



EMPRESARIOS AGRUPADOS

Supervision Execution Dismantling

JuanCañizaresMontón

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DISMANTLING EXPERIENCE

Vandellós I NPP

GCR (natural uranium-graphite-gas)

480 MWe

French technology

Level 2 Dismantling

Dismantling execution supervision

- Preparation of the dismantling
- Conventional disassembly
- Dismantling of active parts
- Decontamination of facings/surfaces
- Demolitions, excavations and fills

1998 - 2002



DISMANTLING EXPERIENCE

CIEMAT – Experimental Nuclear Facility for Investigation

UCM Campus, Madrid, Spain

JEN-1 experimental reactor

3 MWth

American technology

Actions

- Reactor Building
- Fuel reprocessing plant
- Liquid radwaste treatment plant

Dismantling execution supervision

- Preparation of the dismantling
- Conventional disassembly
- Dismantling of active parts
- Decontamination of facings/surfaces
- Demolitions, excavations and fills

2005 - 2009



DISMANTLING EXPERIENCE

José Cabrera NPP

Almonacid de Zorita (Guadalajara), Spain

PWR (pressurized water reactor)

160 MWe

American technology

Level 3 Dismantling

Dismantling execution supervision

- Preparation of the dismantling
- Conventional disassembly
- Dismantling of active parts
- Decontamination of facings/surfaces
- Demolitions, excavations and fills

2010-present



DISMANTLING EXPERIENCE

Kozloduy NPP – VVER440 – 4 units

2013 - Ongoing



Bohunice V1 - Slovakia – VVER440

2002-2009

Full D&D of the Facilities
Project Management Unit for the complete D&D of the Units
Subcontracting management
Technical and Managing advise – Development of ToR
Support to the Operator for Validation and Licensing
Environmental Impact Assessment Support

EXPERIENCE IN STORAGE OF RADIOACTIVE WASTE

Novi Han Repository, Bulgaria

Development of technical design for waste processing and storage facilities for Novi Han Repository

2004 - 2005

Radiana, Bulgaria

Engineering and construction PMU for the storage facilities of Radiana Repository

2010 - ongoing

ISFSF and Laboratory, Spain

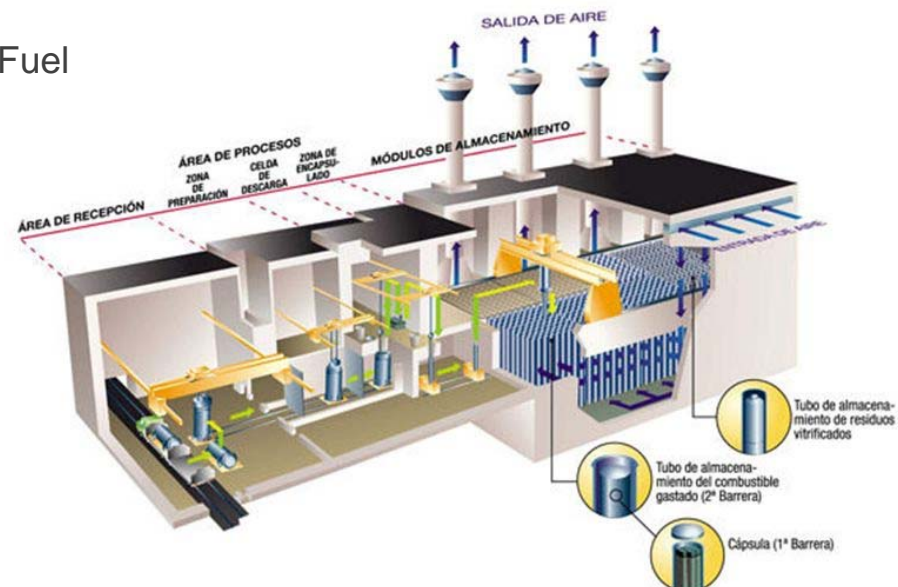
Full design of the Spanish repository for Spent Fuel and high level waste

2012 - ongoing

Vektor complex, Ukraine

Design of RAW treatment and disposal facilities

2015 - ongoing





BASIC DISMANTLING ENGINEERING

General zoning of the facility

- Criteria of physical delimitation and functional and radiological homogeneity
- Basis for specifying actions
- Inventory of materials
- Equipment and components
- Buildings and structures

Initial radiological inventory

- Classification of materials
- Waste volumen and mass
- Dose estimation
 - ✓ Theoretical calculations
 - ✓ Direct measurements, radiometric study

Status of the facility before dismantling

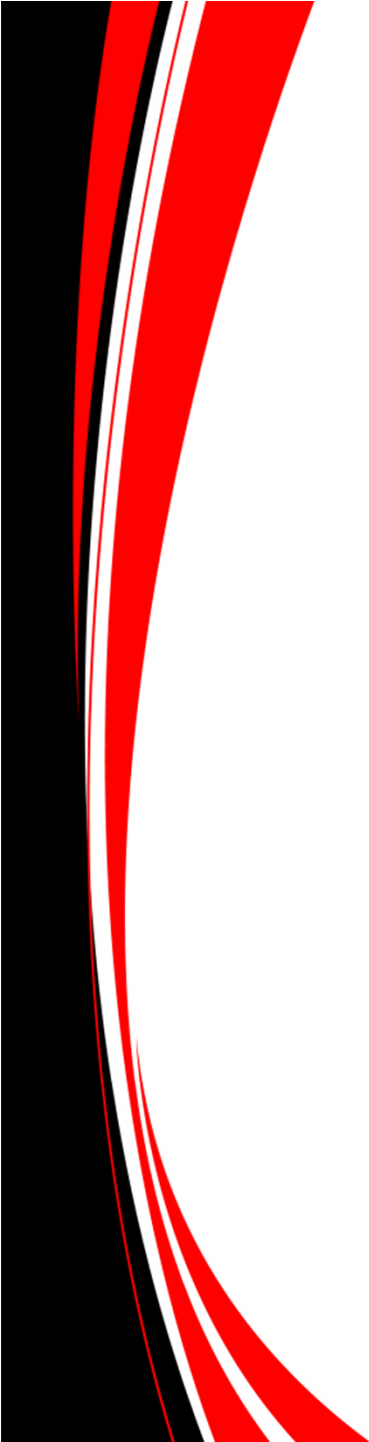
- Systems required, totally or partially
- Systems not required
- Special use buildings
- Buildings not required
- Structures and systems that must remain



LICENSING

Dismantling and Decommissioning Plan

- Safety study
 - ✓ Initial radiological status
 - ✓ Project general description
 - ✓ Description of final configuration
 - ✓ Accident analysis
 - ✓ Radiological impact (workers and public)
- Operating regulations
 - ✓ Organisation
 - ✓ Responsibilities
 - ✓ Operating codes and standards
- Execution Schedule
- Quality Assurance Programme
- Waste Management Plan
- Radiological Protection Manual
- Interior Emergency Plan
- Environmental Radiation Monitoring Plan
- Off-site Dose Calculation Manual
- Security Plan
- Plant Technical Specifications



DETAIL DISMANTLING ENGINEERING

1/2

Auxiliary Systems Design

- Ventilation/filtration; FP; water; waste treatment; Radiation Monitoring

Design of NEW structures

- Cutting workshop; Decontamination workshop;
- Waste conditioning; waste storage buildings; laboratories

Modifications of EXISTING systems and structures

Procedures and Technical Specifications

Planning, Schedule and Cost estimate

- Plan for disassembly of conventional components
- Plan for dismantling of radiological components
- Plan for decontamination of components and structures
- Waste management plan
- Demolition and excavations plan
- Site restoration plan



DETAIL DISMANTLING ENGINEERING

2/2

Definition of Intervention Units

- Physical limits and location
- Inventory of equipment to dismantle
- Radiological inventory
- Existing risks
- Available existing services
- Final state required

Waste management

- Pre-classification
- Inventory
- Characterization
- Treatment
- Conditioning
- Packaging
- Movement/handling paths/routes
- Interim storage
- Radiological clearance
- Transport to final storage

DISMANTLING

Preparation

- Implementation of new systems
- Modification of existing systems
- Conditioning of existing buildings
- Construction of new buildings
- Equipment and system tagout plan
- Risk reduction programme (removal of toxic and hazardous substances); reduction of fire loads)
- Site accommodation for contractors and subcontractors

Execution

- Conventional component disassembly plan
 - ✓ Conventional intervention units
 - ✓ Technical specifications
 - ✓ Procedures
- Radiological components dismantling plan
 - ✓ Radiological intervention units
 - ✓ Technical specifications
 - ✓ Procedures
 - ✓ Prior decontaminations
 - ✓ Radiological analysis; ALARA assessments
- Building and Equipment Decontamination Plan
 - ✓ Radiological measurements
 - ✓ Decontamination
 - ✓ Final characterization. Clearance
- Demolition Plan
 - ✓ Contaminated buildings and structures
 - ✓ Decontaminated buildings and structures
 - ✓ Conventional buildings and structures



SUPERVISION AND EXECUTION OF DISMANTLING 1/3

Essential Functions

- Liaison between the Project Organization (INPP) and the Contractors
- Coordination of different executors (partial specific programmes) with the rest of the organisation (general dismantling plan)
- Interface resolution
- Milestones monitoring (scheduling)
- Cost control
- Technical execution documentation (specs, procs and reports)
- Real and up-to-date knowledge of the facility as tasks are performed
- On-site presence and continuous evaluation
- H&SE risk prevention requirements (safety culture)
- Foreseeing and anticipating interferences of manouvers
- Team building



SUPERVISION AND EXECUTION OF DISMANTLING 2/3

Supervision tools

- Request for Job Permit
- Special execution procedures
- Radiological Works Permits
- Risk assessments
- Permits for Jobs with Risk of Fire
- Waste handling units
- Authorisations to cut radiological materials
- Ventilation and filtering requirements
- Tagout requests. Tagout verification
- Inspection points programmes
- Work planning (scheduling)
- Building completion certificates (objectifiable take-offs)
- Preparatory working meetings
- Daily work operation meetings
- General award follow-up meetings



SUPERVISION AND EXECUTION OF DISMANTLING 3/3

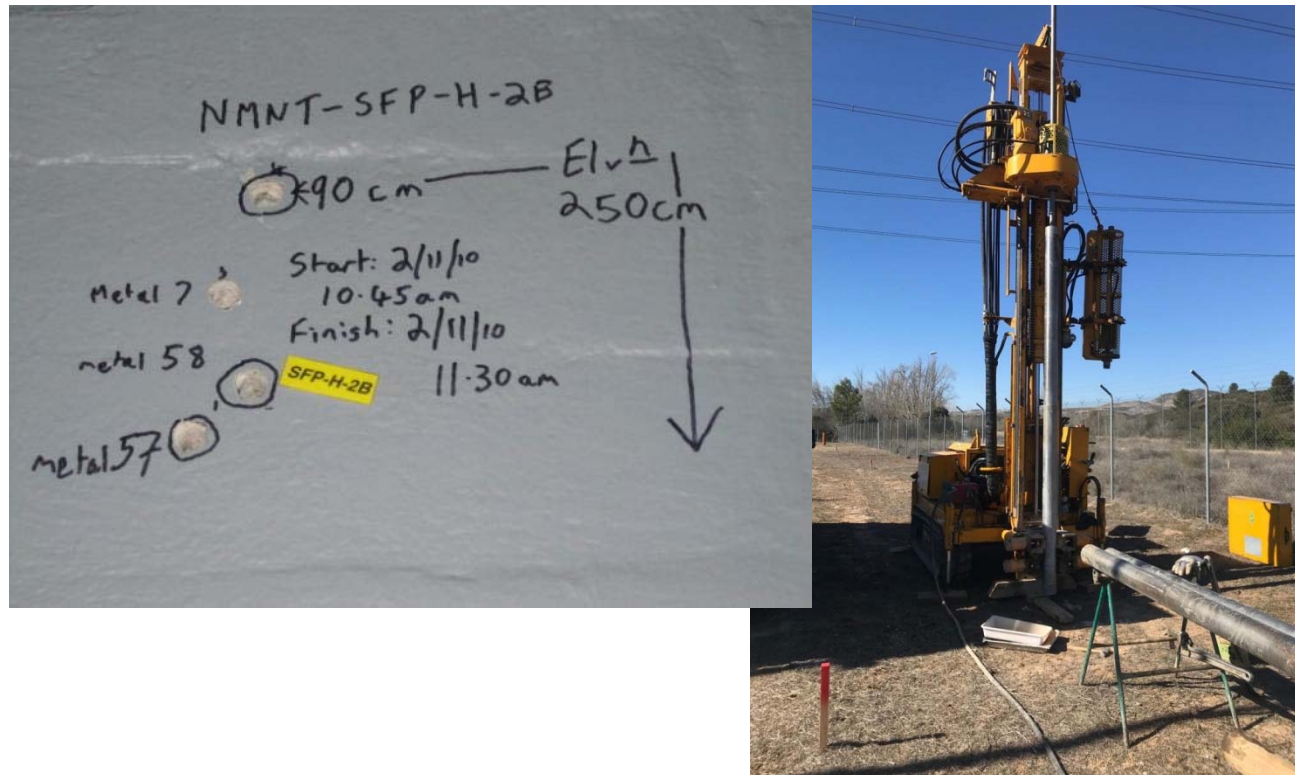
Application in the preliminary stages of the project

- Experience
- Lessons learned
- Identification of interfaces
- Complementary needs analysis
- Prior verification of processes and equipment.
- Simulation with mock-ups, pre-test and staff training

Thanks to our real experience in Full Scope Decommissioning and Dismantling programs we can implement all our expertise since the very beginning of the new projects.

SUPERVISION AND EXECUTION OF DISMANTLING 3/3/a

Characterization with measurements in situ



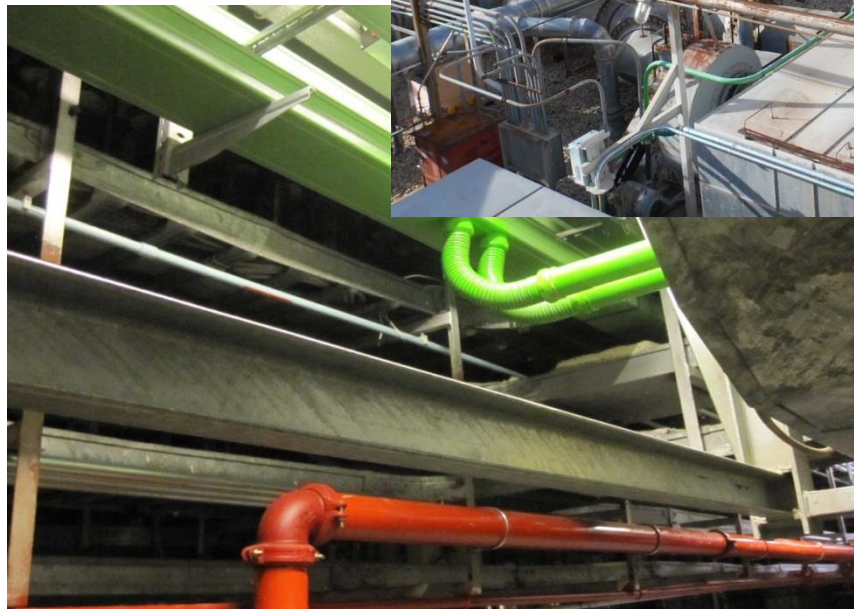
SUPERVISION AND EXECUTION OF DISMANTLING 3/3/b

Adaptation of existing buildings. Modifications needed.



SUPERVISION AND EXECUTION OF DISMANTLING 3/3/c

Use of existing systems. Selection of useful parts.



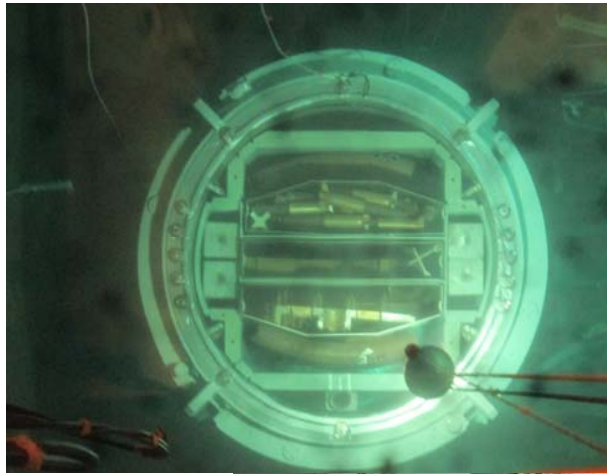
SUPERVISION AND EXECUTION OF DISMANTLING 3/3/d

Field identification of elements that can be dismantled. Marks and labels.



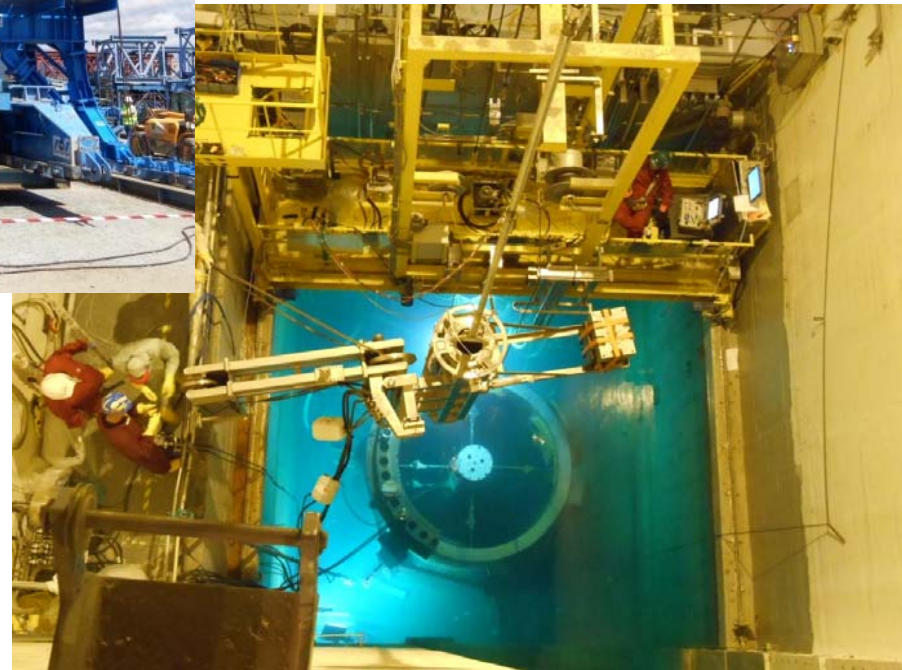
SUPERVISION AND EXECUTION OF DISMANTLING 3/3/e

Selection of adequate containers. Different typologies.
Volumes and weights to be handled.



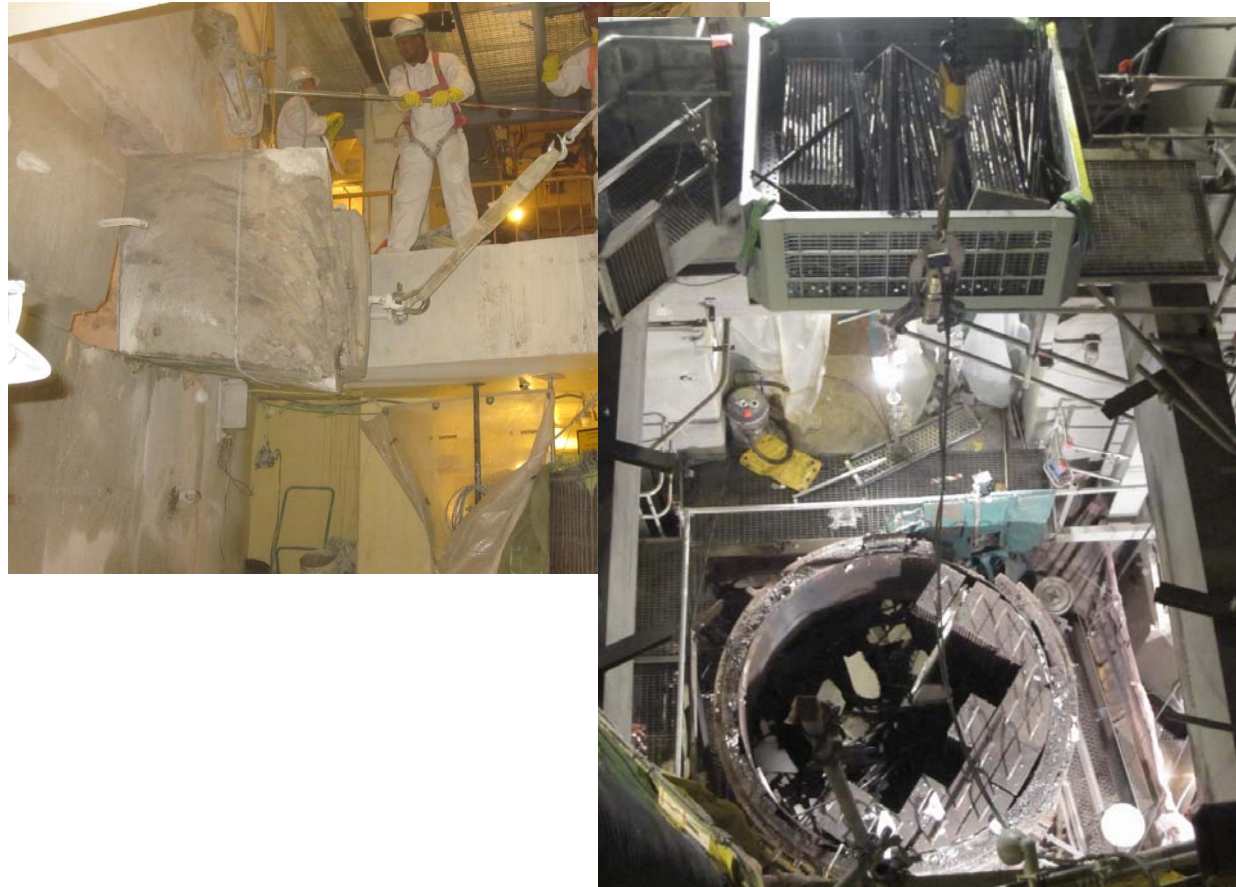
SUPERVISION AND EXECUTION OF DISMANTLING 3/3/f

Verification of processes and equipment. Previously checked layout.



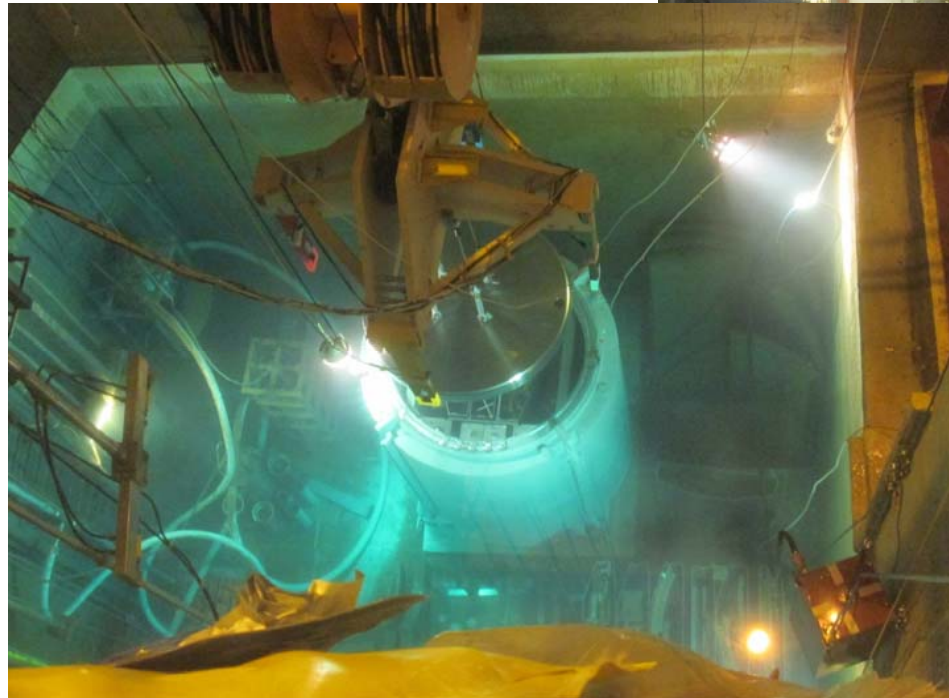
SUPERVISION AND EXECUTION OF DISMANTLING 3/3/g

Physical limitation of the spaces available for dismantling



SUPERVISION AND EXECUTION OF DISMANTLING 3/3/h

Need for auxiliary means and resources. Water treatment, lighting, adaptable tools. Extraction-filtration-ventilation.



SUPERVISION AND EXECUTION OF DISMANTLING 3/3/i)

Handling elements. Manoeuvres. Scope



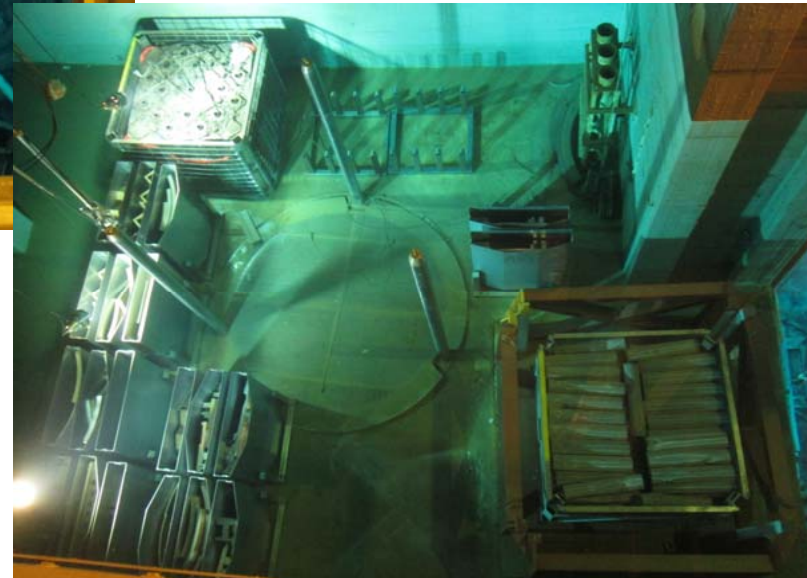
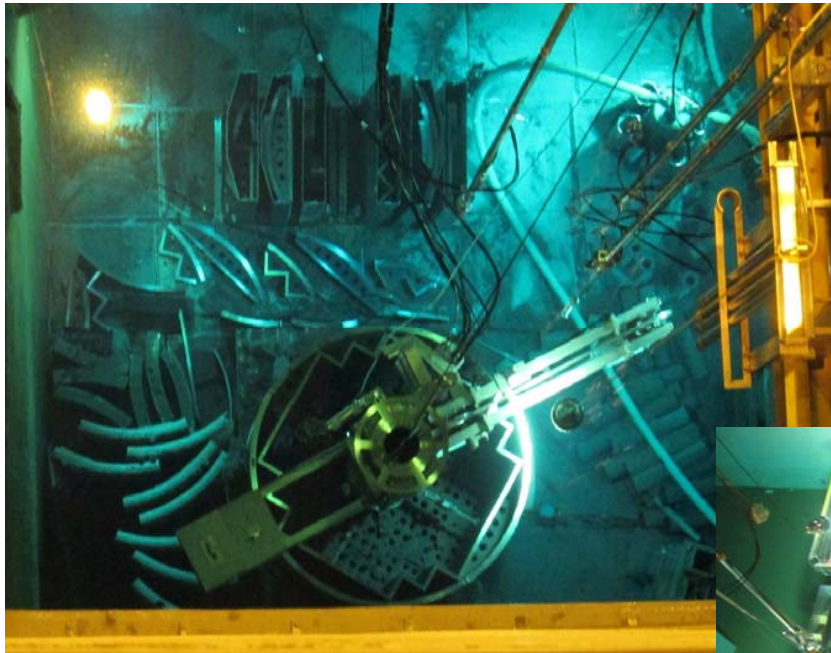
SUPERVISION AND EXECUTION OF DISMANTLING 3/3/j

Preliminary study of handling possibilities, maximum load, compatible dimensions. Structural reinforcements.



SUPERVISION AND EXECUTION OF DISMANTLING 3/3/k

Waste inventory. Classification. Order.



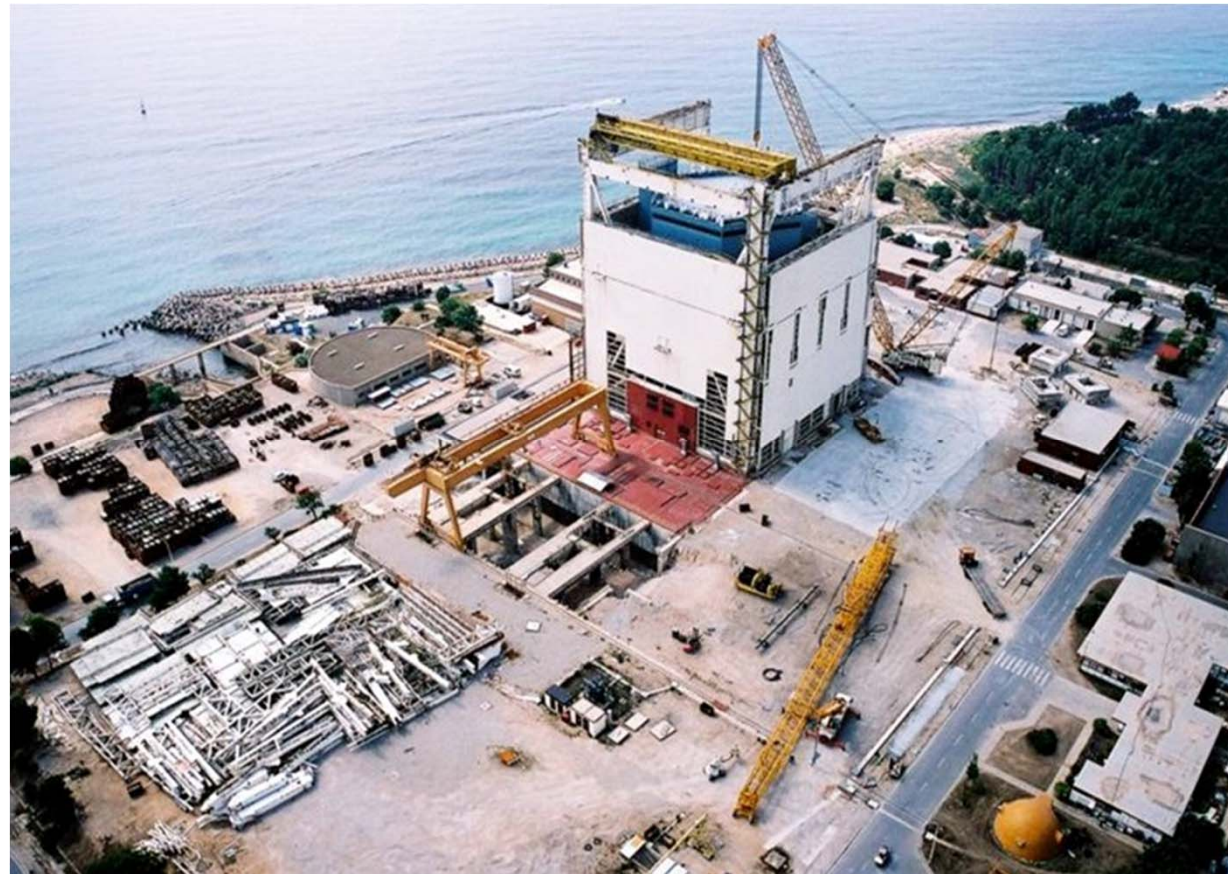
SUPERVISION AND EXECUTION OF DISMANTLING 3/3/I

Dismantling sequence. Means required. Spaces reserved.
Temporary stockpiling and storage.



SUPERVISION AND EXECUTION OF DISMANTLING 3/3/m

Dismantling sequence. Means required. Spaces reserved.
Temporary stockpiling and storage.



SUPERVISION AND EXECUTION OF DISMANTLING 3/3/n

Demolition. Excavation. Restoration

