

GROUP 3

China, Philippines, Serbia, Brazil

ASSUMPTIONS

- ✓ **Only the reactor building will be decommissioned**
- ✓ **No fission products from SF fracture**
- ✓ **Simple technology**
- ✓ **Wastes go to interim storage**
- ✓ **Other materials considered no-radioactive wastes go to the landfill**

INTERDEPENDENCES

- ✓ **Legal aspects (national and international)**
- ✓ **Radiation protection and environmental monitoring**
- ✓ **Industrial safety**
- ✓ **Personnel training**
- ✓ **Procedures**
- ✓ **Time frame for each activity**
- ✓ **Record**

DECOMMISSIONING ACTIVITIES

- ✓ **Six basic activities were identified:**
 - **Characterization**
 - **Decontamination**
 - **Dismantling**
 - **Transportation**
 - **Treatment and conditioning of the waste**
 - **Storage**

CHARACTERIZATION

- ✓ Surface detectors (α , β , γ)
- ✓ Analyzers for α , β , γ (spectrometer)
- ✓ Smear tests
- ✓ Measuring devices for different

DECONTAMINATION

- ✓ Possible contaminated surfaces
 - Concrete
 - Al liner of the reactor pool
 - Coolant Al piping
 - Pb bricks
 - Reinforcing bars (concrete)
 - Hold up tank (carbon steel)
 - Equipment (pumps, heat exchanger, demineralizer tank)

DECONTAMINATION: TECHNOLOGY

☞ Concrete

- scabbing
- shaving
- grinding

☞ Metal

- closed system – mechanical
- open system – chemical

DECONTAMINATION: TECHNOLOGY

☞ Tools

- Scabbing – chisel
- Shaving – shaving machine
- Grinding – grinder
- Mechanical – hi-pressure washer
- Chemical – chemical solutions

DISMANTLING

If necessary, then

- ✓ **Hire a local contractor to the dismantling under the supervision of PNRI reactor staff.**
- ✓ **The Operator shall be responsible for the technical specifications and procedures.**

DISMANTLING (cont.)

- ✓ **Coordinate with the radiation protection and waste management department on the dismantling activities.**
- ✓ **During dismantling, determine what waste packages are acceptable and the maximum activity as per package.**
- ✓ **Protect the package from external contamination.**

TRANSPORTATION

- ✓ **Contaminated materials/equipment shall be transported in carrying containers using a forklift or a truck with a lifting capacity.**
- ✓ **Removal of contaminated materials/equipment from the reactor building to a waste storage facility shall be coordinated with the radiation protection unit.**

TRANSPORTATION

- ✓ **Necessary packaging arrangements shall be supervised by the radioactive waste department.**
- ✓ **Internal regulations for the transport of contaminated materials/equipment shall be followed.**
- ✓ **Segregation and labeling of waste packages shall be done.**
- ✓ **Define the transportation route to the waste storage.**

TRANSPORTATION - TOOLS

- ✔ forklift
- ✔ weighing scale
- ✔ survey meters
- ✔ protective devices, such as pen dosimeter, gloves, mask, coveralls

WASTE TREATMENT

- ✔ Determine possible reuse or recycling
- ✔ Segregate the packages in accordance with the treatment options.
- ✔ Determine if waste is within acceptable criteria.

WASTE TREATMENT

☞ Liquid waste

- precipitation
- filtration
- cementation

☞ Ion exchange resin / sludges

- Cementation

WASTE TREATMENT

☞ Solid waste

- Immobilization

☞ Soil

- Conditioning ???

☞ Clothes/papers

- compaction

WASTE TREATMENT - TOOLS

- ✓ tanks
- ✓ chemicals
- ✓ filter
- ✓ resin
- ✓ mixer
- ✓ compactor

STORAGE

- ✓ For each waste package, define position in the storage facility - map
- ✓ Record the dose rate of the storage facility-inside/outside
- ✓ Environmental monitoring of air particulates
- ✓ Security surveillance of the waste storage facility- camera

NEEDS

☛ Quality Assurance Program

- **Definition of the responsibilities**
- **Selection / Elaboration of legislation and regulations**
- **Procedures**
- **Documentation and records**
- **Safety and security requirements**
- **Data base**

NEEDS

☛ Quality Assurance Program (Cont.)

- **Contractors (control,)**
- **Training program**
- **Calibration and sampling program**
- **Record procedure**
- **Audits and evaluation of non-conformance program**

NEEDS

- ☛ **Packages – qualify for transportation and storage, considering material, radionuclides and activity.**
- ☛ **Development and implementation of treatment techniques for the wastes that can be arise from the decommissioning.**

NEEDS

- ☛ **Implementation of tests to determine the waste product characteristics important for the storage.**
- ☛ **Improvement of the interim storage unit regarding to the security, safety, environmental protection, monitoring program.**

NEEDS

- ✓ Development of the Waste Acceptance Criteria for the storage.
- ✓ Development of the documents to control the material generated during decommissioning activities.
- ✓ Survey of available techniques for decontamination and dismantling in the country and contractors to do it.

SCHEDULE

ACTIVITIES	1	2	3	4	5	6
Planning	xxxx					
Characterization		xx				
Decontamination		xxx		x		
Dismantling		x	xxx			
Transportation		xx	xxxx			
Waste Treatment			xxxx	xxxx		
Storage				xxxx	xxxx	xx
Final survey						xx
Quality Assurance						
Record						
Control						