The Importance of Experience Based Decommissioning Planning

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Agenda

• Introduction and overview
• The Decommissioning Steps
• Experience based Decommissioning Planning
• Conclusions
The Decommissioning Planning process

Define
- Program set-up
- Boundary conditions
- End state preferences

Develop Strategies

Generate Plans

Planning for Implementation

Implement the Program
Decommissioning overview

I. Initial Planning
- Detailed planning & Licensing support
- Fuel Leakage Detection

II. Defueling
- Planning studies
- Decontamination systems

III. Inventory & Characterization
- Inventory calculations
- Chemical decontamination

IV. Decontamination
- On-site dismantling
- Segmentation

V. Dismantling
- Decontamination systems
- Waste treatment systems

VI. Waste Management
- Waste transportation
- Waste processing

VII. Clearance and Demolition
- Waste acceptance
- Material flow optimization

VIII. Site Clearance
- Survey measurements
- Characterization
- Clearance measurements

PARTNERSHIP FOR DECOMMISSIONING & DISMANTLING | 4
Decommissioning success factors

- Defined end-state criteria
- Early decision on self performance or contracting
- Clear and well communicated objectives
- Staff management (transition, replacement and redundancy)
- Active knowledge management
- Focus on structure and logistics, do things in the right order
- Effective and robust waste management processes
- Good relations to stakeholders
Decommissioning is interface management

Participation in 250 decommissioning projects the last 10 years
The Decommissioning Steps

I – Initial planning

• Decommissioning strategy
• Dismantling and Waste Management Strategies including disposition routes
• Licensing documentation
• Material flow optimization
• Detailed planning

II – Defueling

• Fuel leakage detection
• Management of intact and failed fuel
Decommissioning Steps

III – Inventory and characterisation

- Inventory assessment – theoretical calculations verified by in-situ measurements
- Radiological characterisation of systems, installations, structures and site
- Waste and material categorisation based on risk for contamination
- Building and site categorisation based on risk for contamination
Decommissioning Steps

IV – Decontamination

• Selection of decontamination techniques
• Chemical decontamination of systems and components
• Mechanical decontamination of materials and structures

V – Dismantling

• Segmentation of internals and reactor pressure vessel
• Dismantling of systems and installations in a waste led process
VI – Waste management

• Development of a Waste Management Plan implementing the Waste Management Strategy

• Establish the required in-situ Waste Treatment and Material Clearance Systems

• Implement waste transportation and off-site treatment routes

• Implement waste conditioning for disposal in accordance with WMP

• Implement the waste documentation systems
Decommissioning Steps

VII – Clearance and demolition of structures
• Characterisation and categorisation of structures upon completion of dismantling
• Decontamination and demolition of contaminated structures, as necessary
• Clearance measurements and documentation
• Demolition of remaining structures after clearance

VIII – Site clearance
• Site characterisation (surface/sub-surface)
• Site remediation
• Site clearance
Planning for Implementation

- Develop Strategies, Plans, and detailed planning
- Characterize according to defined DQO
- Apply decontamination measures
- Plan dismantling procedures
- Select and optimize waste management and clearance
- Define preferred End-State and requirements

I Initial Planning
II Defueling
III Inventory & Characterization
IV Decontamination
V Dismantling
VI Waste Management
VII Demolition
VIII Site Clearance
Planning for Implementation

Define end state and disposition routes

Key objectives:

• Clearance criteria for materials, buildings and site
• Secure disposal routes
• Evaluate costs and economical risks for different options
• Evaluate repository requirements (WAC) and availability

Do not underestimate consequences of intermediate storage – try to reach end-state as soon as possible
Planning for Implementation

Select and optimize waste management and clearance

Key objectives:

• Select the material and waste management processes to meet selected end-states

• Define and optimize the different waste streams

• Define what should/could be done inside the facility, at other locations on the site and off-site.

• Start planning for validation and acceptance of methods (statistical methods for clearance evaluation etc.)
Planning for Implementation

Plan the dismantling procedures

Key objectives:

• Safety is always No 1
• Secure robust and proven technologies
• Apply ALARA
• Focus on material and waste management.
  Do not forget the logistics
Planning for Implementation

Implement decontamination measures

Key objectives:

• ALARA (keep dose rates low)
• Transfer waste to another category (for example LLW -> VLLW)
• Open up for expanded possibilities for clearance

Watch up:

Residues from chemical decontamination from chemical decontamination can be a Waste Management challenge
Planning for Implementation

Define the Characterization and categorisation efforts required

Key activities:

• Definition of objectives in general and especially DQO
  Define plant status and perform initial categorisation

• Careful planning

• Proper implementation

• Data assessment and draw conclusions

A proper information management system should be taken into operation as early as possible
Planning for Implementation

Optimisation and finalisation

• Perform modelling to identify and mitigate potential bottle necks
  Revisit and optimise previous steps, as necessary

• Secure Quality Assurance

• Communicate to build stakeholder confidence

• Identify and secure competence and resources for the different phases. Plan for transition- and redundancy programs, recruitments and contractor support

Press the button: Ready to Go
Decommissioning planning is an iterative process
Summary and conclusions

• Decommissioning projects are complex. Planned and performed by people

• Do not underestimate the staff management in planning activities

• Experience, competence and understanding is crucial in planning

• Structure, logistics and robust processes is vital for success

• Focus planning on reaching end-state conditions as early as possible

Motivated staff building their career performs better
Thank you for your attention