Interface between Operator, Regulatory Body and the Public

Ingemar Lund - Swedish Radiation Protection Authority, SSI, Sweden

IAEA Regional Workshop: Legal and Regulatory Aspects of Decommissioning of Research Reactors
Manila, Philippines, 26 -30 June 2006

Objective

• Regular interface between operator, the regulatory body and the public during transition, decommissioning and site release period

• Some examples from the regulation of decommissioning of research reactors and other facilities
Interface between Operator, Regulatory Body and Public

Decommissioning is/was ideally addressed during all the stages of a nuclear facility:

- Construction
- Operation
- Closure
- Transition period
- Dismantling
- Site release
- Waste Management & Disposal

Decommissioning considerations in the Design and Construction phase:

- Choice of material (steel in tube ports & inserts, purify graphite)
- Construction (e.g. avoid embedded piping, proximity to concrete, provide leak detection, minimize leaking neutrons)
- Good documentation (photos, drawings, materials data)
- Measurements of neutron flux at strategies positions in the bio-shield (minimize intrusive testing)
- Requirement of decommissioning plan and updating procedures

Requirements in regulations or authorized on a case-by-case basis
Interface between Operator, Regulatory Body and Public

Decommissioning considerations in the Operational phase:

- Safe operation (within operating limits, contamination control, safety culture, keep radiation doses ALARA)
- Effective operator and maintenance training
- Frequent & adequate radiological monitoring, decontamination
- Periodic sampling of materials (spot neutron streaming)
- Configuration control, record-keeping, tracking neutron exposure variations
- Funding of back-end activities (decommissioning, waste management & disposal)
- Periodically updating decommissioning plan

For many existing research reactors, decommissioning was not fully accounted for during design, construction and operation

At Closure (technical & economical reasons, accident) the planning process will then be even more important than otherwise

The Transition phase from operation to implementation of decommissioning strategy deserves extra attention

Interface between Operator, Regulatory Body and Public

continued….


Interface between Operator, Regulatory Body and Public

Typical organisational and administrative activities in the transition phase:

- Changes to structure of licensee’s organisation (decommissioning project team & manager)
- Establishment of clear interfaces with interested parties, including the public, information exchange mechanisms
- Preparation of final decommissioning plan
- Collection and retention of important records and record keeping system
- Development & selection work on dismantling techniques and equipment
- Communication with regulatory body, public, etc…
Interface between Operator, Regulatory Body and Public

**Licensing** during the transition phase:

- Authorization dependent on the processes and requirements established by the Regulatory Body (e.g. one or several stages, for specific support activities [safety systems, waste facilities…])
- IAEA safety standards require pre-review and pre-approval of decommissioning activities during the transition period (decommissioning licence/plan)
- Evaluation of impact (safety & environmental impact assessment)

---

**Interface between Operator, Regulatory Body and Public**

**Operation**
- Pre-planning
- Record keeping system
- Operational experience
- Analysis of decom. options
- Prepare organisational change

**Transition Period**
- Decommissioning report/plan
- Safety assessment

**Implementation of decommissioning strategy**
- Selection of decommissioning option
- Safety & Environmental impact
- Declare intended future work
- Staffing issues

**Site release**
- Documentation of measures and residual radioactivity
- Application for site release
- Off-site waste management

**A ≡ Authorization**

International Atomic Energy Agency
Interface between Operator, Regulatory Body and Public

Public involvement [Open, Clear, Transparent]
- U.S., EU & elsewhere: Environmental Impact Assessment, involving public hearings, is often mandatory (Council Directive 97/11/EC, 3 March 1997);
- Local community, staff – timely dissemination of correct and meaningful information, develop confidence and trust;
- Liaison committee (i.e. government & regional organizations, public, others)
- Seminars, meetings, media, web-sites, information centres, public visiting days…

13 May, Ispra, Italy

• Annual information day to the residents in the area around JRC-Ispra
• Closed nuclear labs, two research reactors
• Decommissioning is being prepared
Interface between Operator, Regulatory Body and Public

Public involvement: Some possible issues of concern:

• Removal of emergency preparedness systems
• Decommissioning policy and strategies;
• Fuel & Waste management and material reuse;
• Authorised release of site and facilities;
• Long-term funding and related responsibilities;
• Framework for safety regulation of decommissioning;
• Social dimensions, public and political relations;
• Decommissioning techniques (is waste incineration or melting used, any releases)

Deferred dismantling (Inadequate funding and/or legal and regulatory framework, lack of waste management system, small nuclear programme)

• Radiological survey / minimise source-term
• Place the facility in a stage of safe enclosure (plant and system changes)
• Update plant and system records (data, drawings, photos)
• Surveillance and maintenance programme
• Actively prepare final decommissioning work!
• Address, as needed the issues of funding, amendment of legal & regulatory frame-work and waste management system
Interface between Operator, Regulatory Body and Public

Regulatory issues if deferred dismantling:
Decommissioning stages, time plan, funding
Clear management and sufficient knowledgeable staff
Review and authorize:
- structural changes and operational systems (to be kept)
- safety assessment (including physical status of facility)
- surveillance and maintenance programme (record keeping)
Close contact with the operator is important (meetings, regular inspections, status reports). Address, as needed:
- Funding situation (national or international)
- Amendment of decommissioning legislation/regulations
- Creation of waste management system

Involvement of interested parties (public, staff, others) in case of deferred dismantling:
- Ensure that the public (interested parties) can comment on and influence decisions, as commensurate with national legislation
- Independent review of safety assessments (important for confidence building)
- Inform on the changing status of the facility, outcome of the surveillance and maintenance programmes and projected time plan for final decommissioning work
- Special attention: final use of site, waste issues and any existing/future on-/off-site consequences
### Interface between Operator, Regulatory Body and Public

**Entombment** (a waste repository is established on site)  
IAEA Safety Requirements, WS-R-1 (1999)

- Reuse of site and any remaining facilities usually constrained
- Requires a robust regulatory/legal framework
- Public consultation and possibility to influence is crucial in order to obtain acceptance for a waste repository
- Is the amount of long-lived alpha-emitting radionuclides commensurate with near surface disposal?
- International assistance in entombment planning, execution and management (e.g. IAEA)
- Use the operating personnel in implementing phase

### Interface between Operator, Regulatory Body and Public

**Of importance for the entombment option:**

- Regulatory Body must ensure:
  - Adequate barriers over relevant time periods (100 – 300 years) are supplied;
  - Release and dispersion of radioactive nuclides is retarded and meets requirements;
  - Relevant intrusion scenarios are evaluated and compatible with acceptable, authorized risk criteria;
  - A programme for institutional control.
- Public awareness and public acceptance
- Future possible use of site
Interface between Operator, Regulatory Body and Public

Final site characterisation & release

- Regulatory Body shall establish criteria for site release and procedures for meeting these criteria;
- Regulatory Body & Operator must agree on the measurement methods, sampling procedures and any data on which calculations may be based;
- Interested parties should be able to have insight into the regulatory review and assessment of the site release application/process;
- Any remaining regulatory requirements must be commensurate with projected future activities at the site;
- In case of entombment or other on-site radioactive waste disposal institutional control may be applicable → Closure

Confirmative site-release measurements

- ACL (U/Pu-handling laboratory, other R&D-activities) Studsvik, Sweden 1960-1998
- Dismantling 1998-2005
- Free release by SSI in 2006 (clearance levels by the European Union, RP-133, 2000)
- Building to be demolished

Source: SSI, Sweden
Examples

10 MW experimental reactor Lucens, Switzerland (Entombment)
- Accident 1969: blocked fuel channel, ruptured pressure tube;
- De-fuelling, partial dismantling 1969-1973;
- In 1988: On-site disposal review (Fill lowest caverns with concrete. Drainage system to monitor groundwater during 30 years). Regulatory permit issued December 1990;
- Step-wise work 1991 → [Remaining activity < 2.2 MBq 1992]. Waste containers to separate interim store in 2003;
- Cultural archive of Canton of Vaud (library, museum, restoration workshop, storage of cultural objects) installed in caverns.

Examples

80 MW_th heat producing reactor Ågesta, Sweden (Deferred & partial dismantling)
PHWR in underground rock cavern. Operated 1963-74. D₂O-cooled & moderated
Site outside of rock cavern used as fire brigade testing ground, for dog training, etc

Source: Vattenfall AB / AB SVAFO, Sweden
Specific examples

1 MW, D,0 research reactor R1, Stockholm, Sweden
(Dismantling complete)
Rock cavern. Operated 1954-70
• “Intermediate stage” 1970-1980
• Dismantling 1981-1985 (Step-by-step authorisation)
• Heavy water and graphite stored off-site. Waste in shallow land-fill repository & release of metals
• Spent fuel (metallic) in interim storage pending re-processing
• Great interest in press/public due to its location in central Stockholm
• 25 persons, 140 mmanSv

Research reactors R2 / R2-0, Studsvik, Sweden  (Closed)
• Closed 2005 due to economy
• Decom. strategies investigated
→ Funding to be clarified
• Decom. plan presently updated
• Report to the SSI (strategy selection) in summer 2006
• Under preparation:
➢ Environmental impact assessment
➢ Safety assessment

Source: Studsvik AB, Sweden
Further reading

On-site disposal as a decommissioning strategy, IAEA-TECDOC-1124 (1999)

Summary

• It is important with regular communications between the regulatory body and the operator’s corporate and site management prior to closure and throughout decommissioning operations
• Both the operator and the regulatory body should plan ahead for decommissioning
• Acceptance, confidence and efficient decommissioning operations are achieved through communication with and involvement of the public and other interested parties