JOSÉ CABRERA NPP
SECURITY IN DECOMMISSIONING PROJECT
Vienna, November 20-21, 2019
1. GENERAL INFORMATION ENRESA

2. INSTALLATION MAIN DATA.

3. DECOMMISSIONING MAIN STEP.

4. LEGAL FRAMEWORK SECURITY IN SPAIN.

5. SECURITY EVOLUTION IN DECOMMISSIONING.

6. LESSON LEARNING.
1. GENERAL INFORMATION ABOUT ENRESA

- State OWNED Company - RD 1984

- **Duties:**
  - The management of all RadW - SPAIN
  - The DECOMM of Nuclear Installations

- **Framework:**
  - Responsible for implementation of activities contemplated in the General Radioactive Waste Plan, prepared by the Ministry for Ecological Transition and approved by the Government
High Level Waste (HLW)

Decommissioning of Nuclear Installations

Very Low Level Wastes (VLLW) and Low and Intermediate Level Wastes (LILW)
2. INSTALLATION MAIN DATA

**Type:** Westinghouse - 1-Loop PWR

**Net Electrical Power:** 160 MWe

**Net Thermal Power:** 510 MWth

**Fuel Elements:** 69 – 14x14

**Fuel Type:** UO₂ – enrichment 3.6% (U-235)

**Mass UO₂ (core):** 20,76 t

**Control Rod (Banks):** 17

**Reactor Vessel (Diameter):** 2,82 m

**Reactor Vessel (Height without Head):** 5,87 m

**NSSS (Diameter):** 70 cm

**CNJC Building Related Activities**

**Containment:**

- Reinforced concrete
- Stainless Steel Head

**Spent Fuel Pool:**

- In Containment

**Final cooling:**

- Tajo River
Guadalajara. JOSE CABRERA NPP (ZORITA)

- Project length: 2010-2021
- Reactor type: PWR
- E. Power: 160 MWe
- Status: Dismantling
**CNJC NPP DECOMMISSIONING SECURITY**

**Decommissioning main step**

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**LIFE CYCLE**

**FIRST NPP IN SPAIN**
DEVELOPING the SPANISH NUCLEAR INDUSTRY
BASE for TRAINING

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<tr>
<td>ENGINEERING &amp; START UP</td>
<td>COMMERCIAL STAGE</td>
<td>FINAL SHUTDOWN TRANSITION STAGE</td>
<td>D&amp;D EXECUTION PROJECT</td>
<td>CLAUSEURE</td>
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**TRANSFER of RESPONSIBILITY** (Feb, 11, 2010)

**SITE RETURN to the OWNER**

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Build up Starting – Jul-65
1st Criticality – Jun-68
1st Electrical Net Connection – Jul-68
Commercial Status– Oct-69

**ENRESA’s RESPONSIBILITY**

**OTHER RESPONSIBILITIES**

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**ELECTRICAL NET DISCONNECTION**
**NSSS DECONTAMINATION**
**SPENT FUEL MANAGEMENT**
**SPENT FUEL CASKS at the ISFI**

**STRATEGY BASIC STUDIES**
**DOCUMENTATION + EIS**
**LICENSING**
**D&D PLANNING**
**“LANDING” PLAN**
3. DECOMMISSIONING MAIN STEP
4. LEGAL FRAMEWORK SECURITY IN SPAIN

• Ley Energía Nuclear. 25/1964. (Nuclear energy law)

First nuclear energy law in Spain, requires the physical protection of nuclear materials. This law does not specify anything.

• Real Decreto 1308/2011 de 26 de septiembre “Sobre protección física de las instalaciones y los materiales nucleares, y de las fuentes radioactivas”.

It describes how the physical protection systems (PPS) of nuclear facilities and materials and radioactive sources are.

• Real Decreto 1086/2015, de 04 de diciembre, por el que se modifica el Real Decreto 1308/2011 de 26 de septiembre “


• Instrucción Técnica IS-09, del CSN de 14 de junio de 2006, “por la que se establecen los criterios a los que se han de ajustar los sistemas, servicios y procedimientos de protección física de las instalaciones y materiales nucleares”

Technical instructions TI’s 09, Nuclear Safety Council (CSN). Describes the design, development, implementation, operation, maintenance, and upgrade of the On Site physical protection measurements of nuclear facilities.
5. SECURITY EVOLUTION IN DESMANTELING.

In the dismantling of a NPP Jose Cabrera with a security approach we distinguish the following stages:

A. Nuclear power plant shutdown. *(2 years)*

B. Remove the fuel in order to begin decommissioning. Load the cask and move to Independent spent fuel storage installation (ISFSI). *(2-3 years)*

C. Dismantling NPP *(10 years).*
   C. 1. Load de cask contain HLW (metal pieces from the segmentation of the reactor internal) *(6 month)*

D. Transport to Centralized spent fuel Storage installation (CSFSI). *Future*
5. A. NUCLEAR POWER PLANT SHUTDOWN

<table>
<thead>
<tr>
<th>NPP</th>
<th>Security</th>
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</table>
| • Nuclear Fuel is in pool  
• Main systems are operative.  
• There are high activity radioactive sources.  
• Normal number of entry and exit. Employees, visitor, equipment, supplies, waste etc.... | • The Physical Protection System (PPS) as an operational NPP  
• same security areas (protected and vital).  
• Do not change sensor systems, structural barriers, number of guards (private security), etc ... |

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NPP EXAMPLE
5. B. REMOVE THE SPENT FUEL / LOAD THE CASKS

<table>
<thead>
<tr>
<th>NPP</th>
<th>Security</th>
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<tbody>
<tr>
<td>ISFSI (independent spent fuel storage installation) constructed close to the plant.</td>
<td>Increase security areas (protected and vital). ISFSI.</td>
</tr>
<tr>
<td>Remove nuclear spent Fuel in pool.</td>
<td>Incorporate new security systems (sensor systems, fence, structural barriers).</td>
</tr>
<tr>
<td>Load cask and move to ISFSI.</td>
<td>Control of employees with access to jobs with nuclear spent fuel.</td>
</tr>
<tr>
<td>Main systems are operative.</td>
<td>Special security operations at the move the cask to ISFSI. Private guards and coordinate with state security forces.</td>
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<tr>
<td>Significant increase access to vital and protected area.</td>
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<tr>
<td>There are high activity radioactive sources.</td>
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All modifications to the PPS are authorized by the nuclear safety council and the ministries involved.
NPP EXAMPLE

Protected Area

Vital Area

River
INDEPENDENT SPENT FUEL STORAGE INSTALLATION (ISFSI)
5. C. DISMANTLING NPP

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>• The casks are load on ISFSI (independent spent fuel storage installation).</td>
<td>• Reduction of vital areas in NPP (not ISFSI).</td>
</tr>
<tr>
<td>• The fuel pool is empty.</td>
<td>• Uninstall security systems (sensor systems, fence, structural barriers).</td>
</tr>
<tr>
<td>• Dismantling systems operative.</td>
<td>• Employees reduction with access to jobs with nuclear spent fuel.</td>
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<tr>
<td>• access increases for disassembly, decontamination, radiological measurements or demolition.</td>
<td>• Reduction of security guards.</td>
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<tr>
<td>• Increase in outputs and inputs of supplies, equipment, waste, etc.</td>
<td>• Communication and coordination with the state security forces in the expeditions of radioactive waste.</td>
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<tr>
<td>• Increase in shipments of radioactive waste (VLLW, LILW and high activity sources)</td>
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All modifications to the PPS are authorized by the nuclear safety council and the ministries involved.
CNJC NPP DECOMMISSIONING SECURITY
5. C. 1. LOAD DE CASK CONTAIN HLW (METAL PIECES FROM THE SEGMENTATION OF THE REACTOR INTERNAL)

<table>
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<tbody>
<tr>
<td>• Load cask and move to ISFSI (independent spent fuel storage installation).</td>
<td>• Control of employees with access to jobs with nuclear spent fuel. (ISFSI).</td>
</tr>
<tr>
<td></td>
<td>• Temporary increase of security guards</td>
</tr>
<tr>
<td></td>
<td>• Special security operations at the move the cask to ISFSI. Private guards and coordinate with state security forces.</td>
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Spain does not currently transport any high level radioactive waste or spent fuel. These materials remain in the power plants’ onsite pools or ISFSI.

Security:

• Special security operations at the move the cask to ISFS.

• Communication and coordination with the state security forces in the expeditions of nuclear spent fuel.

• Control of employees with access to jobs with nuclear spent fuel.
6. LESSONS LEARNED

- Include in the Physical Protection System (PPS) future modifications and special operating situations, according to the evolution of the dismantling. (increase or reduction security areas).
- Specific control of jobs with access to spent nuclear fuel (including guards).
- Different communication lines and action protocols with national security forces.
- Remove communication and power security lines from the areas in disassembly.
- Move laboratories with high activity radioactive sources from the disassembly areas.
- Control of the material with value, inputs outputs (equipment, copper, tools, etc.).
- Publication of photos with security systems (open sources).
THANK YOU VERY MUCH FOR YOUR ATTENTION