

**International Atomic Energy Agency**

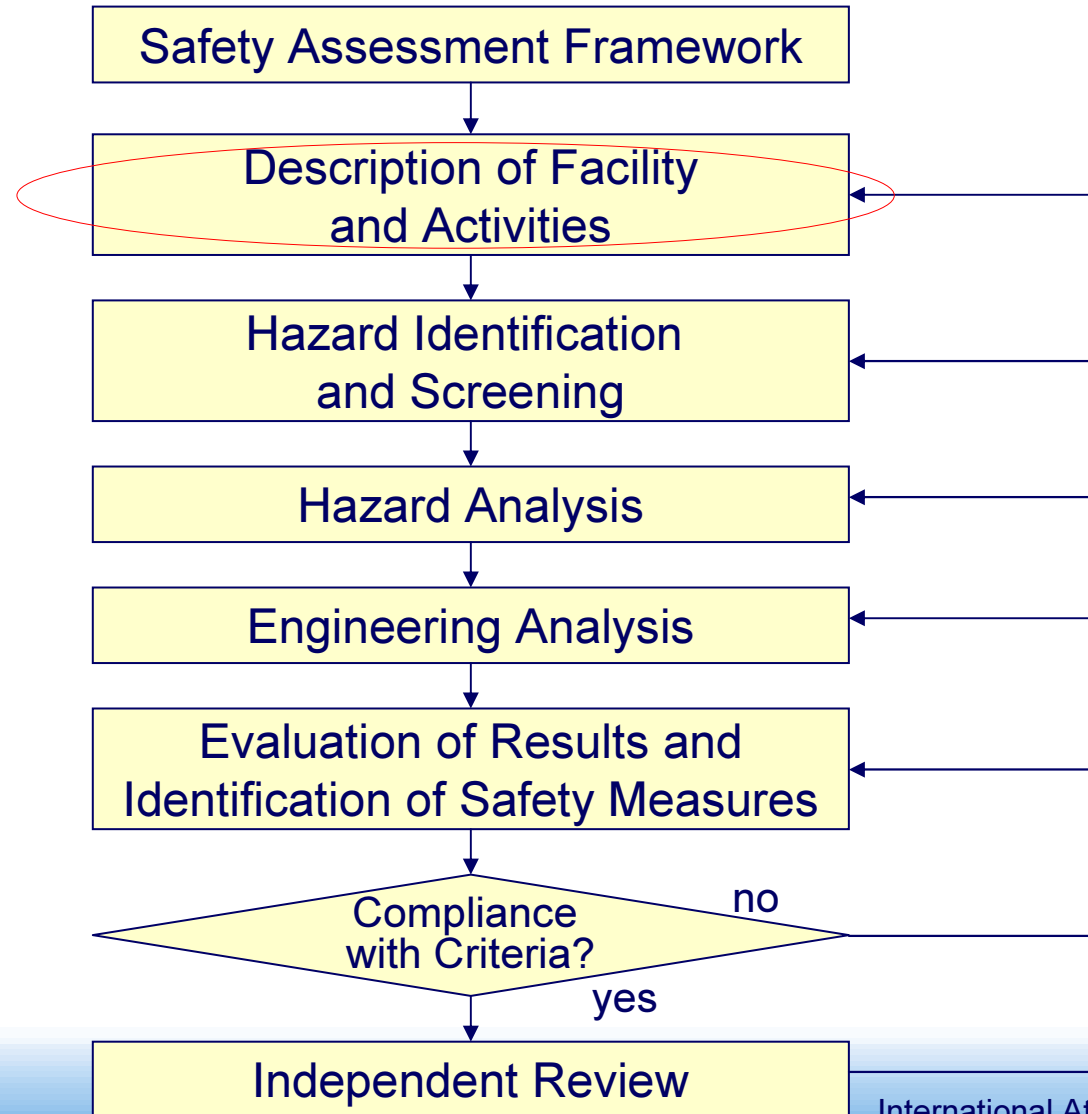
# **Description of Facility and Decommissioning Activities**

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Nuclear Power Plants and Research Reactors

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# Safety Assessment Methodology



## Description of the facility and of the decommissioning activities (WS-G 2.5 para. 4.6. to 4.10.)

- Safety Guide on Safety assessment for decommissioning (WS-G.5.2.)
- *“The safety assessment should use the [...] information from the decommissioning plan, in relation to the facility and its associated land, buildings and SSCs and their decommissioning ”:*
  1. The facility and the existing hazards associated with it,
  2. The decommissioning activities to be performed,
  3. The end points and the final state of the facility after decommissioning,
  4. The existing and planned safety measures,
  5. The common systems with other operating facilities or facilities under decommissioning

# Description of Facility and Decommissioning Activities

## 1. The facility and associated existing hazards (1/2)

- Site description and local infrastructure:
  - should include sufficient information to enable dose and/or risk calculations to be performed:
    - information on population distribution,
    - present and future land use,
    - meteorology, geology and seismology,
    - surface water and groundwater hydrology and natural resources.
- The facility, structures, systems and components:
  - should include all existing safety functions and their associated SSCs, and should document their previous and present use; the physical and radiological state; any hazards they may present.
  - should include all relevant information on the systems, large components and the buildings.



# Description of Facility and Decommissioning Activities

## 1. The facility and associated existing hazards (2/2)

- The inventory of radioactive material:
  - should include relevant radionuclides and calculated and measured activity; the radionuclide distribution in contaminated and (if applicable) activated components and building structures; and the dose rate distribution.
  - should be based on radiological surveys, calculations and records at an adequate level of detail.
- The operational history:
  - should include operational records, post-operational on site and off site surveys and information from ongoing decommissioning activities:
    - any modifications to the facility design,
    - identification of additional contamination of buildings, structures and systems above or below the ground,
    - contamination of land (including surface or groundwater) as a result of incidents, accidents or due to structures buried on the site.



# Description of Facility and Decommissioning Activities

## 2. The decommissioning activities to be performed:

- The sequence of decommissioning tasks and their interfaces in terms of time, resources and utilization of common premises including:
  - the techniques to be used,
  - the management of radioactive material, non-radioactive hazardous material and other materials on the site
- The supporting facilities necessary for the purpose of safe decommissioning :
  - facilities for electrical supply;
  - facilities used for the purposes of the management of radioactive waste, e.g. waste processing facilities, waste storage facilities.
    - ⇒ May require a separate safety assessment

# Description of Facility and Decommissioning Activities

3. **The end points and the final state of the facility after decommissioning:**
  - Before, during phases and after decommissioning
    - ❑ end-point of one phase = initial state for following phase
    - ❑ detailed information about physical, chemical and radiological end-point objectives will need to be described for each phase
    - ❑ The supporting facilities required to safely perform the decommissioning .
  - The end state of the facility after decommissioning should be defined including:
    - ❑ the unrestricted release of the site from regulatory control,
    - ❑ the restricted release administered through some form of institutional control.

# Description of Facility and Decommissioning Activities

## 4. The existing and planned safety measures:

- work control procedures,
- use of personal protective equipment,
- training and testing programmes,
- radiation protection programmes

## 5. The common systems with other operating facilities or facilities under decommissioning:

- The common systems and services for the decommissioning of a facility that is on a site where other facilities may be located, including information about common systems and services, their reliability for supporting decommissioning and the possible effects of the decommissioning activities on other facilities





# **Experience feedback**

## **Description of facility**



# Experience feedback: description of facility

## 1. Lost knowledge of engineering configuration phase:

- Facility description: detailed drawings missing
- Facility modification: no description and no drawings available

## 2. Lost knowledge of operational phase:

- No record of operational events
- Qualified personnel employed during the operation retired
  - ⇒ Interview operations personnel

## 3. Aging of the facilities and equipments:

- Modifications of the surveillance conditions at the end of the operation,
- Corrosion of equipments, structures and components,
- Maintenance of the crane, ventilation system and equipments.



# Experience feedback: description of facility

## 4. Lack of radiological inventory:

- Factors leading to contamination from reactor operation:
  - ❑ Corrosion and erosion products activation in coolant,
  - ❑ Primary cooling system leakage,
    - Leakage can generate external contamination (fixed or not) as aerosol dispersion and lead to wall (concrete) and ventilation system deposit,
  - ❑ Fuel unloading operations.
  - ❑ Although not typical, fission products released by fuel cladding defects,
    - Fission products can be transported by coolant along the primary cooling system and stay along internal circuit surfaces (singularities) until the end of the facility life,
  
- Factors leading to activation from reactor operation:
  - ❑ Reactor vessel and internals
  - ❑ Concrete
    - In Belgian BR-3 reactor, concrete has been activated until 60 cm depth



# Experience feedback: description of facility

## 5. Management of operational radioactive waste:

- Radioactive waste from the operation phase still in place:
  - Unknown (physical form and radiological inventory) and known solid radioactive waste radioactive waste stored in different places,
    - In the reactor vessel and channels,
    - In the hot cells,
    - In transport packages (need transportation to re-open),
    - In areas not designed for long period of storage (several years)
  - Liquid waste stored in tanks (mixed waste, unknown)
  - Experimental devices for research reactors stored in reactor pool (including spent fuel elements or pellets).
  
- ⇒ A preliminary phase must be implemented in the decommissioning project to manage the operational waste



# Conclusions: Description of facility and decommissioning activities

Description of the facility needs to be sufficiently detailed to ensure that the decommissioning can be planned and performed safely and efficiently to achieve the end point.

- Engineering design, configuration and construction considerations.
- Operational history; spills, leaks, and events.
- Radiological inventory, including neutron activated areas.
- Safety hazards identified and new ones considered.
- Approved decommissioning work plans and procedures.
- Decommissioning end point is known and achievable.
- Description will lead to Regulatory Authority approval.

