R2D2P WORKSHOP on SAFETY ASSESMENT
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NATIONAL REPORT

DECOMMISSIONING PROGRAM

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SUMMARY

1. Legal and regulatory framework

2. Decommissioning planning
   Improvements in the last three years.

3. Characterization survey

4. Decommissioning technologies

LEGAL and REGULATORY FRAMEWORK (1)

- The ARN is an independent entity within the jurisdiction of the Presidency of the Nation, and has full legal power to act in the fields of public and private rights.

- The regulatory system applied in Argentina by ARN considers that the owner and operating organization, known as Responsible Organization, is fully responsible for the radiological and nuclear safety of the installation.

- The Nuclear Regulatory Authority (ARN) is in charge of nuclear activity regulations and control, concerning radiological and nuclear safety, safeguards and physical protection.

- The regulatory standards are not prescriptive, but, on the contrary they are "performance based" standards, that is to say, they establish the fulfillment of safety objectives. The construction, commissioning, operation or decommissioning of a significant nuclear installation shall not start without the corresponding license issued by the Regulatory Authority.

LEGAL and REGULATORY FRAMEWORK (2)

LICENSING SYSTEM AND REGULATORY ACTIVITIES

The regulatory standards establish a Licensing System. One of its main requirements is that the construction, commissioning, operation or decommissioning of a significant nuclear installation shall not start without the corresponding license, required by the Responsible Organization and issued by the Regulatory Body.

- **Routine inspections**
- **Non routine inspections**
- **Assessments**
- **Audits**

LEGAL and REGULATORY FRAMEWORK (3)

APPLICABLE REGULATIONS TO THE DECOMMISSIONING STAGE

Four main standards issued by the Regulatory Authority are applicable to the decommissioning stage of nuclear installations in Argentina. One of them is specific and the other three have general requirements for the licensing of nuclear installations and for the radiological or waste safety. They are:

1. "Licensing of Relevant Nuclear Installations"1, AR 0.0.1, Rev.1, 1997.

In the Argentinean standards, Installations are considered as *relevant* and *non-relevant* (or minor) in function of the associated risk. Examples of relevant installations: nuclear reactors, large accelerators.

2. "Basic Standard for Radiological Safety", AR 10.1.1, Rev.2, 1999.

3. "Decommissioning of Nuclear Power Plants", AR 3.17.1, Rev.1, 1995.

4. "Radioactive waste management", AR 10.12.1, Rev.0, 1999.

LEGAL and REGULATORY FRAMEWORK (4)

Licensing of Relevant Nuclear Installations

The basic concepts of this standard are:
A license issued by the Regulatory Authority is required for the construction, operation and decommissioning stages of an installation life-cycle.

- **A Responsible Organization (RO) must be identified for each stage of a relevant installation. This RO is responsible for the nuclear and radiological safety of the installation in each of its stages: design, construction, commissioning, operation and decommissioning.**

- **The RO must identify a qualified staff member, called Primary Responsible, who is assigned with the direct responsibility for the nuclear and radiological safety of this installation.**

- **The Responsible Organization shall present to the Regulatory Authority, with the precedence that this decides, the technical documents required for the safety assessment, nuclear and radiological, of the installation stage whose license is applied to.**

LEGAL and REGULATORY FRAMEWORK (5)

"Basic Standard for Radiological Safety"

This standard provides the radiological criteria to be applied for the decommissioning of nuclear facilities. Although this applicability is not explicitly mentioned in the standard, the decommissioning stage is considered a part of an installation life-cycle (according to the AR.0.0.1. Standard, and other international recommendations.

"Decommissioning of Nuclear Power Plants", AR 3.17.1, Rev.1, 1995.

This standard establishes the general requirements for the decommissioning stage.

The main conditions are:

The Responsible Organization, holder of the Decommissioning License, is responsible for the planning and provision of the required resources for the safe decommissioning of the nuclear power plant.

LEGAL and REGULATORY FRAMEWORK (6)

"Basic Standard for Radiological Safety"(2)

The **Decommissioning Programme** shall consider the necessary institutional **arrangements** and, anticipate the adequate radiological protection in each step. A previous approval by Regulatory Authority is required to implement the Programme.

The **Responsible Organization** may delegate to perform the decommissioning, either totally or partially, to third parties, but keeping all responsibilities. During the decommissioning process, the **Responsible Organization** shall contemplate and put under Regulatory Authority consideration, the following:

a) Management of the project

b) Site management

c) Role and responsibilities of the organizations involved

and plants where radioactive materials are processed, used or stored and their inventory is about a

given amount.

d) Radiation protection

e) Quality assurance

f) Waste segregation, conditioning, transport and final disposal

g) Surveillance after completion of partial stages of decommissioning

h) Physical protection

LEGAL and REGULATORY FRAMEWORK (7)

"Basic Standard for Radiological Safety" (3)

i) Safeguards and non-proliferation Commitments

If the dismantling is deferred for a significant period of time after the final shutdown decision, the Responsible Organization shall provide the adequate storage for drawings, reports, data and all the relevant documents for the decommissioning. In this case, the Responsible Organization shall keep its responsibilities during this period, maintaining in operation all the safety systems required to keep the facility on safe conditions.

By Decree 1390/98 , whose Annex I regulates said law, establish among other things, CNEAs liability as Responsible Organization for defining the manner in which nuclear power plants shall be decommissioned, and also the liability of the agency that operates such reactors

Decommissioning planning Improvements in the last three years.

- The CNEA has considerad the Decommissioning activities like a strategic subject.
- A programme for the next ten years must be performed taking into account budget and human resourses
- This programme has two scenarios:

A) Research Reactors, small facilities and structural componentes
B) Nuclear Power Plants

"The objetive is to achieve in a reasonable time, the technical capability required to evaluate and decide on the best alternative for the Decommissioning of given Nuclear Facilities, taking into account the amount of radioactive waste generated".

Research Reactors, small facilities (1) and structural componentes

Research Reactors and Critical Assemblies:

UNIT	TYPE	FUNTIONING	LIFE CYCLE PHASE	OPERATOR
RA-0	U_{235} 20% 1Wt	1970-	OPERATION	CORDOBA UNIVERSITY
RA-1	U_{235} 20% 40kwt	1958-	OPERATION	CNEA
RA-2	U_{235} U 90% 1Wt	1966-1983	DISASSEMBLED	----------
RA-3	U_{235} 20% 5Mwt	1967-	OPERATION	CNEA
RA-4	U_{235} 20% 1Wt	1971-	OPERATION	ROSARIO UNIVERSITY
RA-6	U_{235} 20% 0,5 MWt	1982-	OPERATION	CNEA

Research Reactors, small facilities (2) and structural componentes

Research Reactors:

Preliminary Decommissioning Planning for RA-0, RA-4, RA-3 and RA-6. Take into account the staff and budget available it was divided in three parts:

POSSIBLE PROBABLE UNLIKELY

It means how is the approach to the information : Inmediately-midterm-longterm.

Research Reactors, small facilities (3) and structural componentes

1.-Facility Description
- Description of the site
- Operational history
- Equipment and systems
- Radiological inventory

2.-Decommissioning strategy
- Alternatives
- Type of waste, volumes
- Dose estimated
- Cost estimated
- Financing

3.-Project Management
- Organization and responsibilities
- Reviews, training, reports and records
- Schedule – time

4.-Decommissioning activities
- Decontamination
- Decommissioning
- Waste management
- Maintenance and monitoring program

5.-Environmental impact assessment

6.-Conventional security

Risk assessment

Protection for workers, population and environment

Emergency Assessment

7.-Radiological Safety

Predicting dose for interventions

ALARA principle "standard of decontamination"

8.-Quality assurance programs

9.- Radiological assessment final report

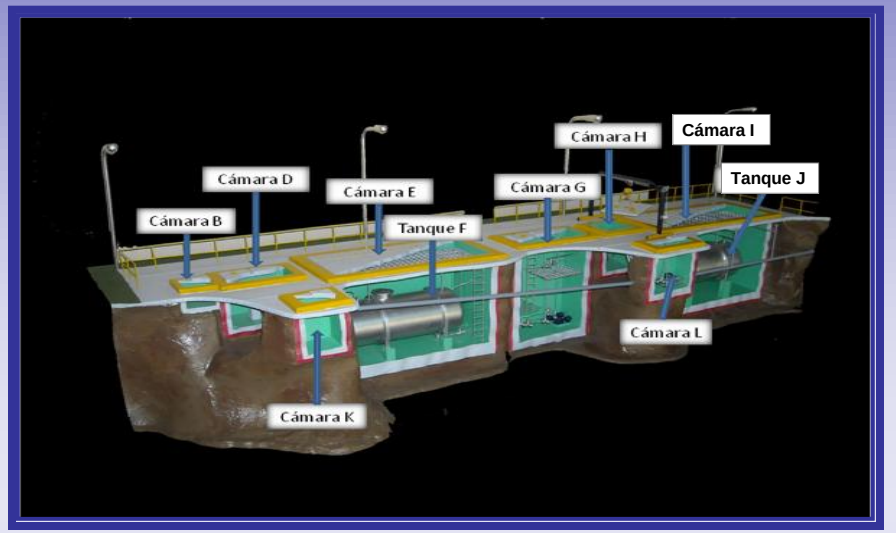
10.-Decommissioning final report
- Occupational dose report
- Structures remaining
- Volume and type of waste
- Materials and equipment
- Decontaminated for reuse
- Lessons learned

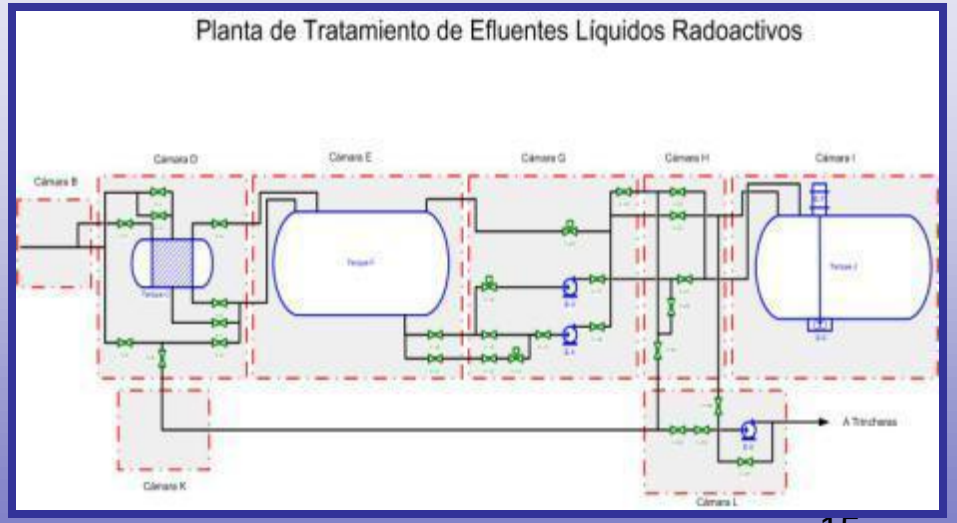
Research Reactors, small facilities (4) and structural componentes

SMALL FACILITIES 1.-

Between 1968-1970 a Reprossesing Plant was commissioned to separate Pu 239 from the Research Reactor RA-1. As a result 5 m3 of liquid waste were generated and sent to a Radioactive Waste Management Facility for its conditioning.
This facility was never used again from that time.

Research Reactors, small facilities (5) and structural componentes





Research Reactors, small facilities and structural componentes (6)

A decommissioning plan was prepared and sent to the Regulatory Body for its approval following the IAEA's guides

- The main problems were
  - Inadequate records
  - Responsibility for spills, accidents, cover-ups.
  - Conflicting information
  - Failing personnel memories
  - No drawings available
- Main tasks

Determination of the current radiological and hazardous status of the facility.

Assessment of the decommissioning cost, schedule, waste volumes, and radiological dose to workers.

Assessment of environmental, and health and safety risks.

Select an appropriate waste disposal strategy.

Compile in inventory of all material in the facility.

Research Reactors, small facilities and structural componentes (7)

STRUCTURAL COMPONENTS

During the operation and maintenance of NNP's and Research Reactors many structural components, valves, flanges, pipes, bars were storage and must be processed in order to reduce the activity and the amount of waste.

Research Reactors, small facilities and structural componentes (8)

STRUCTURAL COMPONENTS

Procedure for treament:

- Reduction of size
- Classification of different types of materials
- Classification of pipes, bars, sheets.
- Characterization.
- Decontamination.
- Storage or free release.

Nuclear Power Plants

- Administrative arrangements are being discussed in order to start with the preliminary decommissioning plan.

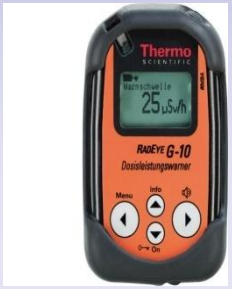
Characterization Process

Process consists of:

Planning the Characterization and defining requirements
Performing Sampling and Measurements
Analyzing the Data
Documenting the Results

Canberra Alfa/Beta

Gamma Digital Spectrometer



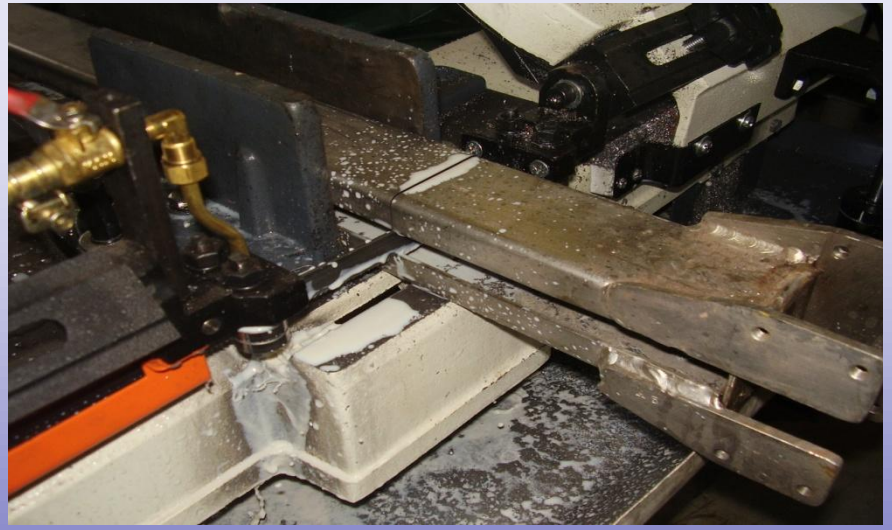
RadEye G-10 Environmetal Dosis

RadEye AB100 Alfa/Beta

Decommissioning Technologies (1)

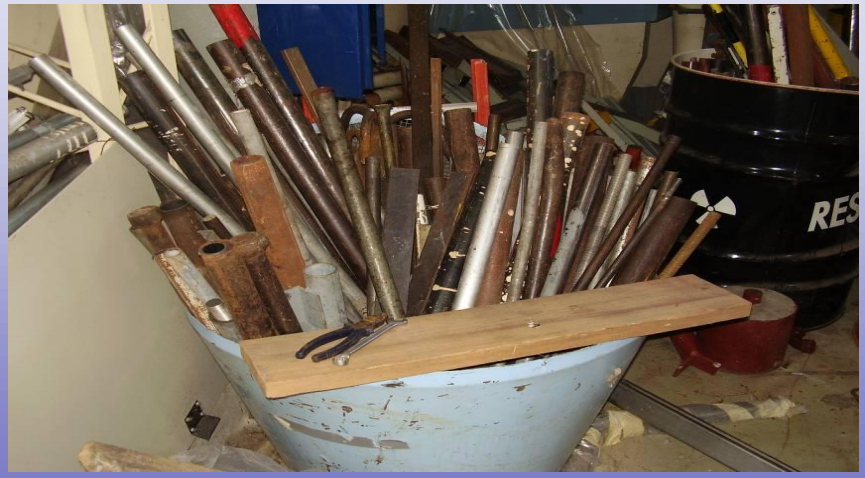
A) MECHANICAL CUTTING:

- Most of the mechanical techniques are adaptation of industrial technologies which are used for the pipes, bars, sheets
  - Hydraulic and manual shears are used for different types of sheets.
  - Mechanical saws (various types) for pipes and bars.



Decommissioning Technologies (2)

A) MECHANICAL CUTTING:

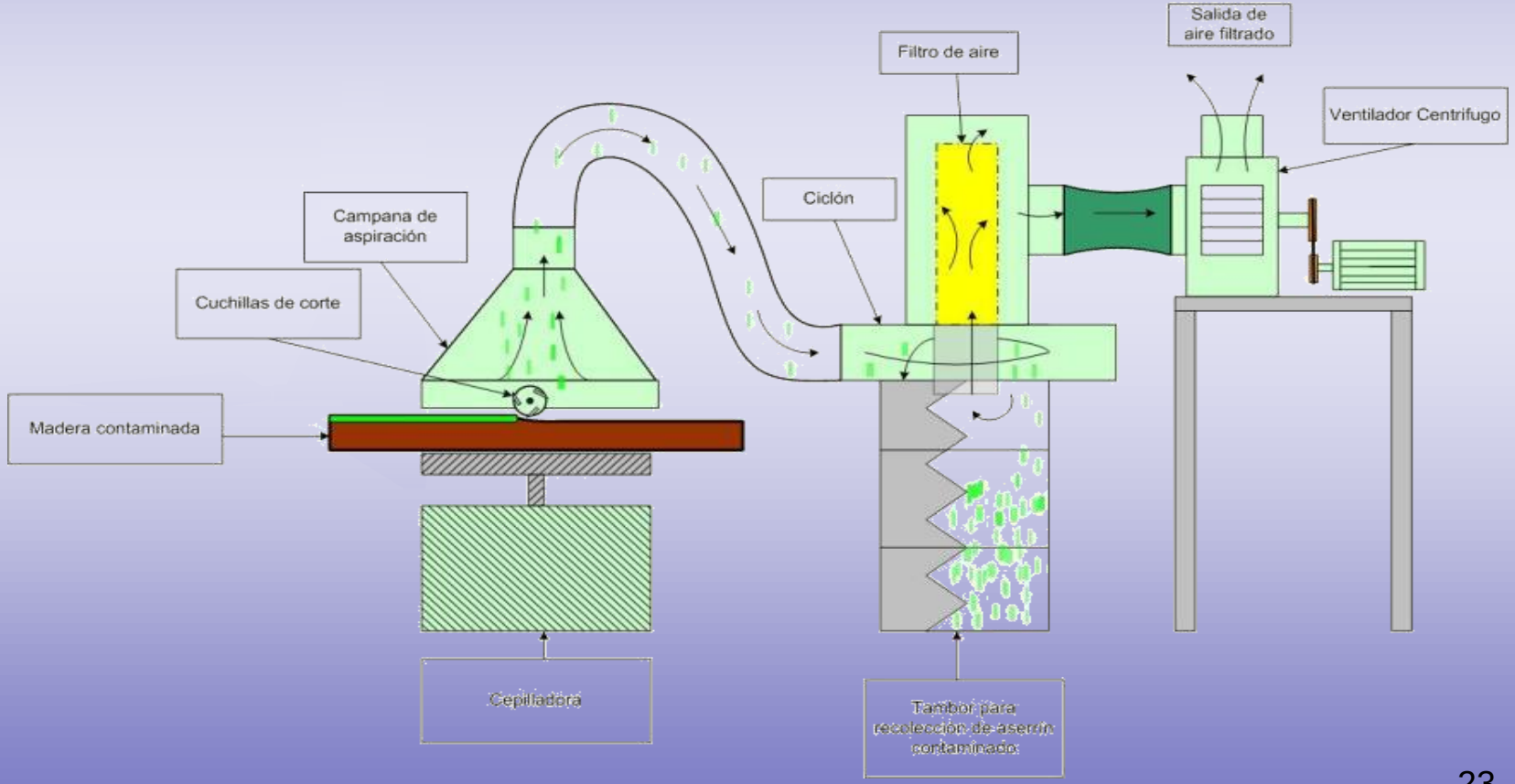


Decommissioning Technologies (3)

DECONTAMINATION

A) Wooden Structures

Electric conventional plane used by carpenters. The shavings produced are put In drums and compacted. The main structures are reused.



Decommissioning Technologies (4)

Decontamination

B)Decontamination of metallic structures:

- Chemical Immersion with concentrated or diluted chemical reagents, electrochemical Method, Mechanical Method and Ultrasonic wave method are testing.

Laboratory Machine