Optimized determination of the radiological inventory during different phases of decommissioning

Characterization within licensing procedure

**Operational shutdown**
- Final shutdown
- Licence: Full System Decontamination (FSD)
- Assessment criteria:
  - Atomic Energy Act, FPO
  - Guidelines, Directives
  - ISO, DIN...
- Concepts have to be:
  - optimized
  - comprehensive
  - verifiable

**Post operational Phase**
- Initial/rough characterization of radiological inventory
  - relevant nuclides + dismantling activities
  - other hazards
- concept of sampling
- concept of clearance
- concept of waste management
- concept of radiological character

**Licence: Decommissioning**
- Supervision by competent authority:
  - compliance with terms and conditions of licence
  - compliance with state of the scientific and technical knowledge
  - assessment of relevant documents
  - supervision at the site
  - supervision of procedures
  - supported by independent experts
- Application Documents

**Licence: Dismantling of systems and components – Parts I … X**
- Supervision by competent authority:
  - as above and
  - special supervision for procedures concerning release of concrete and rubble
- Application Documents

**Licence: Clearance of buildings and withdrawal procedure**
- Supervision by competent authority:
  - as above and
  - special supervision for procedures concerning release of concrete and rubble
- release of site from nuclear regulatory control
  - (release of licensee from nuclear regulatory control because of e.g. radioactive waste stored elsewhere)

Radiological framework during decommissioning

**Phase**
- Removal of fuel elements
- Dismantling reactor vessel and interior constructions
- Biological shield
- Primary circuit, aux. systems
- Buildings and site
- residual activity

**Associated Collective Dose**
- ~100 mSv
- several 100 mSv
- several 50

**Potential Risk of Alpha-Incorporation**
- Reactor vessel and interior constructions
- Bio. shield
- Primary circuit, aux. systems
- Buildings incl. sumps

**Characterization over time for decommissioning**

**Characterization (detailed)**
- for license
  - for dismantling
  - nuclide vector
  - appropriate measurement technique
  - changes of decontamination
  - radiation protection

**Characterization (rough)**
- for release of site
  - based on operational history
  - determination of contaminants (spatial and ratio)

**Conclusions:**
- The specific requirements for characterization are associated with the milestones during decommissioning
- The amount of activity does not directly correspond to the radiological hazard potential of the facility