ENSREG
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# Decommissioning of NPPs

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*Imagines by Sogin*

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# Decommissioning is part of that……

*"We did not inherit earth from our parents but rented it from our children"*

*Indian proverb*

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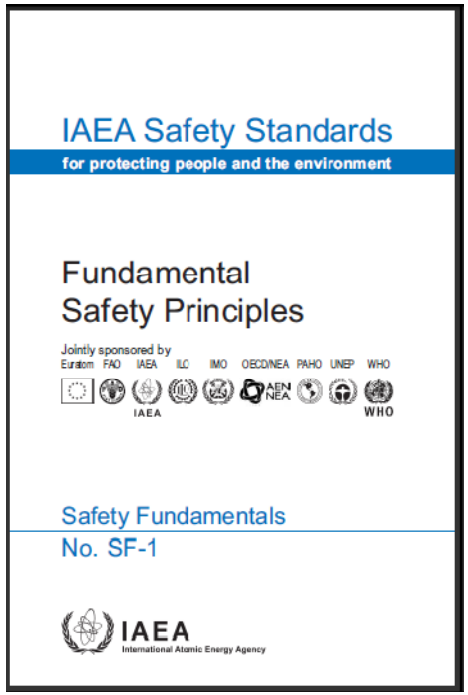
**SAFETY OBJECTIVE**

*The fundamental safety objective is to protect people and the environment from harmful effects of ionizing radiation*.




Principle 7: Protection of present and future generations

*People and the environment, present and future, must be protected against radiation risks.*

# Options after NPPs operation

**Immediate dismantling**

Decontamination/dismantling shortly after termination of operation

**Deferred dismantling**

Safe conservation of structures and components until dismantling and unconditional release

**Entombment**

# Options after NPPs operation (2)


Dismantling and decontamination operations completed

RW on the site

Site unconditionally released

Key Issue: availability of adequate storage capacity of resulting waste

# Main nuclear installations to be decommissioned in Italy

TRINO NPP
PWR – 270 MWe

CAORSO NPP
BWR – 860 MWe

LATINA NPP
Gas-Graphite – 210 MW

GARIGLIANO NPP
BWR – 160 MWe

**IPU - CASACCIA**
**MOX Fuel Experim. Fabr**

**BOSCO MARENGO**
**LEU Fuel Fabrication**

**OPEC - CASACCIA**
**Post Irrad. Hot Cells**

**ITREC - ROTONDEL**
**U-Th Fuel Exp. Repr.**

**EUREX - SALUGGIA**
**Experimental Fuel Rep.**

Installations at
Ispra JRC

# The Italian experience

All NPPs were definitively shut down in 1987

A safety conservation strategy was initially adopted

Strategy was changed in 2000 into a single step decommissioning

A lot of preparatory activities are needed on the sites before addressing dismantling of nuclear island

# Key elements of regulatory approach during decommissioning phase

## Ensure that the Licensee:

- maintain an high level of safety on the sites
- perform in due time waste conditioning, final spent fuel management and dismantling activities relevant to improve safety
- perform any activity in compliance with safety and radiation protection requirements
- produce wastes adequately conditioned

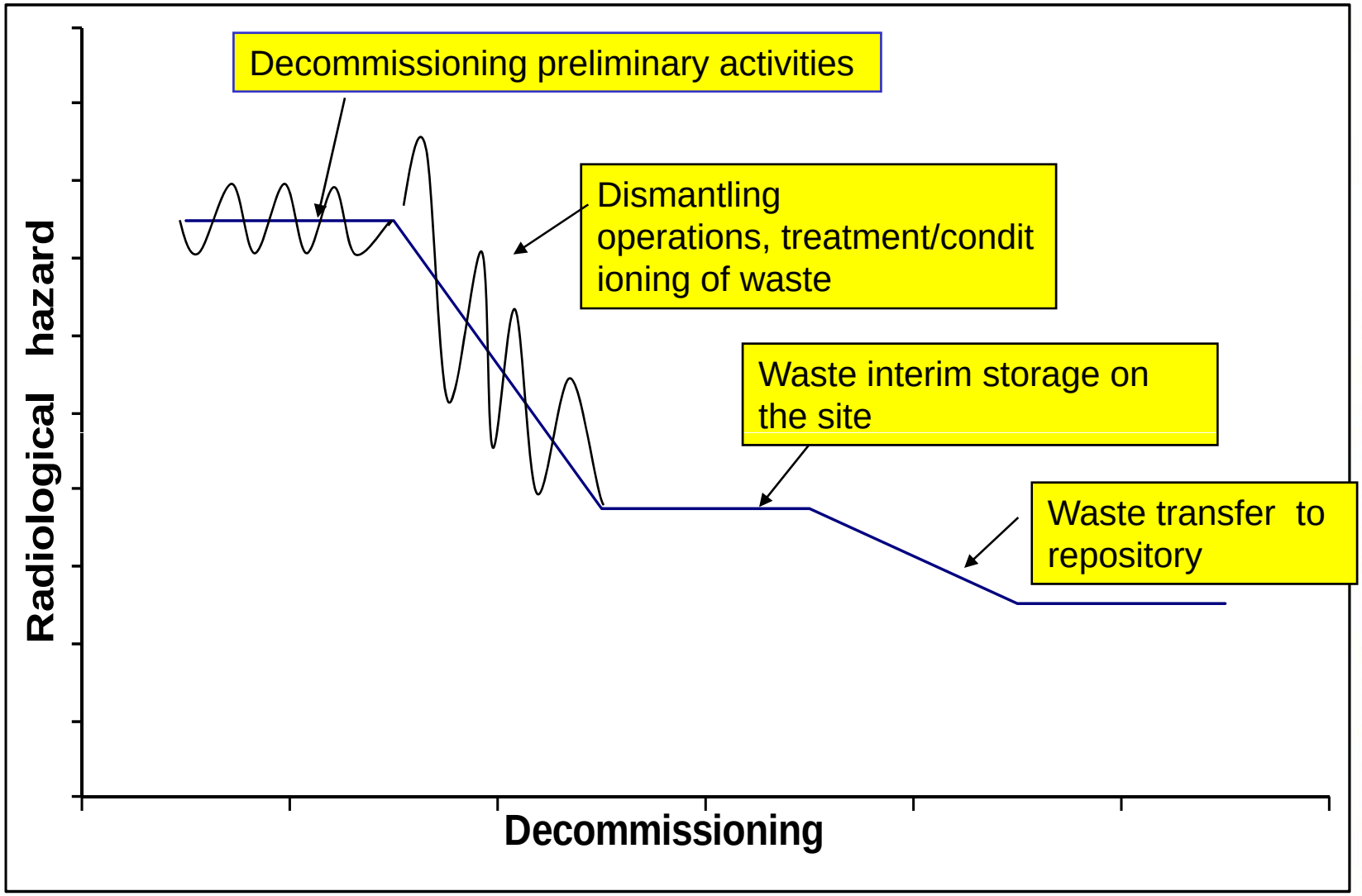
# Key elements of regulatory approach during decommissioning phase

## Graded Approach:

Taking into account the radiological hazard which is obviously below the one of the operational phase

# Key elements of radiological hazard and potential environmental impact

- Irradiated fuel transfer operations
- Events during waste treatment /conditioning and dismantling operations
- Fire during waste storage
- Materials clearance from the site


Decommissioning preliminary activities
Dismantling operations, treatment/conditioning of waste
Waste interim storage on the site
Waste transfer to repository
Radiological hazard
Decommissioning

# First stage

*Activities aimed at improving safety conditions:*

- removing spent fuel from the pools;
- treatment and conditioning of radioactive waste from past operation ready for disposal or long term storage;
- removing structures and materials implying conventional risks (e.g. asbestos);
- construction of interim waste storage facilities
- preliminary decontamination activities;

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# Transport of irradiated fuel

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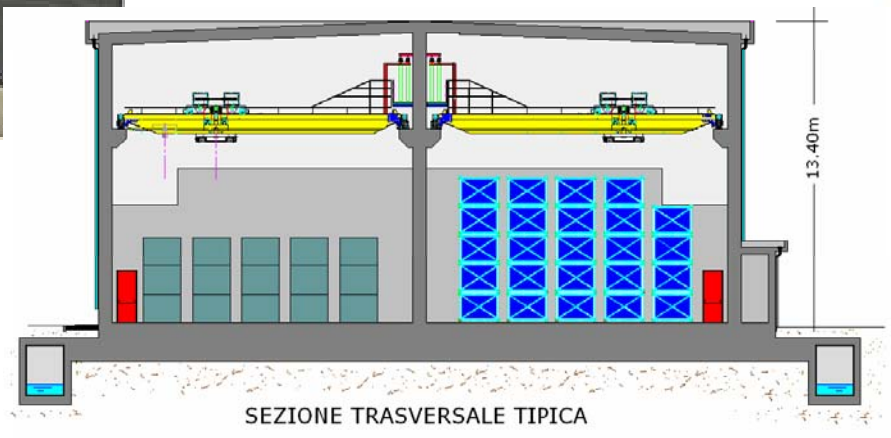


Latina NPP interim Storage Facility under construction

# First stage (2)

*Activities faciltating subsequent decommissioning operations*, e.g.:

- dismantling parts of the plants not contaminated or at low contamination levels,
- installation/reforbishment of plant systems relevant to decommissioning operations;
- construction of Radioactive Waste Management Facilities

## Second stage

- dismantlement of the nuclear island,
- decontamination/demolition of buildings,
- completion of waste treatment/conditioning
- clearance of materials/buildings

## Third stage

- completion of demolitions, final radiological survey and site release.

# Decommissioning Licensing process

- One step decommissioning to be terminated with the unconditional release of the site.
- In force legislation requires a comprehensive licensing process, based on the filing of Decommissioning Plans (DP) and on the performance of an articulate regulatory assessment. The decommissioning licence is granted also based on an Environmental Impact Assessment (EIA).
- Decommissiong activities can be performed before decommissionong licence is granted based upon “ad hoc” authorizations

# Licensing Documents

**"Ad hoc" authorizations before decommissioning licence**

- *"Detailed Design Reports - DDR"* in case of construction/reforbishment of systems and structures *"Plans of Operation – PO"* for dismantling activities.

**Decommissioning licence**

- *Overall decommissioning plan document*

**Approval of selected activities after decommissioning licence**

- D*etailed Design Reports - DDR"* and *"Plans of Operation – PO"*

# Licensing process and verification of safety

- **Comprehensive strategy** until site unconditional release
- Detailed **radiological characterization** of structures and components
- Detailed **safety case** for dismanling, waste treatment/conditioning and storage
- **Proven** decontamination & dismantling **technology**
- Proper site **safety management** (special attention to contractors activities)

# Licensing process and verification of safety

- The full implementation of the decommissioning plan will depend on the **availability of adequate wastes storage capacity**
- High livel of **fire protection** (Fire protection programme and risk analysis)
- **Proper residual materials** management
- **Legally binding clearance levels** and verification methodology

# Bosco Marengo Fuel Fabrication Plant
# Materials Sorting

# Bosco Marengo Fuel Fabrication Plant
# Dismantling of production line

Before

After

# Licensing process and verification of safety

## Radiation protection and safety objectives

- 10 microSv/year for normal conditions (criteria of no radiological concern)

- 1 mSv/event for accident conditions

- Preservation of conditioned waste from damage

Decommissioning via dismantling or decontamination?

Containment “ball” to be unconditionally released in compliance with clearance levels

Chimney and water tower to be dismantled

# Garigliano NPP

# Thank you for your kind attention

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