Lessons Learned during decommissioning planning and implementation

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Key lessons in Pre-decommissioning Survey

- Don’t utterly trust ‘As built’ drawings
- Review available records, old photos
- Perform interview of former or current workers
- Pay attention to waste in storage rooms, pits and embedded components
- Don’t overlook contamination of groundwater, soil, trees...
- Address all the hazards (incl. non radiological one)
- Do not rush into showing ‘visible progress’ before a thorough characterization can be performed
Key lessons in Characterization

- Know the expectations of your Regulatory Body and your Radioactive Waste Management Agency
- Use techniques capable of achieving release criteria activity levels
- Review and analyze the results (cross-check)
- Account for natural radioactivity
Key lessons in Final Survey

- Plan the final survey early in the decommissioning planning process
- Understand the expectations of the Regulatory Body for how this phase of the work will be performed
- Know the clearance criteria for the site before beginning to plan the final survey or the facility decommissioning phases
Key lessons in Planning

- Collect and review all the data (inventory, drawings, flow sheets...) before starting to plan
- Develop a comprehensive work breakdown structure covering the whole decommissioning process
- Account for licensing, authorization, training, preparation, performance, cleaning of working area and contingency
- Clearly identify links between activities, deliverables and milestones
Key lessons in Management

• Be aware that decommissioning is performing non-repetitive activities in a permanently changing environment
• Be aware that with the progress in decommissioning the radiological risk is decreasing while the industrial risk is raising
• Pay attention to the consignation (i.e. de-energizing) of facility supplies
Key lessons in Management

• Monitor your project to take on due time corrective measures or simply, to improve the performances
• Don’t underestimate the benefit of visiting the working area
• Be prepared to manage unexpected events
• Foresee back-up activities
Key lessons in Management

• Clearly define the role of each staff member
• Don’t forget that the operator (licensee) can delegate tasks to contractors, but retains overall responsibility!
• Recognize the necessity of appropriate levels of contractor control, supervision and training
• Pay attention to the terms of reference and the type of contracts [fixed price, target cost plus incentive fee, cost (time and material, labor hour type, cost reimbursement type)]
• Cannot overemphasize the need to communicate with all involved parties in the decommissioning (see further)
Key lessons in Management

- Select decommissioning technologies based on a cost/benefit analysis accounting for all the expenses (i.e. labour, investment, purchases, secondary waste, contingency) and the dose during the whole process (i.e. pre-operating phase, operating phase, post-operating phase)
- Don’t reinvent the wheel
- Don’t believe manufacturers
- Don’t foreclose on techniques at the tendering stage
- Take benefit of the return of experience of other similar decommissioning projects
Key lessons in Management

• Be ready to face changes of:
  ➢ the reference decommissioning strategy;
  ➢ the future destination of the site.

• Be ready to face the evolution of:
  ➢ the legal framework;
  ➢ the financing of the decommissioning project;
  ➢ the waste tariff.
Key lessons in Waste management

• Prior to final facility shutdown, minimize the volumes of legacy operational radioactive waste
• Closely evaluate (cost/benefit analysis) any and all opportunities to decontaminate material for release or to recycle/reuse
• Evaluate options for large intact component one piece removal versus size reduction
Key lessons in Waste management

- Entrust enough workforce to fully characterize your material streams to the satisfaction of the Regulatory Body and Radioactive Waste Management Agency
- Pay attention to measures facilitating timely storage/disposal of your waste materials
- Maintain detailed and accurate records on the contents of your waste packages
Key lessons with Stakeholders

- Cannot overemphasize the need to communicate with all involved parties in the decommissioning
- Main fields of interests are for:
  - Regulators
    - Protection of workers, public and environment
    - Other Safety Issues
  - Radioactive waste Management Agency
    - Waste conformity
  - Management / funding sponsors
    - Optimizing/minimizing the expenses
    - Transparency in the use of the fund
  - Workers
    - Employment, specially in transition phases (at the end of the operation and at the end of decommissioning)
    - Radioprotection
Key lessons with Stakeholders

- Main fields of interests are at:
  - Municipality level
    - Protection of public and environment
    - Topics impacting the local economy and finances (e.g. Decommissioning strategy and the future of the site)
  - Regional level
    - Protection of public and environment
    - Topics impacting the regional economy and finances
  - National level
    - Protection of public and environment
    - Topics impacting the national economy and finances
Sources of Lessons Learned

- Experienced technical and management staff members that have performed decommissioning of nuclear facilities – regulators, operators and contractors

- Often lessons learned are detailed in project final reports and in some instances specific reports on lessons learned

- Site visits to units or facilities in decommissioning is another useful way to learn what others have done in similar situations (beware: don’t believe everything vendors say !)
Sources of Lessons Learned

- Dedicate resources to track projects as they are happening
- In addition, there are some sources of lessons learned available on the Internet
- Important: do not re-invent the wheel!
Conclusions

- Technology, organization and management are essential in a successful decommissioning project.
- Human, technical and financial resources should be planned for in good time prior to decommissioning.
- Experience is available on different technological, organization and management techniques that would match MSs conditions and objectives.
References

• “Radiological Characterization of Shutdown Nuclear Reactors for Decommissioning Purposes”, IAEA TRS # 389, 1998
• “State-of-the-Art Technology for Decontamination and Dismantling of Nuclear Facilities”, IAEA TRS # 395, 1999
• “Organization and Management for the Decommissioning of Large Nuclear Facilities”, IAEA TRS # 399, 2000
• “Operation-to-Decommissioning Transition”, IAEA TRS # 420, 2004