International Atomic Energy Agency

Key Concepts for Implementing Decommissioning

Lawrence E. Boing

$R^2 D^2$ Project Workshop
December 3-7, 2007
Manila, The Philippines

Lessons Learned Sources

- Sources of material for this lecture are lessons learned from various segments of the nuclear decommissioning industry including:
  - My own personal decommissioning project experience
  - Other subject matter experts in the industry
  - Other decommissioning project experiences – NPP, research facilities, government operated and private operated
  - International organizations – IAEA, EC and others
  - Other specialty support staff experience – licensing, health physics, waste management, public relations

The Top 10

1. Information Exchange / Regulatory Interactions
2. Communications
3. Site/Facility History
4. Waste Management
5. Hazards Assessment / Safety Assessment
6. Planning/Cost Estimates
7. Technologies
8. Final Surveys / End State
9. Management / Organization
10. Teamwork

Action #1 – Information Exchange / Regulatory Interactions

- Knowledge - know what other decommissioning projects are completed and underway – learn from their experiences and share with this technical community as well
- Attend a good technical conference on the topic – you will be amazed at what you learn - gather 'easy picking, low hanging fruit'
- Regulations and guidance can be complex - strive for some regulatory flexibility - decommissioning is a dynamic process
  - Example - DOE-Rocky Flats Site cleanup
- Have well defined project scope and mutually agreed to clean-up / end-points criteria – understand the dose-based and risk-based standards concept – include stakeholders input

Action #2 - Communications

- **Communicate with the employees and community – describe the path forward**
  - Typically less staff is needed to decommission than to operate and typically using a more streamlined structure – this means there could be a loss of quality employment opportunities
- **Know your regulators and stakeholders and communicate with them on a regular basis – no surprises**
  - "… a township commissioner, said (the licensee) did a good job because it had been up-front with the community and early on held public meetings. "

Action #3 – Site and Facility History

- **Spend an adequate amount of time on a historical site assessment in sufficient level of detail to really understand the history of the site and facility**
- **Perform an adequate amount of characterization activity to fully support becoming very familiar with the site and facility**
- **Records 'gathering' should be started early in the planning cycle (actually on-going continuously) for decommissioning**

Action #4 – Waste Management

- Know your waste streams including their characteristics, composition, disposition paths, packaging requirements, clearance options, do your homework including cost-benefit analyses
  - DOE-Mound Site – double the anticipated amount of contaminated soils – increased cost & delayed completion
- If you don't know your waste streams well, someone else will
- Remember - you are hostage to the waste disposal site – typically this aspect of decommissioning is one of the more costly and more challenging parts

Action #5 – Hazards Assessment / Safety Assessment

- Assess the hazards your project poses to
  - The workers
  - The environment
  - The public
- Understand how you can eliminate them or control them effectively

Action #6 – Planning/Cost Estimates

- Fail to plan and plan to fail !!
  - Start the planning process early and involve all parties early in the planning process
  - Organize a dedicated project team with the proper resources
  - Expect to spend your contingency funds
- Develop realistic future land-use scenarios in order to understand the risk posed by the site after completion; long term stewardship issues/responsibilities also need to be understood
- Use a well qualified, proven cost estimating organization to perform a proper detailed cost estimate for your project – get it right he first time
- Proper and prompt operations deactivation assigns liabilities to the correct cost centers and eliminates surprises for the decommissioning team

Action #7 - Technologies

- Technologies for decommissioning are typically readily available 'off-the-shelf' to fully support the work activities
- Carefully analyze the costs/benefits of using the different technologies
- However, stay current on new and evolving technologies just in case a major breakthrough does occur – don't be the first site to use an unproven technology

Action #8 – Final Surveys / End State

- Final survey planning must start before the project field activities are even close to starting – plan, collect, analyze, document and report
- Have well defined project scope and mutually agreed to clean-up / end-points criteria
- This is the regulators last chance to hold the licensee accountable if unrestricted release and license termination is planned (just when you thought the hard part of the work was over)

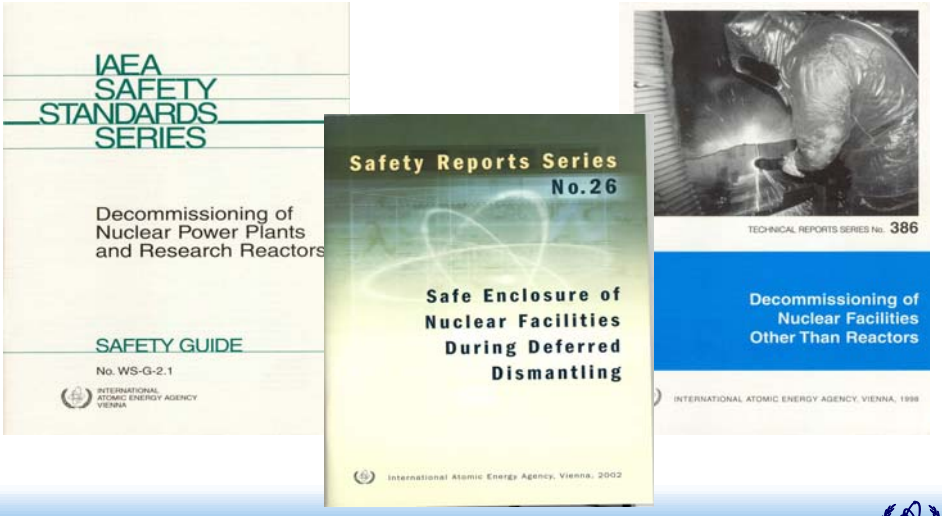
Action #9 – Management / Organization

- Keep your 'decommissioning life' simple to the greatest extent possible - within certain reasonable limits – approach, organization, technologies, etc
- Assemble a well qualified and skilled team for the job – 'on the job' training can be 'slow' – and expensive
- Use proven, well qualified, independent specialists in the decommissioning area with prior project experience – look at recent or current players in the D&D industry

Action #10 – Teamwork

- Learn how to work well together as a team - do your job well and others will take notice
- Invest in the project team and give them the tools to do their job well – one shot at getting it right
- Share lessons learned openly to help future projects to build upon your work and be successful

References - IAEA



IAEA TRS Reports

II–1.6. System modifications (as-built drawings): ETRR-1 research reactor, Egypt

Problem encountered

The Egyptian research reactor (ETRR-1) was commissioned in 1960. At the beginning of 1990 a modification plan for upgrading the instrumentation and control system was developed. The very experienced facility shift supervisor died during the installation of the new control system for the primary cooling pumps and the only copy of the original drawings of the dismantled system was lost.

Solution found

The reactor operating organization painstakingly traced and produced a series of as-built drawings of the existing components, cables, connections, etc., which subsequently needed to be thoroughly checked. While this caused a major delay to the modification programme, the new installation subsequently worked perfectly.

Lessons learned

Documentation and original drawings of all reactor systems are very important and valuable, and must be available before implementation of any decommissioning or modification activity. Copies of these drawings must be available in more than one place. Also, information exchange with suitably qualified and experienced persons is important to make the correct judgment about dismantled components or systems.

II–1.5. New route for high activity waste: MELUSINE and SILOE reactors, France

Problem encountered

The MELUSINE research reactor had not been in use since 1993 and had some residual HLW in its pool. When the decommissioning programme restarted in 2000, the reactor's hot cell (the normal route for HLW) was not usable due to a lack of maintenance. The cost of its refurbishment was estimated at € 1 million, and the engineering planning would take two years.

The SILOE research reactor and its hot cell, located on the same site, had been shut down since 1997 and therefore were not allowed to receive any waste from the outside.

Solution found

The waste from the MELUSINE pool was transferred to the SILOE research reactor's pool. To do this the operator requested authorization from the safety authorities to transfer external waste into the SILOE pool and hot cell and then transferred HLW from MELUSINE to SILOE in order to use its hot cell for waste conditioning.

Lessons learned

The decommissioning plan of a facility should be developed in the context of an overall (integrated) programme for the nuclear site. The safety authorities should be informed as soon as possible and authorizations should be obtained for the integrated programme.