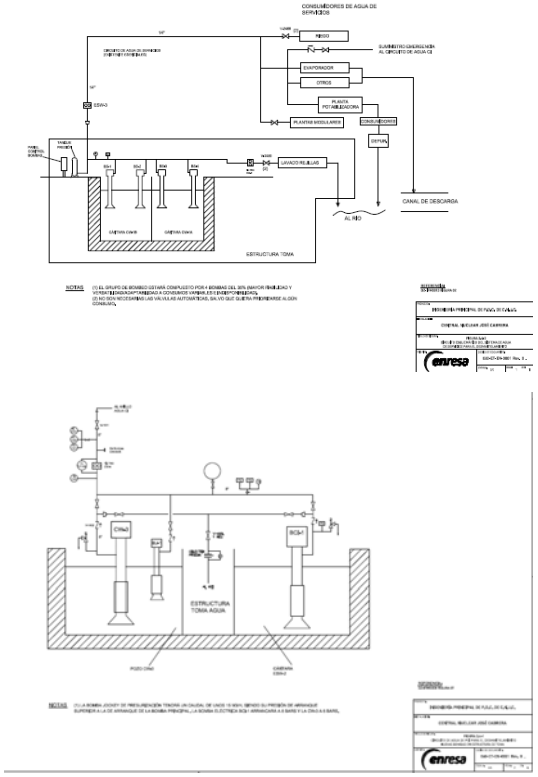
Scope partial or total, depending on whether it is or not required in the dismantling processes.

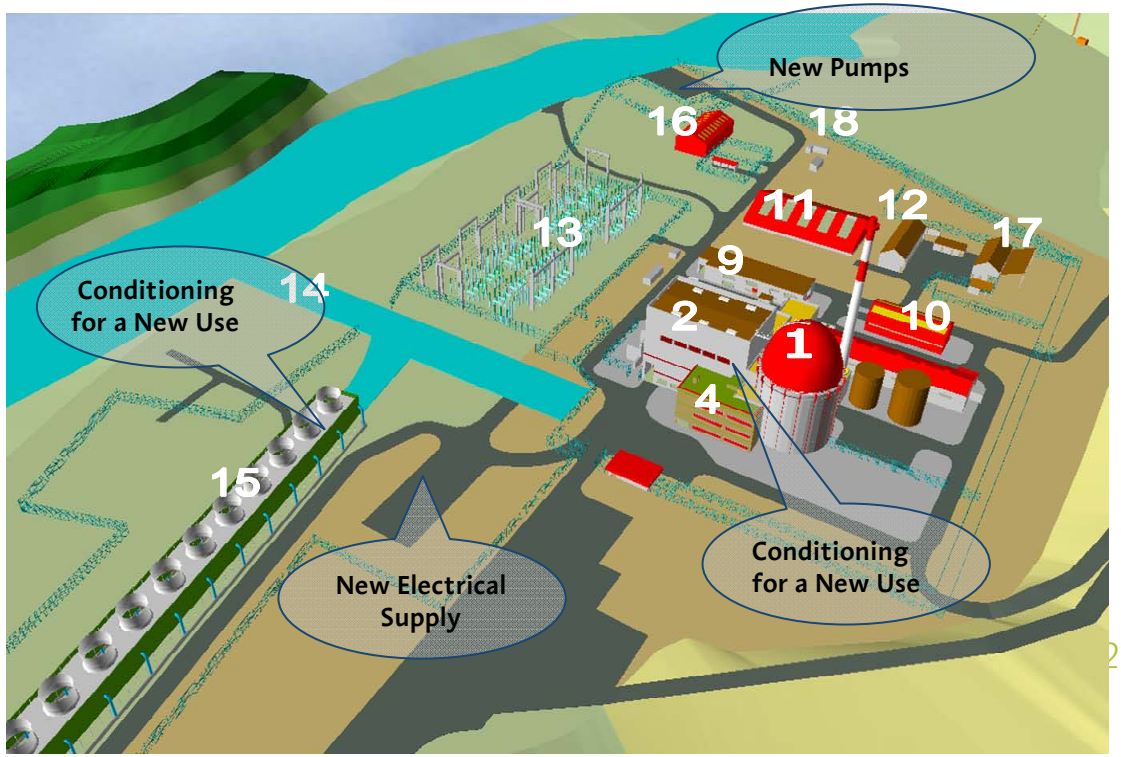
Hazardous products Removing and fire load reduction (Oils, cables, etc.)

PREPARATORY ACTIVITIES

✓ System Modification Plans

New design of water supplies (PCI, general services and effluent dilution), electrical supply, instrumentation and control, etc.



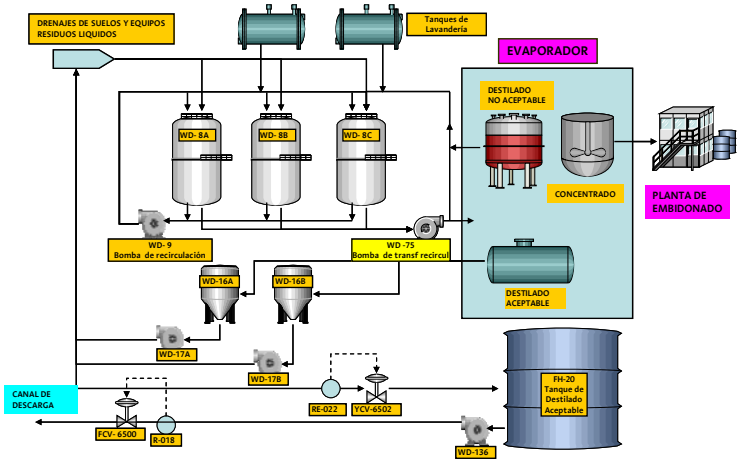


PREPARATORY ACTIVITIES

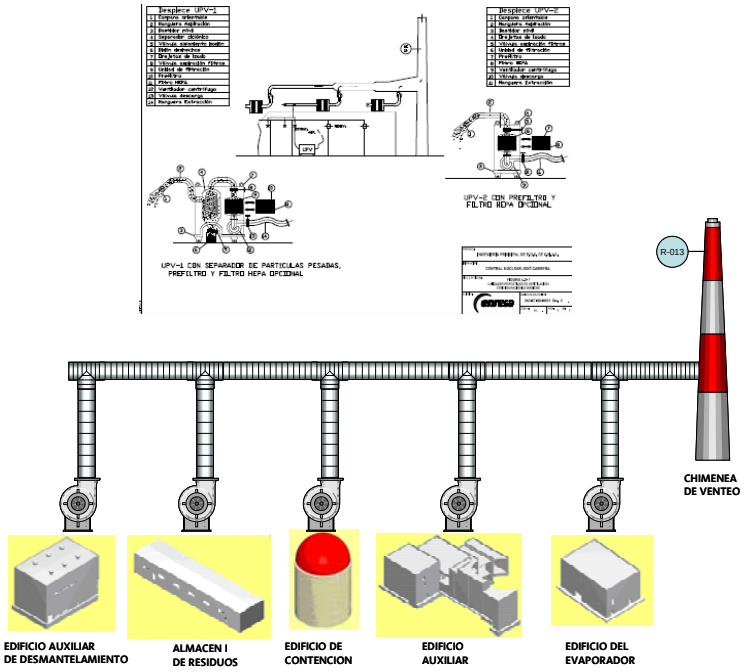
- ✓ **System Modification Plans**

  Systems are adapted to the needs of the decommissioning works (Radwaste Treatment, De-mineralized Water, ventilation systems, etc.)

Liquid Radwaste Treatment System



Ventilation systems during the decommissioning

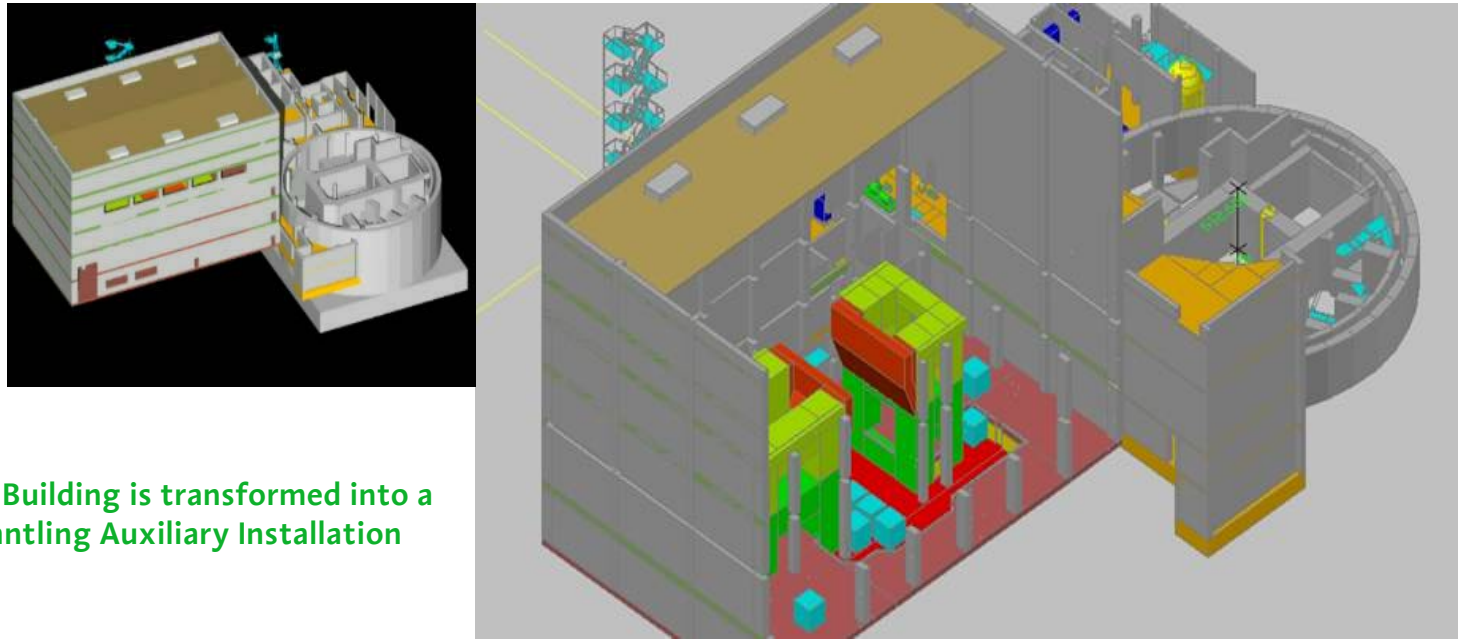


PREPARATORY ACTIVITIES

- ✓ **Installation Adaptation Plans**

  Some buildings are adapted to new uses in order to optimize the performance of the project.

  Conventional disassemblies of Turbine Building and Cooling Towers that are modified as an dismantling auxiliary installation.



Turbine Building is transformed into a Dismantling Auxiliary Installation

PREPARATORY ACTIVITIES

✓ Installation Modification Plan

Implementation of the Radwaste Treatment and Conditioning Installations.

Radwaste Installations	Treatment and Conditioning
Dismantling Auxiliary Building	· Main Decontamination and Cutting Workshops (Blasting Cabin) · Conditioning Systems (Refill/In-mobilization Plant)
Radioactive Waste nº 1	· Cutting and Decontamination Workshops · RadWaste Conditioning Systems (Drum Cementing Plant, Drum Compacting, Other Compacting (filters, scraps, isolations) and Strip-Cable Machines.

PREPARATORY ACTIVITIES

Temporary Radwaste Storages

Storage	Radwaste Category	Capacity
ISFSI	Spent Fuel and Special Radwastes (Non-LILW)	16 HI-STORM 100Z (12 Spent Fuel + 4)
Dismantling Auxiliary Building (New)	LILW. Conditioned & Non-conditioned Packages	90 CE-2/CE-2b (6 heights), CMTs
Warehouse nº 1	LILW. Conditioned Packages	576 CMTs or 1.920 drums (220 l)
Warehouse nº 2	LILW & VLLW. Conditioned Packages	2.016 CMTs or 6.390 drums (220 l) or 1.296 CMDs
Warehouse nº 3	VLLW. Conditioned Packages	400 - 800 CMDs or 4.650 drums (220 l)
Clearance Warehouses (News)	Clearance Materials	1.386 CMDs 1.155 CMDs

Warehouse nº 2

CE-2a/2b Containers

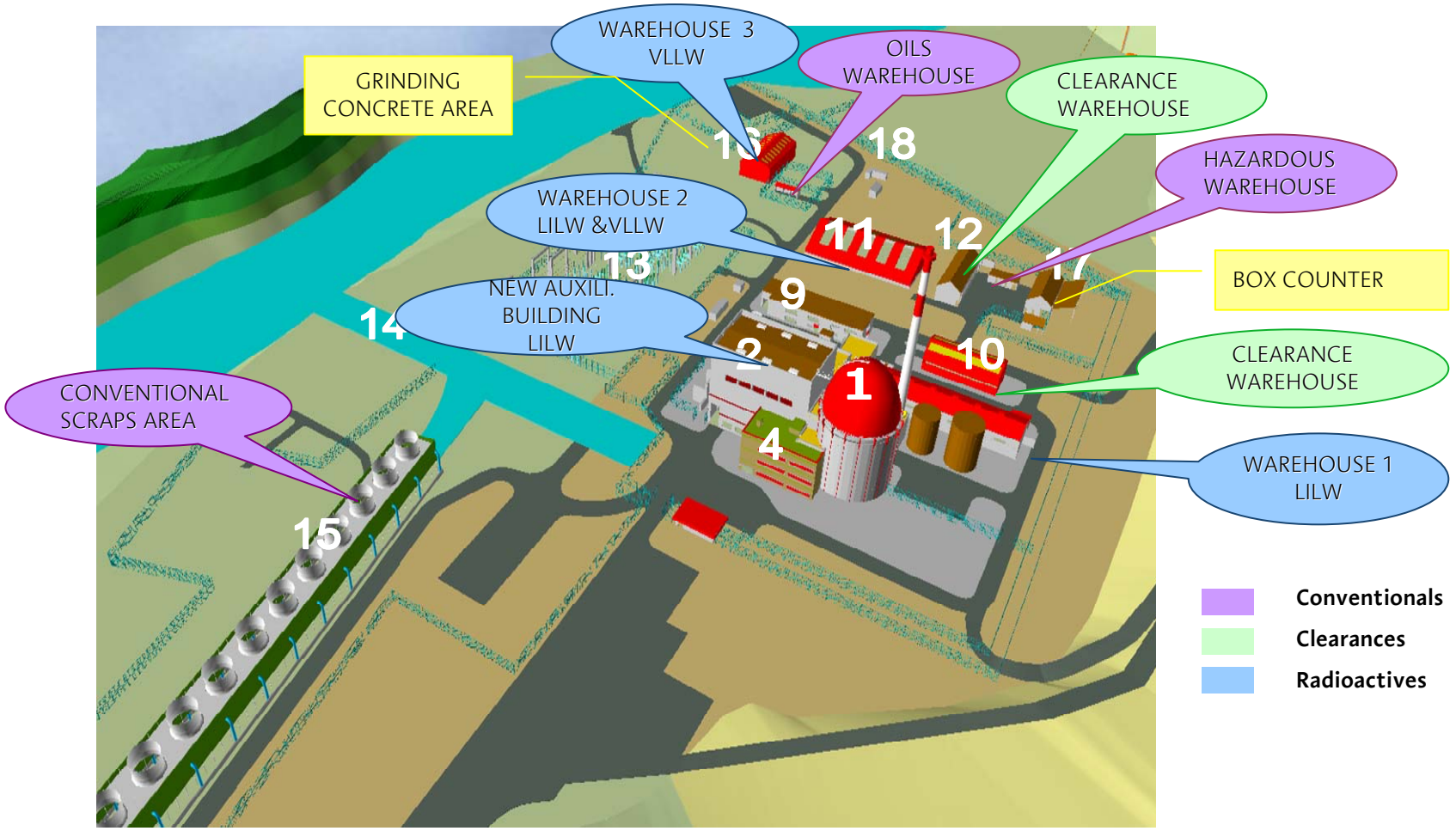
PREPARATORY ACTIVITIES

Non-radioactive and Hazardous Waste Storages

Storages	Waste Category
Cooling Towers Area	Clean/Clearance Scraps Other wastes
Hazardous Warehouse	Hazardous Wastes (Non-oil)
Oil Warehouse	Non-radioactive oils
Grinding Concrete Area	Concrete Debris

Cooling Towers

PERFORMANCE ACTIVITIES



Materials Management. Warehouses

RADIOACTIVE SYSTEM DISMANTLING PLAN

✓ **Radioactive System Decontamination and Dismantling Plan**

System Dismantling per Buildings

In situ Decontamination: Firstly to select the components to be decontaminated and the decontamination techniques .

To define the evacuation routes

✓ **Large Component Dismantling Plan**

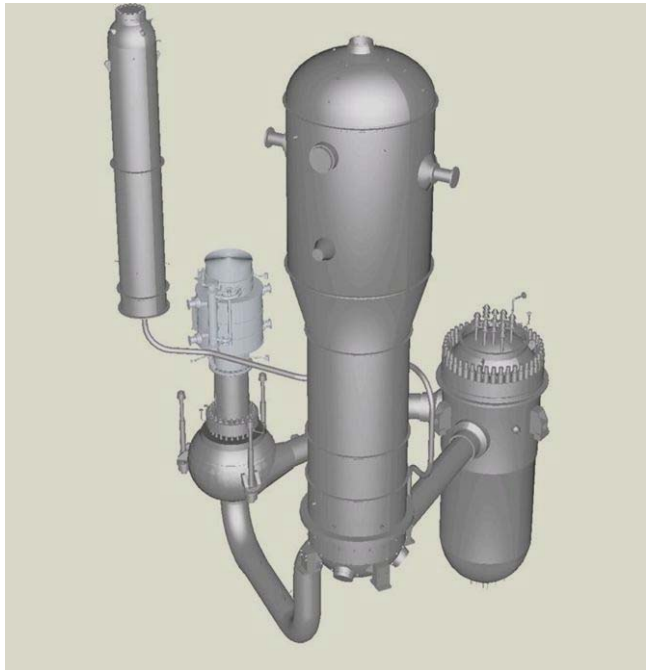
The activity with the biggest operational doses and economical cost

A good Planning and Optimizing is a very important issue during the segmentation and packaging of primary radwastes, as well as the conditioning and packaging of secondary radwastes.

RADIOACTIVE SYSTEM DISMANTLING PLAN

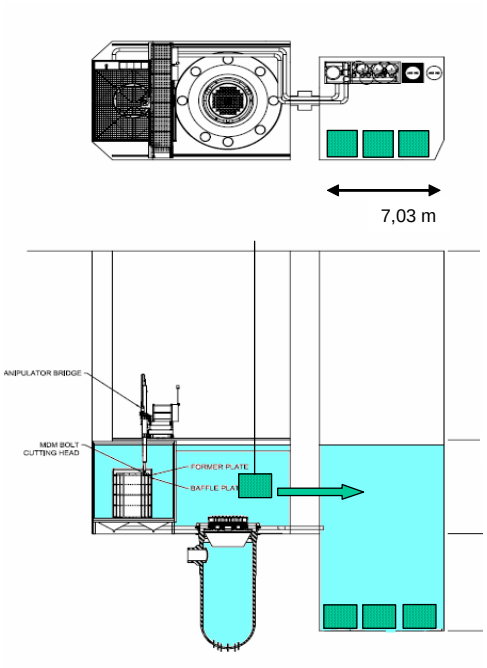
✓ **Large Component Dismantling Plan**

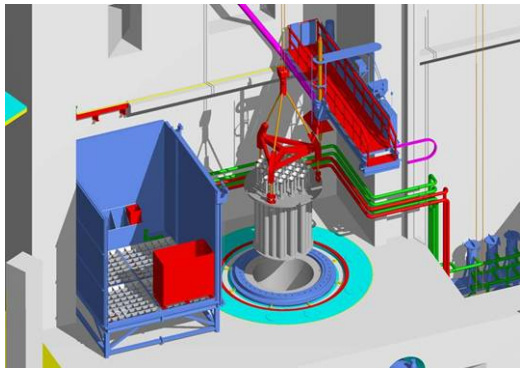
- Internal Vessel Dismantling.
- Vessel Dismantling.
- The remainder large components:
  - *Pump*
  - *Pressurizer*
  - *Steam Generator*

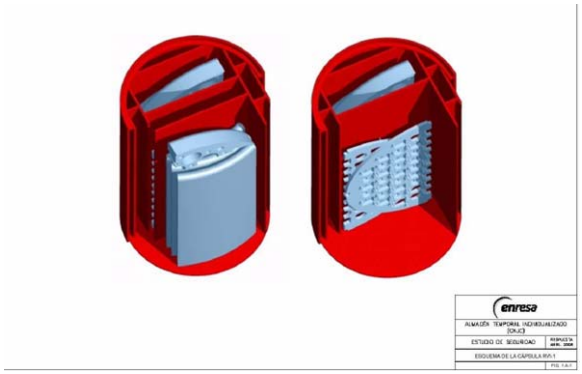


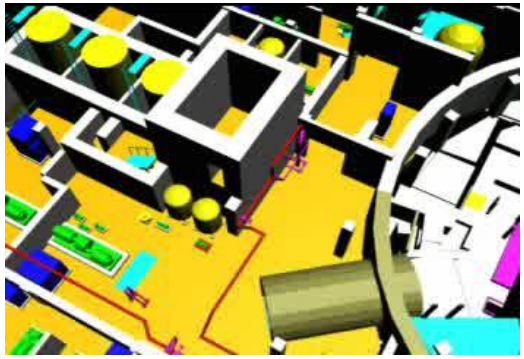
RADIOACTIVE SYSTEM DISMANTLING PLAN

✓ **Large Component Dismantling Plan. Internal Segmentation**









Upper Internal Extraction

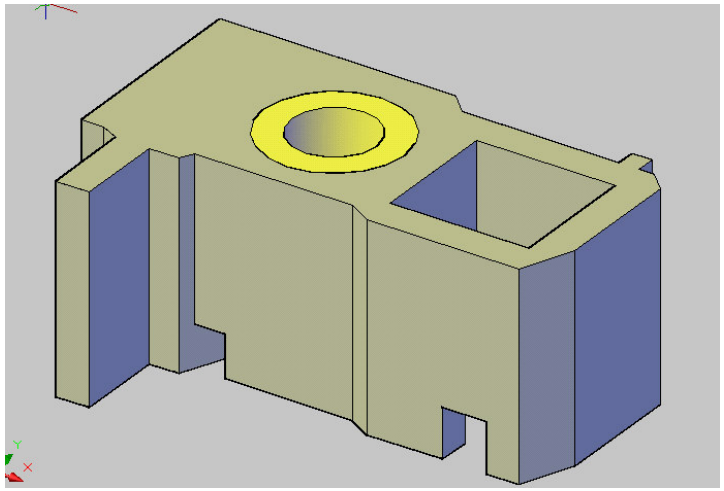
DECONTAMINATION AND DEMOLITION OF BUILDINGS

✓ **Radioactive Concrete Crushing Plan**

SCOPE

- Biological Shielding (Between levels 595,600 y 603,770)
- Walls and Floor of the Re-fuelling Cavity (From level 603,770 to 609,367).
- Walls of the Spent Fuel Pool (From level 603,770 to 609,367)

3D View of the biological shielding and the spent fuel pool



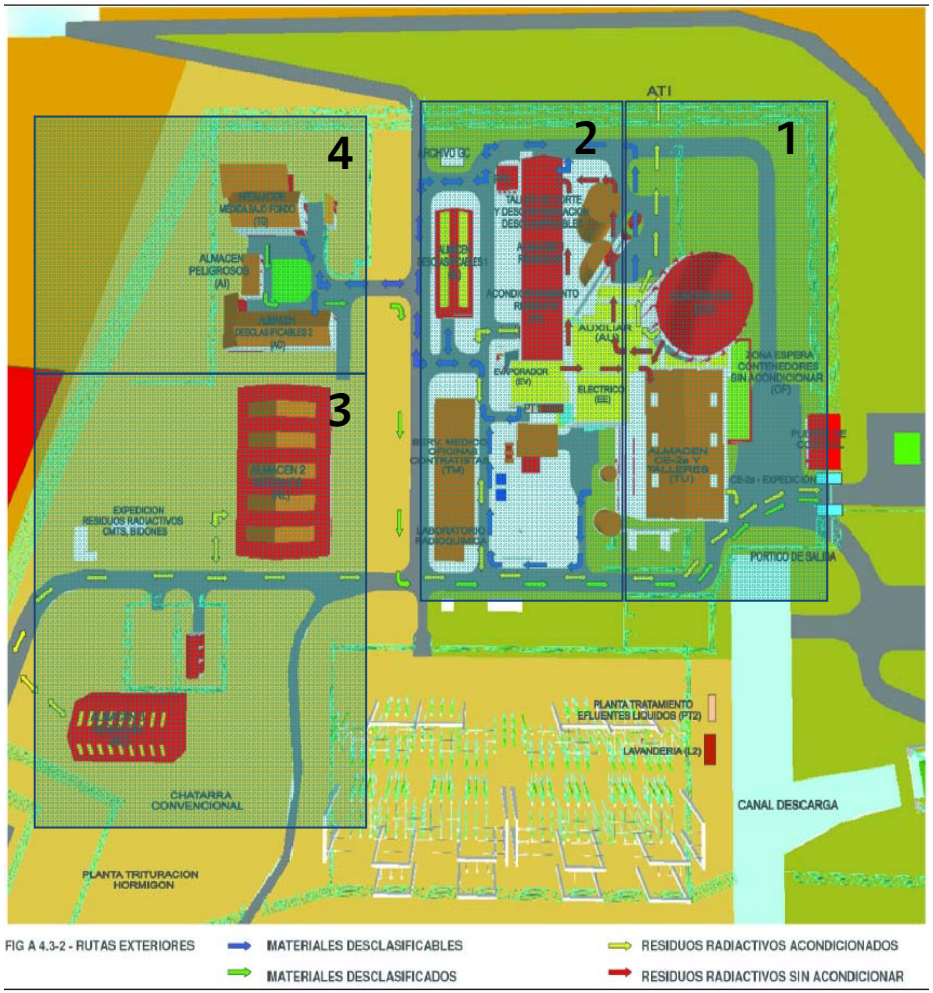
DECONTAMINATION AND DEMOLITION OF BUILDINGS

✓ Demolition and Refilling Plans

Demolition & Refilling Units

Close Areas constitute the same Unit

DEMOLITION & REFILLING UNIT		
CODE	NAME	CODE
UDR-1	REACTOR BUILDING	CO
UDR-2	AUXILIARY AND ELECTRICAL BUILDINGS	AU
		EE
UDR-3	TURBINE BUILDING	TU
UDR-4	OFFICE BUILDING	OF
UDR-5	EVAPORATOR AND WAREHOUSE Nº I	EV
		RI
		ZD1



GENERAL INVENTORY

GENERAL INVENTORY

- MASS
  - ✓ Non Radioactive Materials: 41.000 t
  - ✓ Clearance Materials: 59.000 t
  - ✓ Radioactive Wastes (Cabril): 4.000 t
    - ➢ LILW: 2.500 t
    - ➢ VLLW: 1.500 t
  - ✓ Radioactive Wastes (ISFSI): 43 t
- ACTIVITY
  - ✓ Radioactive Wastes (Cabril): 2,0E+14 Bq
  - ✓ Radioactive Wastes (ISFSI): 1,9E+16 Bq


Thanks for your attention!