

Radiological Characterization in Decommissioning of Nuclear Facilities

International Good Practice on Practical Implementation

Arne Larsson
on behalf of the Task Group

HRP/IAEA/NEA Decom. Workshop 2017 – Sarpsborg, Norway

Background

- NEA WPDD initiated in 2010 a project on *“Strategies for Radiological Characterisation in Decommissioning of Nuclear Facilities”*
- The project **(Phase I)** completed in 2013
- In 2014 a new mandate **(Phase II)** was given on *“...waste and materials end-state perspective”*

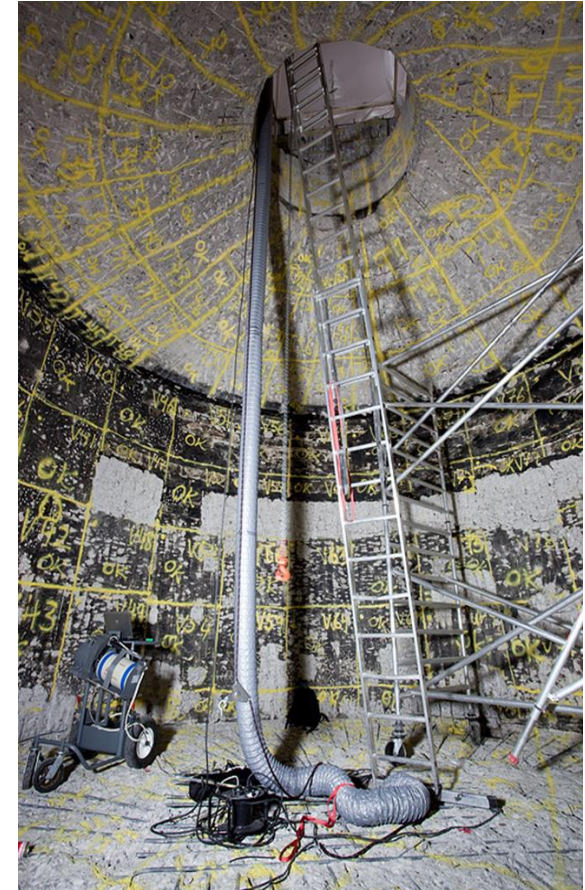


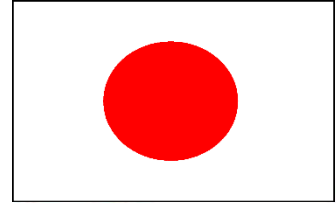
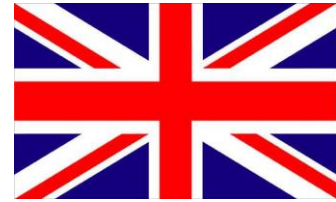
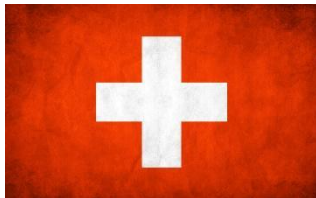
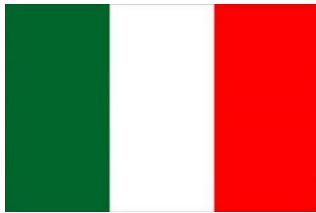
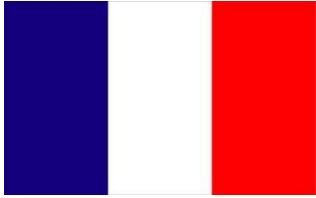
Photo: F Ekenborg, AB SVAFO

Presentation of task group

Task group composed of:

- Independent experts
- Decommissioning organisations
- Regulators
- Repository organisations
- Specialist consultants
- Utilities
- Waste Management organisations

Representatives from 11 countries



ACKNOWLEDGEMENTS

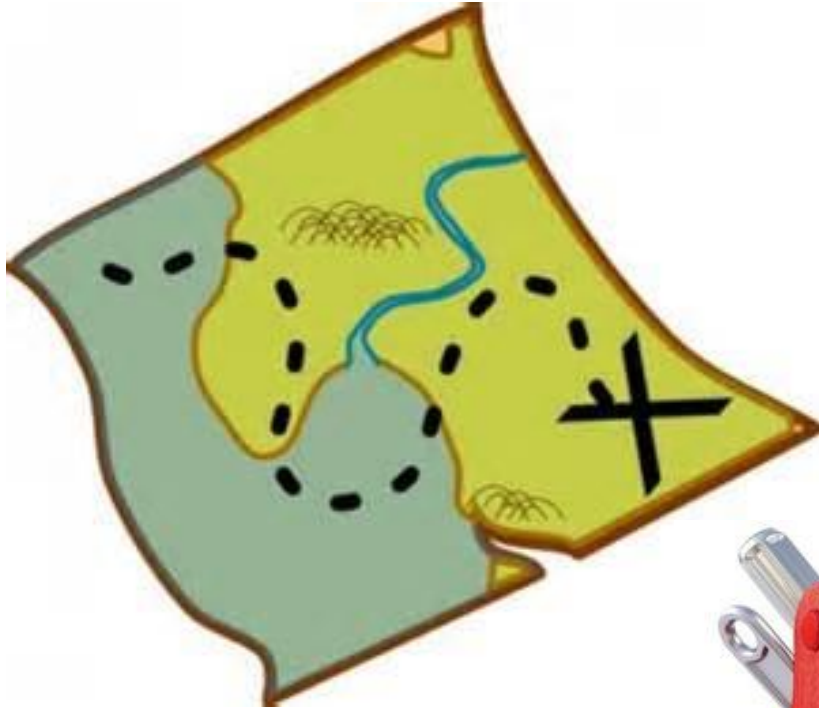
Phase II task group:

Boby Abu-Eid (USA), Massimo Altavilla (Italy), Caroline Andrieu (France), Yvon Desnoyers (France), Sue Brown (UK), Matthew Emptage (UK), Manuel Pantelias Garcés (Switzerland), Michael Knaack (Germany), Daniela Manes (Italy), Nieves Martin Palomo (Spain), Chantal Mommaert (Belgium), Marie-Delphine Salsac (France), Denis Pombet (France), Andrew Szilagyi (USA), Hiroaki Takahashi (Japan), Naeem Ul Syed (Norway), Inge Weber (OECD/NEA); Arne Larsson (Sweden, chairman)

Technical writer: Greg Black (UK)

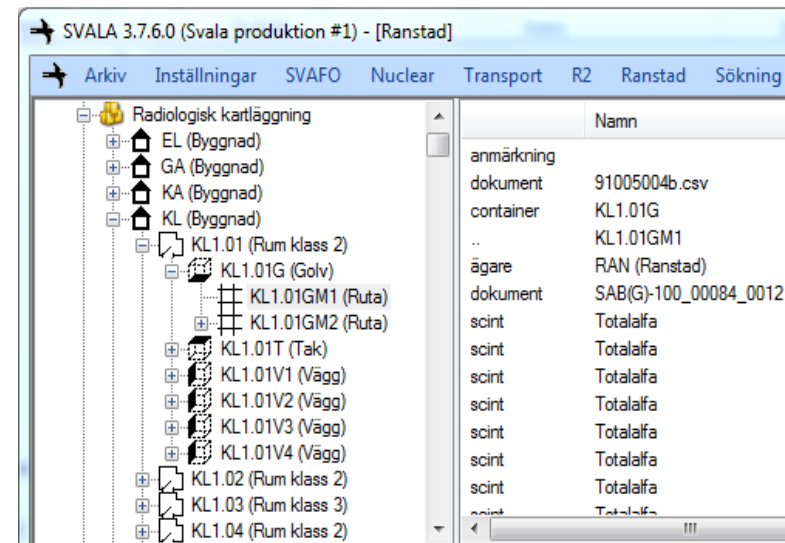
Peer reviewer: Alister Dunlop (UK)

A lot of questions

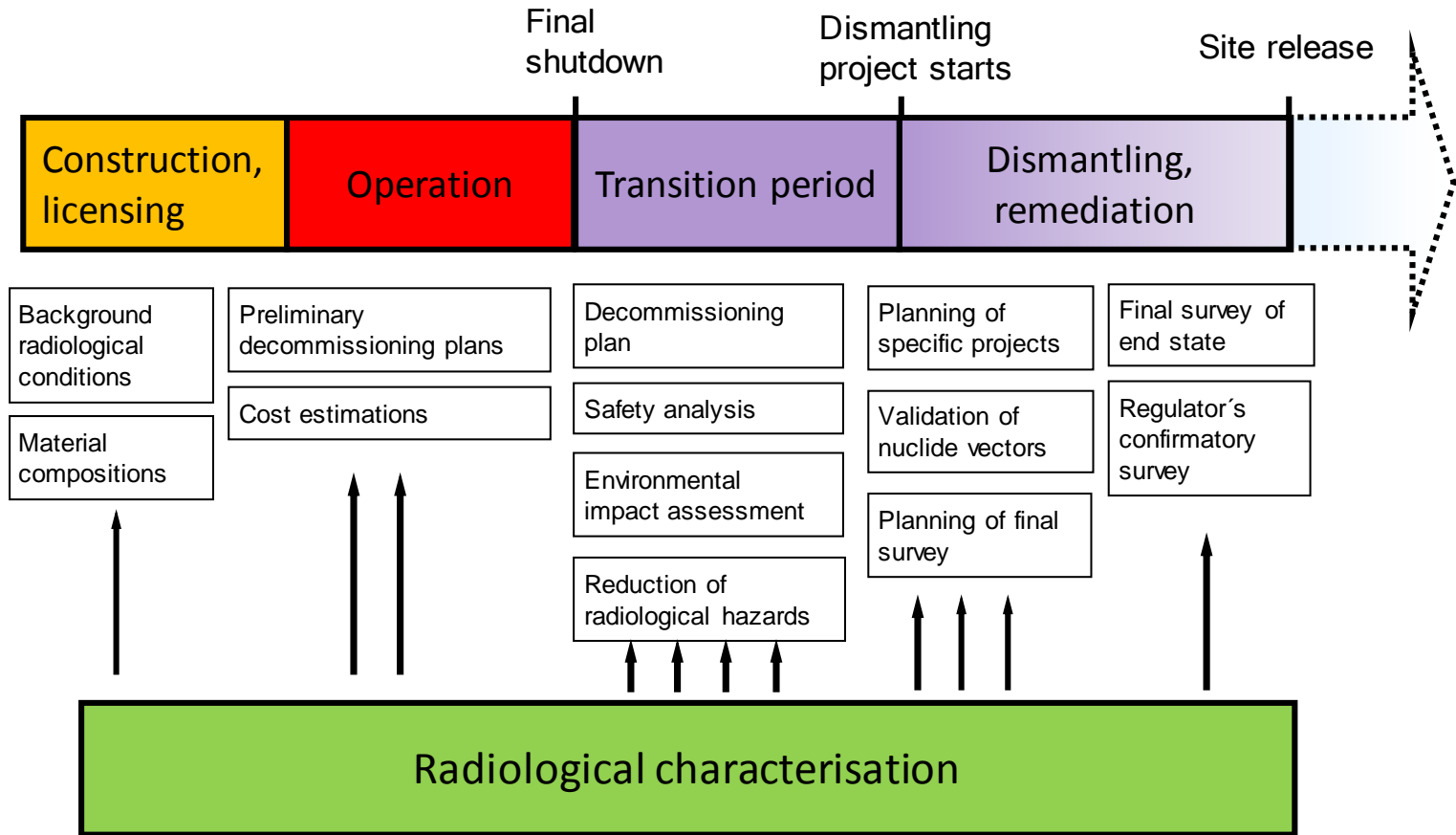


Phase I (2011-2013)

Overall strategies General characterisation issues

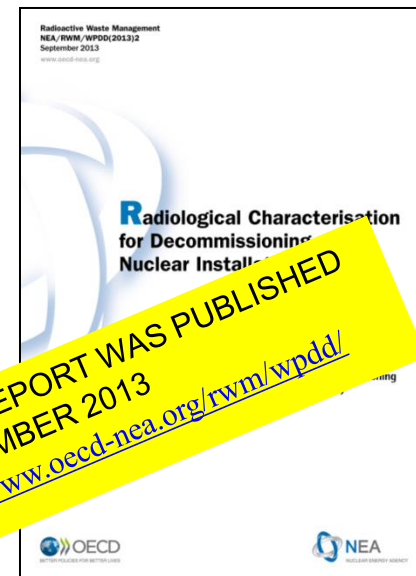


Characterisation – in a life cycle perspective



Phase I – conclusions

- Radiological characterisation is a key activity in all phases of decommissioning
- Characterisation activities to support the decommissioning should start very early
- Well defined objectives and a structured approach is essential
- Generic steps exist, relevant for all projects, independent of size, independent of the nuclear facility lifecycle phase.
- Gathering and appropriate evaluation of historical data and knowledge is crucial.
- Do not get lost in technical details when forming strategies and plans



Read the report
gives a good overview of identified Best Practice

Phase II (2014-2017)

Focus:
Characterisation
in practice.

Strategies for optimization of radiological characterization in a waste and materials end-state perspective



Phase II - Main activities

- ✓ Perform a Questionnaire to gather views on Good Practice, experiences and examples
- ✓ Arrange an international workshop (PREDEC)
- ✓ Case studies to gather experiences, well working practices and lessons learned
- ✓ Collect and analyze standards and guiding documents
- ✓ Define set of Good Practice and areas for further development
- Development of NEA WPDD status report

Questionnaire – conclusions

34+19 responses
12/11 countries

- Solid experience in radiological characterisation among regulators as well as owners
- Survey is allowing distillation of key learning/good practice
- A common view of regulators and owners/implementers on Good Practice
- Highest priorities:
 - Reducing uncertainty about waste and
 - Identification of waste classification
- Major differentiators:
 - National legislation on clearance
 - Set-up of the disposal programs
- Some areas may benefit for development of further guidance

Report available for
download

Conclusions have been internationally circulated for review. Confirmed.

Findings – PREDEC 2016

- **Characterisation is crucial** in all steps
- Early characterisation **lower costs and financial risks**
- Early characterisation mainly are to **confirm and validate**
- **High interdependency** between waste management, dismantling and characterisation
- Characterisation and categorisation performance may reduce radioactive waste for disposal with up to a **factor 10**
- **Non-radioactive characterisation** becomes more and more important
- **Quality audits** appear to focus **on the paperwork side** of characterisation rather than the practical implementation
- Example: decommissioning project **delayed 10 years** due to characterisation during dismantling instead of in advance
- Defined **needs for further improvement**

230 participants from
Asia, Europe and North America



Findings – case studies

5 types of facilities
11 countries

Initiation:

- Definition of stakeholders and contributors and their acceptance was crucial
- Decision on final destination of material/waste was considered to optimise efficiency and effectiveness of characterisation
- Introduce databases for managing plans, historical data and characterisation results

Planning:

- Review of historical information, unexpected events and characterisation activities important to develop list of radionuclides of concern and to make initial categorisation of the plant
- Assessment of historical data collection in the light of current requirement
- Involvement of retired staff in planning

Examples

Findings – case studies (cont'd)

Implementation:

- Combination of calculations, in-situ measurements and sampling
- Numerous cycles of sample collection was needed

Data assessment:

- Statistical methods was helpful to determine radioactivity distribution
- Verification of activity calculation models by sampling and analysis
- Combined materials – analysed separately and combined
- “Four eyes” principle to secure quality. QA in two steps.

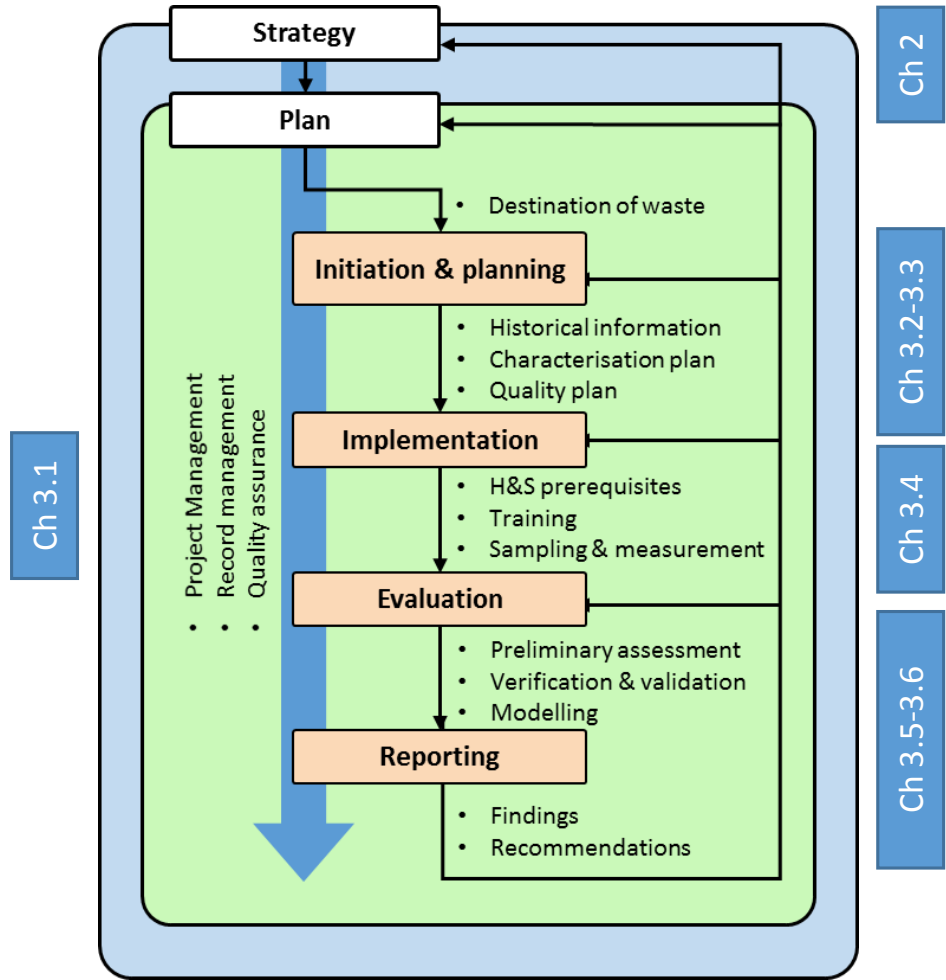
Reporting and use of results:

- Characterisation data was key input to decommissioning design, plans and actual implementation

Examples

The final report

Report expected to be published Q3-2017



The evidence base will be provided in annexes to the report

THANK YOU FOR YOUR ATTENTION !