



Safe Decommissioning R<sup>2</sup>D<sup>2</sup>P Manila 15-19 Sep

# **Safety Related Documentation and Regulatory Review**

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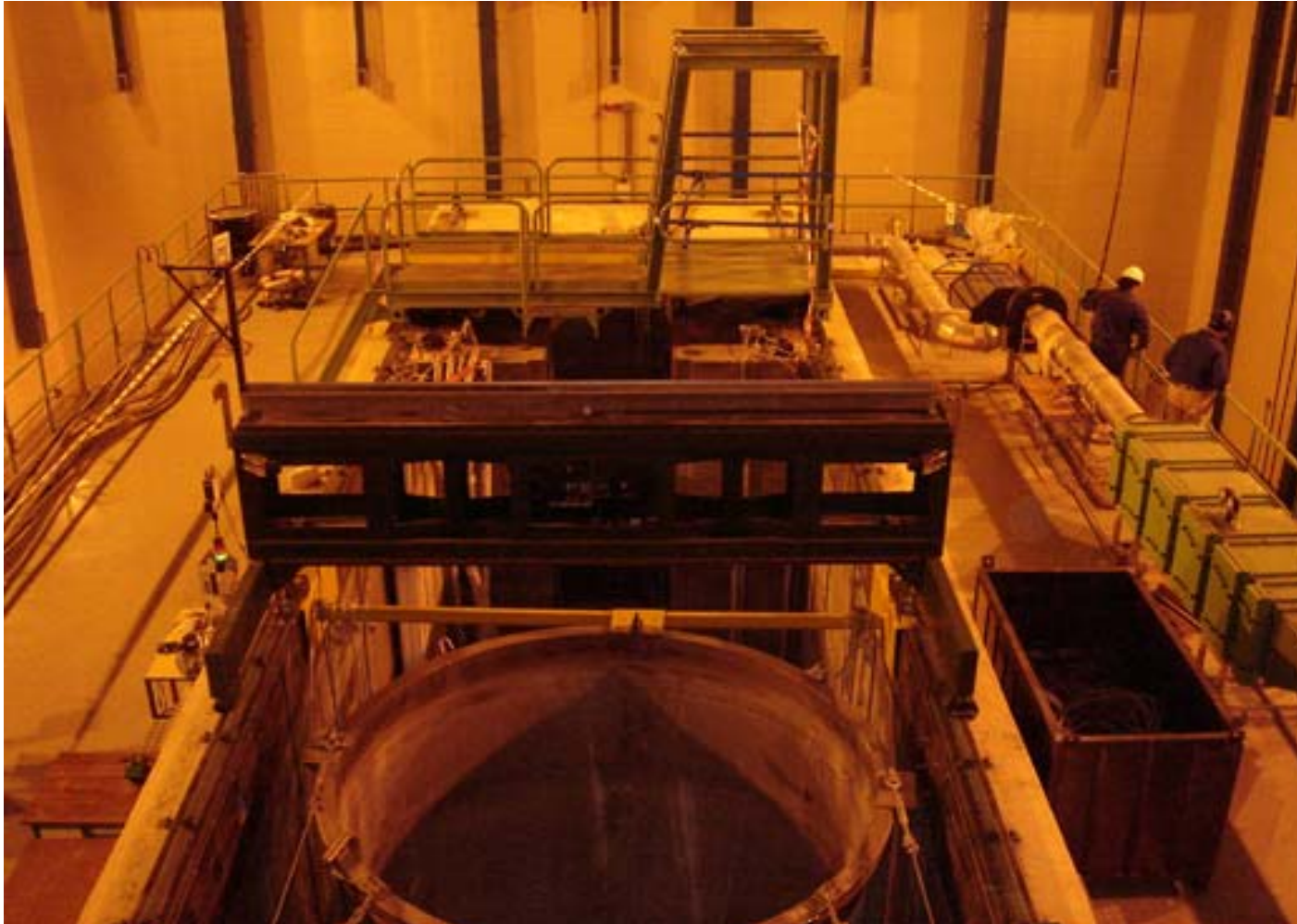
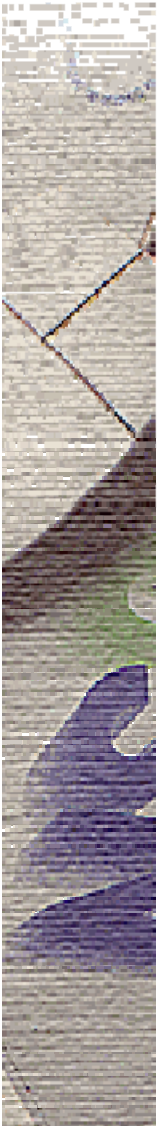


# Objectives

- **Describe typical safety related documents prepared to support a decommissioning project in Spain.**
- **Describe the preparation and content of some of these documents.**
- **Describe the regulatory body review process.**
- **An example of documental adaptation to the decommissioning stage**



# CIEMAT. Research reactor





# Ciemat research reactor

- MTR model
- 3 MW,
- Operation phase since 1958 to 1984.
- Mainly used in isotopes production and operators training
- No spent fuel in it
- Since 1997 to 2001 it was used in a UE research project for investigate on underwater cutting materials techniques



## 2. Activities

- **Application to executive authority**
- **Request to Regulatory body (CSN) report**
- **CSN Safety Assessment**
- **CSN Inspection**
- **CSN Report**
- **Authorization Release (executive Authority)**



# Spanish regulatory framework

## Dismantling authorisation documentation

- # **Safety study**
- # **Operating regulation**
- # **Technical specifications**
- # **Quality assurance manual**
- # **Radiation protection manual**
- # **Site emergency plan**
- # **Radioactive waste management plan**
- # **Clearance materials control Plan**
- # **Site restoration plan**
- # **Financial study**

## Environmental impact statement document





# Documents content (general)

- **The safety related documents that support the decommissioning process are extensive and provide a large amount of detailed information**
- **These documents require a significant effort to prepare and maintain throughout the decommissioning project**
- **These documents serve as the major or main source of information upon which the Regulatory Body bases its decisions for the licensed facility**
- **Information must be accurate and complete**



# Documents sources (general)

- **National rules and guides**
- **International guides and recommendations**
- **Other countries experience**
- **Use your sense and ask the regulator**





# Safety Report

- This shall include the necessary information to perform an analysis of the installation from the perspective of nuclear safety and radiological protection, as well as an analysis and evaluation of the risks deriving from the operation of the installation, both in its normal operating conditions as well as in accident situations.



# Safety Report

## 1. Description of the installation

- Site
- Installations and buildings
- Operative history
- Maps, plans and draw- designs of buildings and site

## 2. Dismantling project

- Radioisotopes Inventory
- Selected release option
- Auxiliary systems and buildings



# Safety Report

## 3. Safety analysis

- Dismantling operations
- Accidents

## 4. Radiological environmental impact

- Doses assessment
- Operational doses
- Public doses
- Environment



# Safety Report

## 5. Radiological protection system

- Supervision of personnel
- Radiological control of working areas
- Control and monitoring of emissions
- Air ventilation system
- Organization

## 6. Environmental Radiological Monitoring programme around the installation



# Radioactive waste management plan

## Objectives

- Must maintain on-site waste management and control systems – whether original plant or temporary systems

## CSN Safety Guide 9.3

- **contents**
  - Inventory of radioactive waste that are generated
  - Characterization
  - Plans for its treatment and conditioning
  - Temporary storage until it is evacuated from the facility
  - Solids management systems
  - Final disposal for solid radwaste



# Clearance materials control plan

- **Develops the different steps of the clearance materials process**
- **Contents:**
  - Management pathways chosen
  - Clearance levels
  - Clearance methodology (characterization, equipments)
  - Verification and traceability
  - Organization
  - Quality control



# Site Restoration Plan

## CSN Safety Guide 4.2

### 1. Site description

- # **Historical site assessment**
- # **Initial status**
  - Physical
  - Radiological characterization
- # **Final status and planned uses**
  - Physical
  - radiological

### 2. Radiological criteria. Release levels

### 3. Restoration actions planned

### 4. Final Status survey. Methodology

### 5. Quality control plan





# Historical Site Assessment

- Design and as built drawings
- Construction materials
- Facility modifications
- Facility operating records
- Production schedules
- Routine surveys
- Interviews with operators and support personnel
- Event log- accidents and unplanned events
- Review of security files for classified projects
- Photographs
- QA document review





# Radiological criteria for the release

- It has been defined by CSN in 0.1 mSv/year.
- This section must contain:
  - SCENARIOS DEFINITION
  - CRITICAL GROUP OF POPULATION
  - PATHWAYS EXPOSURE
  - CODES AND PARAMETERS USED
  - GUIDELINE VALUES PROPOSED
- Remember → Regulator can make its own estimates



# characterization Plan

- General
- Document and Historical Review
- Identification of potential contamination sources and locations
- Characterization and reference surveys
  - # Schedule and resources required
  - # Instrumentation and procedures to be used
  - # Conduct of survey – guidance
  - # Background level determination
  - # Sample analysis requirements
- Data interpretation
- Comparison to guideline values
- Contents of the Characterization Survey Report



# Characterization Report

- **Shows condition of facility at end of operations**
- **Contents**
  - # General
  - # Document and historical review
  - # Identification of contaminant sources and locations
    - Survey Procedures- Techniques and Instruments
  - # Comparison to guideline values
  - # Conclusion and summary
  - # Appendices – detailed information
- **Used to plan decommissioning activities**



# Final Survey

- **The purpose of the final survey is to demonstrate compliance with the regulatory body guidelines for site license termination**
- **Uses a statistical approach to sampling and monitoring to obtain sufficient evidence to demonstrate the case**
- **The Final Survey is conducted following removal of contamination but prior to remediation. The radiological hazards to the surveyors should be minimal, but the industrial safety hazards may be significant**



# Final Survey Report

- **General- Installation name, location, history, etc.**
- **Decommissioning activities**
- **Identification of contaminant sources/ locations**
- **Methods/ Techniques, Measurement Uncertainty**
- **Comparison to guideline values**
- **Conclusion and Summary**
- **Appendices**
  - # Detailed survey data
  - # Sample data
  - # Survey procedures



# Final Decommissioning Report- Contents

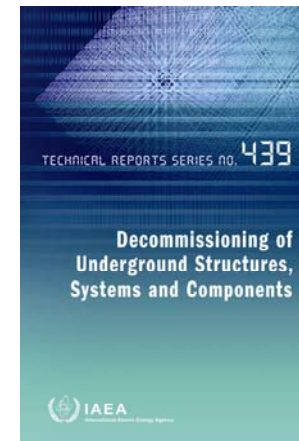
- # **Description of the facility**
- # **Decommissioning objectives**
- # **Description of decommissioning activities**
- # **Release (end point) criteria (radiological)**
- # **Description of any remaining buildings and facilities**
- # **Final radiological status; description of facility restrictions**
- # **Inventory of waste generated/ disposition, material released**
- # **Summary of occupational and public doses from activities**
- # **Summary of any abnormal events occurring during decommissioning**
- # **Lessons learned**
- # **References**
- # **Appendices**



# TECHNICAL REVIEW (CSN Staff)

**Aim: Verify compliance with general and specific requirements.**

- Regulation on nuclear installations
- Regulation on health protection against ionizing radiation
- CSN instructions (in particular IS-13)
- Conditions included in authorizations and permits
- CSN Guides (in particular SG 4.2 and 9.3)
- International recommendations and technical reports (OIEA, EURATOM)





# Methothology

- **The technical review is based on technical procedures for assessment and technical judgement. When it is possible CSN performs independent analysis and calculations.**
- **If necessary, technical meetings with the applicants take place in specific subject and CSN requests directly from the applicant all the information that is needed for assessment.**
- **Finally the CSN emits the report which is binding if negative, and the Ministry delivers the authorization.**
- **Compliance with safety conditions included in the Authorization is reviewed by inspection and analysis of periodic and specific reports and working procedures**

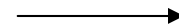




# Technical Assessment report (CSN technical staff)

- **Technical report**

- Object
- Scope
- Criteria
- Evaluation
- Results
- Actions



**CSN binding report**



**Ministerial Authorization**



# Lessons learned

- **Permanent dialog**
- **Interlocutors well established**
- **Collaborating**
- **Arbitrary actions must be avoid (Regulator)**
- **Incidents should not be hidden (operator)**



# Environmental radiological monitoring program during decommissioning

SAMPLES	N° SAMPLING POINTS		SAMPLING FREQUENCY	
	O	D	Operation	D
Gamma radiation (TLD)		23		Continuous (bimonthly)
Outdoor, particulates filter + charcoal cartridge	3	3	Continuous (weekly)	Continuous (weekly)
Airborne H-3	3	3	Continuous (monthly)	Continuous (fortnightly)
Airborne C-14		1		Continuous (monthly)
High volume air sample		1		Continuous (weekly)
Soil	6	9	Yearly	8 locations (quarterly), control location (yearly)
Surface water	7	6	Monthly	Monthly
Sediment and biological indicators	7	5	Yearly	Quarterly
Milk	4	2	Quarterly	Quarterly
Vegetables	4	3	Yearly on harvest time	Yearly on harvest time
Meat and eggs	2	2	Yearly	Yearly





SAMPLES	N° SAMPLING POINTS		MEASUREMENT/ANALYSIS AND FREQUENCY	
	O	D	O	D
<b>Gamma radiation (TLD)</b>		23		Dose rate (bimonthly)
<b>Outdoor, particulates filter + charcoal cartridge</b>	3	3	Gross $\alpha$ , Gross $\beta$ , I-131, (weekly), $\gamma$ Spectrometry, Sr-90 (quarterly)	Gross $\alpha$ , Gross $\beta$ , I-131, (weekly), $\gamma$ Spectrometry, Sr-90 (quarterly)
<b>Airborne H-3</b>	3	3	H-3 (monthly)	H-3 (bulked monthly)
<b>Airborne C-14</b>		1		C-14 (monthly)
<b>High volume air sample</b>		1		$\gamma$ Spectrometry (weekly), Sr-90, Pu-239+240, Nat-U, $\alpha$ Spectrometry (bulked monthly) Ni-63, Fe-55 (bulked quarterly)
<b>Soil</b>	6	9	$\gamma$ Spectrometry, Sr-90 (yearly)	<b>8 locations</b> $\gamma$ Spectrometry, Sr-90, Pu-239+240, Nat-U (quarterly) $\alpha$ Spectrometry Ni-63, Fe-55 (bulked every six months) <b>Control location</b> $\gamma$ Spectrometry, Sr-90, Pu-239+240, $\alpha$ Spectrometry Ni-63, Fe-55 (yearly)



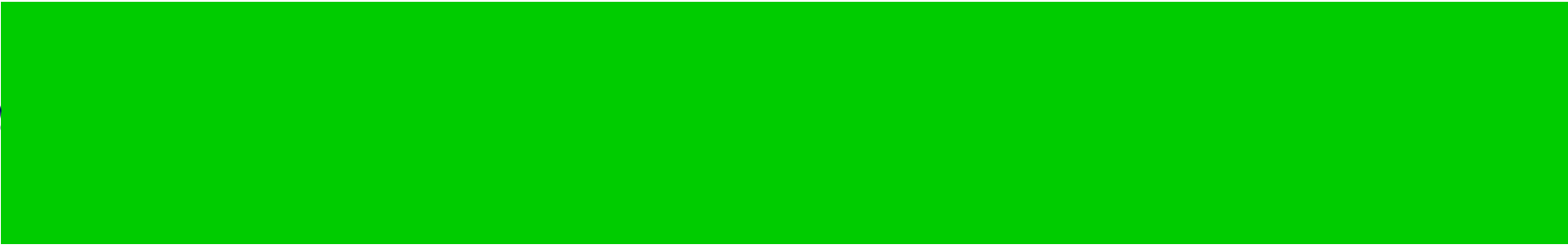
<b>Surface water</b>	7	6	Gross $\alpha$ , Gross $\beta$ , Residual $\beta$ , (monthly), I-131, (single quarterly), $\gamma$ Spectrometry Sr-90, H-3, Ra-226, Nat-U (U-238) Bulked (quarterly)	Gross $\alpha$ , Gross $\beta$ , Residual $\beta$ , (monthly), $\gamma$ Spectrometry, Sr-90, H-3, Nat-U (bulked quarterly), I-131, (single quarterly), $\alpha$ Spectrometry (bulked yearly)
<b>Sediment and biological indicators</b>	7	5	$\gamma$ Spectrometry, Sr-90, Nat-U, (yearly)	$\gamma$ Spectrometry, Sr-90, $\alpha$ Spectrometry, (bulked yearly), Nat-U, (single quarterly)
<b>Milk</b>	4	2	I-131, $\gamma$ Spectrometry, Sr-90 (quarterly)	$\gamma$ Spectrometry, Sr-90, I-131 (quarterly)
<b>Vegetables</b>	4	3	$\gamma$ Spectrometry, Sr-90 (yearly)	$\gamma$ Spectrometry, Sr-90, (yearly), I-131 (leafy vegetables yearly)
<b>Meat and eggs</b>	2	2	$\gamma$ Spectrometry (yearly)	$\gamma$ Spectrometry. (yearly)





# summary

- **Safety related documents have to be prepared to obtain the decommissioning and release authorization.**
- **These documents require a significant effort to prepare and maintain throughout the decommissioning project.**
- **Most of them are operational documents adapted to this life-stage.**
- **They serve as the major or main source of information upon which the Regulatory Body bases its decisions for the licensed facility.**
- **Information must be accurate and complete**
- **An on-going process of communication between the regulator and operator is critical for a timely and successful decommissioning project.**



**¡Thak you!**

