Radiological characterisation in a waste and materials end-state perspective

International Characterisation Survey
Aiming to Understand Good Practice

Work of the Radiological Characterisation Task Group within Working Party on Decommissioning and Dismantling (WPDD)

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Content

• Survey Objectives & Design
• Response and Responder’s Experience
• National Context
• Early Survey Results and Discussion
  ➢ Initiation
  ➢ Planning
  ➢ Implementation
  ➢ Assessment
  ➢ Quality assurance
• Preliminary Conclusions & Way Forward
Survey Objectives

• Draw on wide practical experience of international experts.

• Understand characterisation good practice.

• Establish if the regulators/owners share a common view of good practice and, if not, how views diverge.

• Understand similarities/differences in national contexts and how these impact on radiological characterisation.
Survey Design

- 2 versions of the questionnaire
  - Owners
  - Regulators
- Focus on Good Practice
- Target on responses to secure a “representative” result:
  - >30 responses in total
  - Representing at >5 countries
  - >10 responses for both versions of questionnaire

Questionnaire on the Radiological Characterisation of Nuclear Facilities

*30. How should Sampling be repeated/checked to verify results? More than one alternative can be marked.
- if extreme results
- systematic process (part of sampling/measurement plan)
- random checks
- when found needed, no special process
- Other (please specify)

*31. How should Measurements be repeated/checked to verify results? More than one alternative can be marked.
- if extreme results
- systematic process (part of sampling/measurement plan)
- random checks
- when found needed, no special process
- Other (please specify)

*32. How should Analyses be repeated/checked to verify results? More than one alternative can be marked.
- if extreme results
- systematic process (part of sampling/measurement plan)
- random checks
- when found needed, no special process
- Other (please specify)
### Survey Design (continued)

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Key Issues Explored

- Lifecycle characterisation
- Regulatory requirements and industry practice
- Optimisation of data collection and management (DQO/DQA)
- Approaches for dealing with heterogeneous distributions of radioactive substances
- Development and use of scaling factors
- Quality assurance.
Response and Responder Experience

- Owner (~500years) 34 responses from 12 countries
- Regulator (~300years) 19 responses from 11 countries
- Geographical spread Asia, Europe and North America
National Context

- Preference for immediate dismantling rather than deferred
- Interim waste storage facilities available; preference disposal without delay.
- Radiological clearance wide spread international practice
- Waste repositories are planned/available for most national programmes.
- Regulation mainly through principles + guidance documents.
- Much scope to embed greater consideration of a lifecycle approach.

![Approach to Decommissioning](chart)

- Immediate dismantling: 37%
- As soon as a disposal route is open: 11%
- Deferred dismantling: 16%
- Safe enclosure: 16%
- Not decided yet: 11%
- Other: 5%
Initiation

- Develop characterisation objectives early
- Objectives in overall characterisation plan/high level strategy.

Primary Objectives
- Prior to dismantling: Support development of decommissioning/waste management plans, cost estimation and safety analyses.
- During dismantling: Environmental impact assessment, safety analyses and future waste management.
• Develop detailed & systematic characterisation plan.
• Important capabilities: Planning team, dismantling expert supported by waste management organisation.
• Important resources: Operational history; facility documentation. Also past characterisation results, radiological inventory data and interviews with operating personnel.
• Develop/maintain characterisation plan through consideration of decommissioning strategy/waste management strategy
• Internal dedicated review process essential.
• External expert review important.
• SF commonly used.
• Use SF with great care.
• Develop SF on case by case basis
• Co-60/Cs-137 main SFs, Am-241, U-235 and Pu isotopes used but less.
• Consideration of physical/chemical scaling factors should be integral part of characterisation programme.
• Reducing uncertainty about waste and identification of waste classification are generally the highest priorities for characterisation, both support securing waste route availability.
Focus effort on contaminated/highly contaminated areas.

Tailor choice of the sampling/measurement locations (at both the surface and at depth) on a case by case basis, using specific information.

Characterisation, mainly relies on: dose rate or gamma measurements; sampling & alpha, beta and gamma* analysis; and use of in-situ handheld alpha/beta measurements* and volume gamma counter*.

Systematic verification process needed to check results extreme results and on random basis.

* Reliance increases during dismantling
• Split views on use of a systematic plan for data assessment and case by case approach.
• Data evaluation (uses judgmental & probabilistic approaches) select on case by case basis.

• Graphical modelling for evaluation/presentation of results widely used/accepted.
• Impact of uncertainties greatest from sampling/measurement representativeness factor followed by heterogeneity of activity distribution.
Quality Assurance

• Develop Quality Assurance Plan early
• Most important QA measure: Develop & follow specific documented arrangements.
• Samples & records retention times vary widely across all waste categories. International guidance of benefit?
• Store records on centralized electronic system (retain duplicate records in different form).
• Use independent expert review of results/evaluation.
• ~5% duplication of in-situ measurements/analysis.
Survey Preliminary Conclusions

• Much radiological characterisation experience
• National context/legislation has significant impact on practice
• However fairly common international views on Good Practice
• Survey is allowing distillation of key learning/good practice
• Some areas may benefit for development of further guidance
Way Forward

• Survey Evaluation Final Report – March 2016
• Survey findings merged with other phase 2 work
• All findings will support TGRCD Phase 2 Final Report
Thank you for your Attention!

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