Exercise – Group 3

Brazil, China, Philippine and Serbia
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BOUNDARY CONDITIONS

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

INTERDEPENDENCIES

Decommissioning activities should be related to the following aspects:

- 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:

1. Characterization (radiological, physical etc)
2. Decontamination
3. Dismantling
4. Transportation
5. Treatment and conditioning of the waste
6. Storage

TECHNIQUES / TECHNOLOGICAL NEEDS

1. Characterization (radiological, physical etc)

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

2. Decontamination

- Possible contaminated surfaces
    i. Concrete
    ii. Al liner of the reactor pool
    iii. Coolant Al piping
    iv. Pb bricks
    v. Reinforcing bars(concrete)
    vi. Hold up tank(carbon steel)

vii. soil
viii. Equipment(pumps,heat exchanger,demineralizer tank)

- Technology
  i. Concrete
     1. scabbling
     2. shaving
     3. grinding
  ii. Metal
     1. closed system – mechanical
     2. open system – chemical
- Tools
  i. Scabbling – chisel
  ii. Shaving – shaving machine
  iii. Grinding – grinder
  iv. Mechanical – hi-pressure washer
  v. Chemical – chemical solutions

3. Dismantling

i. If dismantling is necessary, then hire a local contractor to the dismantling under the supervision of PNRI reactor staff.
ii. During dismantling, determine what waste packages are acceptable and the maximum activity as per package
iii. Protect the package from external contamination
iv. The Operator shall be responsible for the Technical specifications and procedures.
v. Coordinate with the radiation protection and waste management department on the dismantling activites.

4. Transport

i. Contaminated materials/equipment shall be transported in carrying containers using a forklift or a truck with a lifting capacity.
ii. Removal of contaminated materials/equipment from the reactor building to a waste storage facility shall be coordinated with the radiation protection unit
iii. Necessary packaging arrangements shall be supervised by the radioactive waste department
iv. Internal regulations for the transport of contaminated materials/equipment shall be followed
v. Segregation and labeling of waste packages shall be done
vi. Tools required for this activity
   1. forklift
   2. weighing scale
   3. survey meters
   4. protective devices, such as pen dosimeter,gloves,mask,coveralls
vii. Define the transportation route to the waste storage

5. Treatment and conditioning of the waste

i. Determine for possible reuse or recycling
ii. Segregate the packages in accordance with the treatment options.
iii. Treatment on the type of waste
   1. liquid waste
      a. precipitation

b. filtration
c. cementation

2. ion exchange resin and sludge
    a. Cementation
3. solid waste
    a. immobilization
4. clothes/papers
    a. compaction

iv. Determine if waste is within acceptable criteria
v. Materials/equipment necessary
1. tanks
2. chemicals
3. filter
4. resin
5. mixer
6. compactor

6. Storage

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

THINGS TO BE DONE

1. Quality Assurance Program
   - Definition of the responsibilities
   - Selection / Elaboration of legislation and regulations
   - Procedures
   - Documentation and records
   - Safety and security requirements
   - Data base
   - Contractors (control, ….)
   - Training program
   - Calibration and sampling program
   - Record procedure
   - Audits and evaluation of non-conformance program
2. Packages – qualify for transportation and storage, considering material, radionuclides and activity
3. Development and implementation of treatment techniques for the wastes that can be arise from the decommissioning
4. Implementation of tests to determine the waste product characteristics important for the storage
5. Improvement of the interim storage unit regarding to the security, safety, environmental protection, monitoring program
6. Development of the Waste Acceptance Criteria for the storage
7. Development of the documents to control the material generated during decommissioning activities

8. 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						