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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PREDEC 2016 - Lyon

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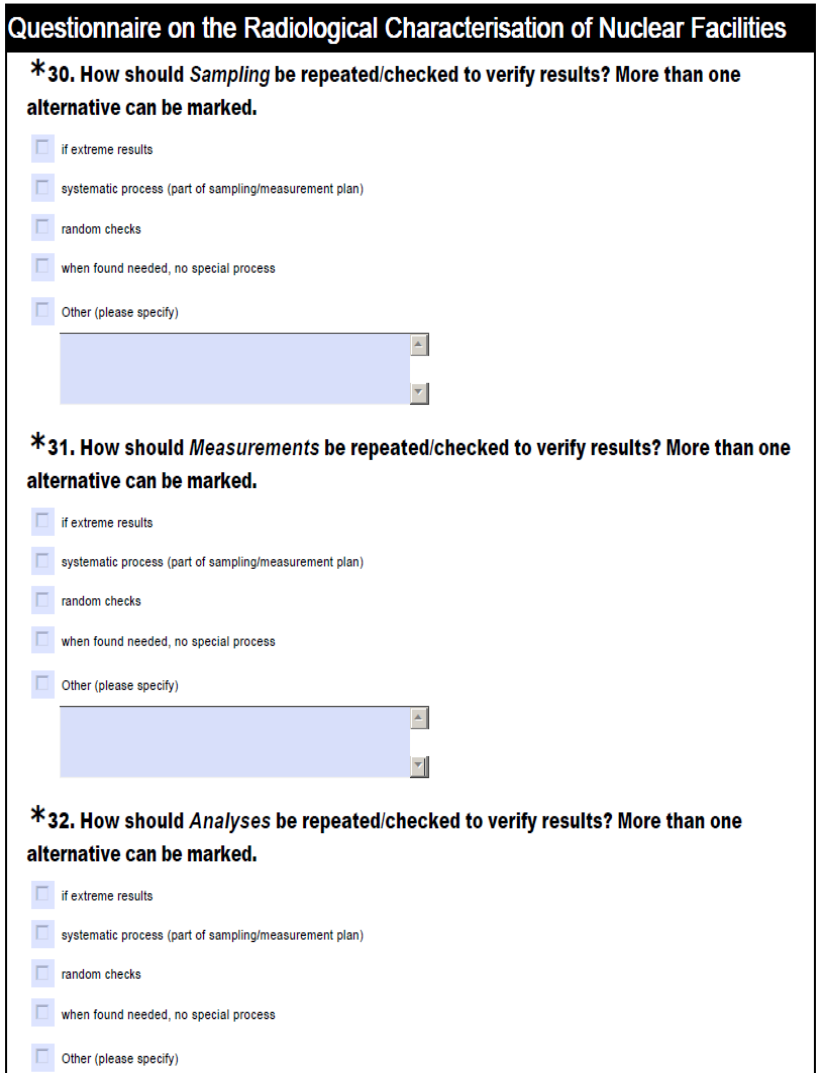
Survey Objectives

- 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.**

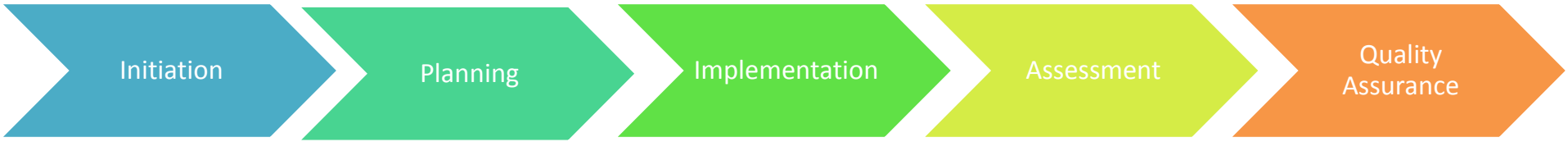
- if extreme results
- systematic process (part of sampling/measurement plan)
- random checks
- when found needed, no special process
- Other (please specify)

***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)

	Regulator	Industry
Responder role and experience	X	X
National context and overview	X	
Initiation phase	X	X
Planning phase		X
Implementation phase		X
Data assessment phase	X	X
Quality assurance	X	X

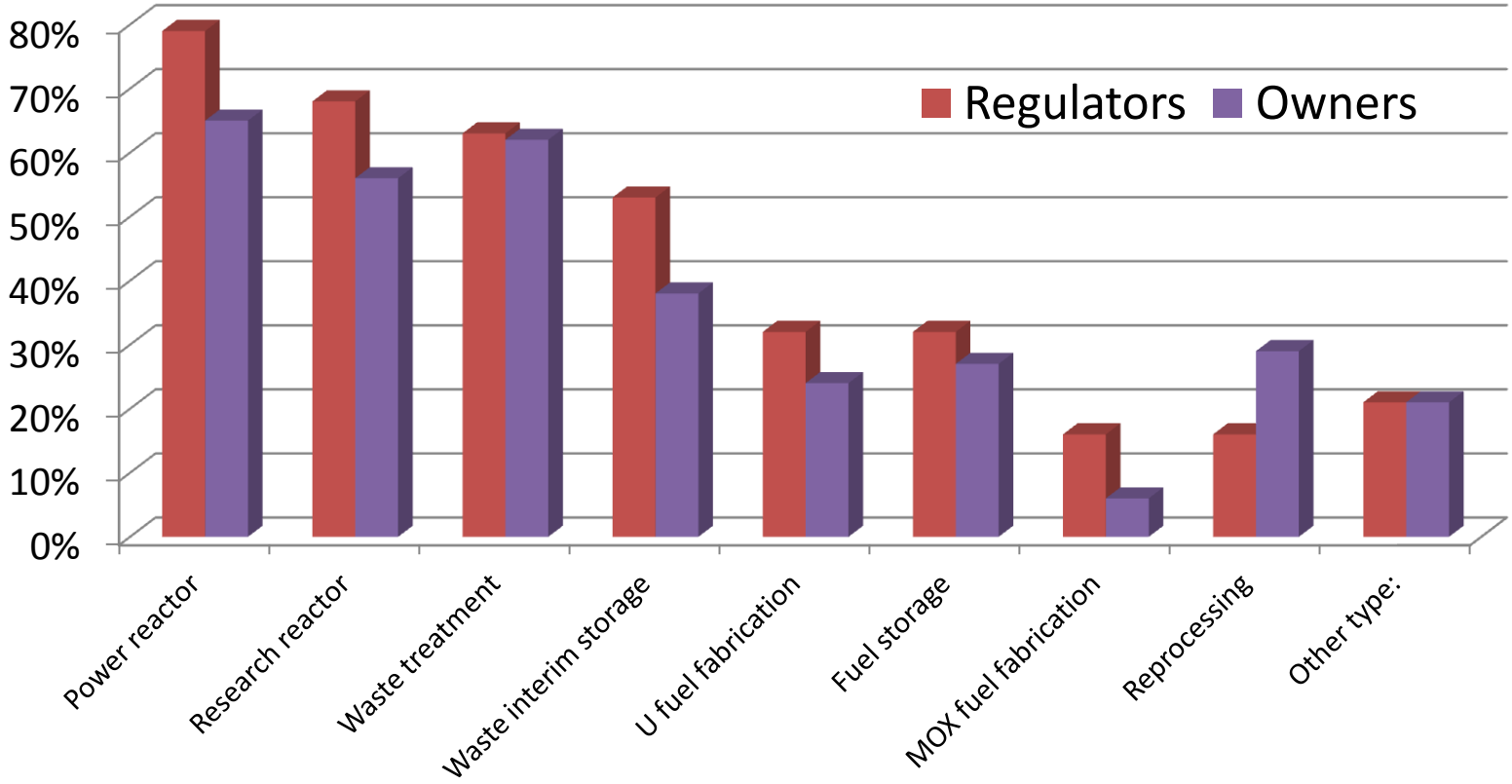


Key Issues Explored

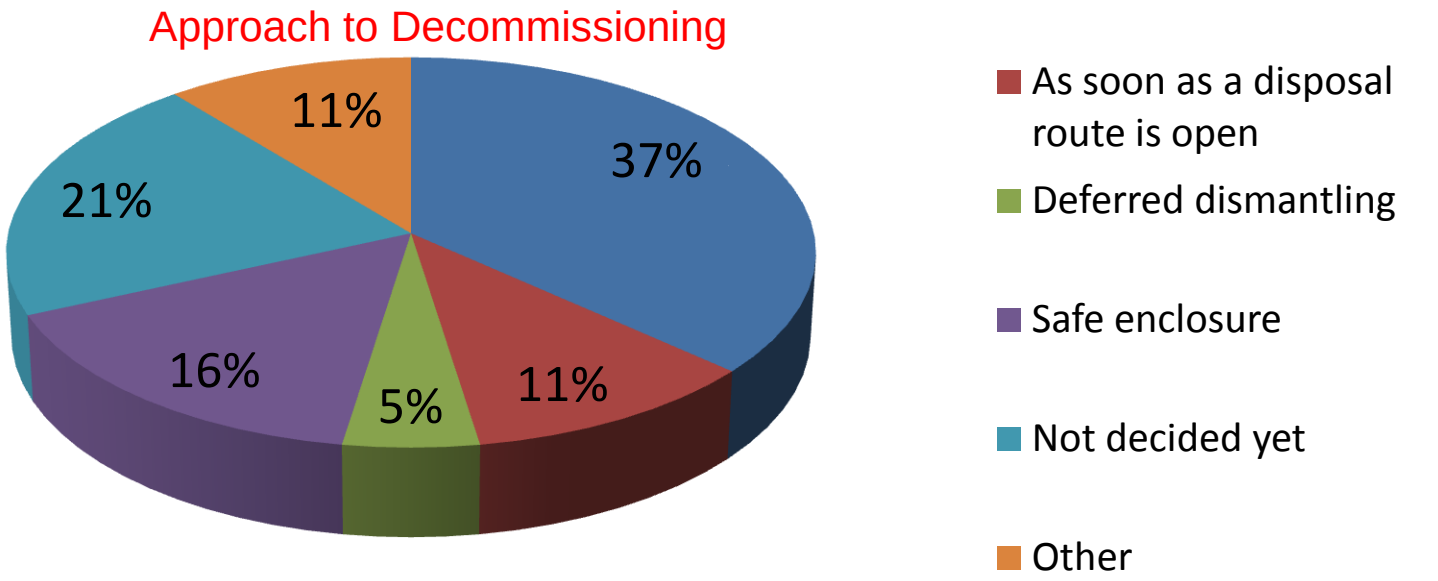
- Lifecycle characterisation
- Regulatory requirements and industry practice
- Optimisation of data collection and management (DQO/DQA)
- Approaches for dealing with heterogeneous distributions of radioactive substances
- Development and use of scaling factors
- Quality assurance.

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



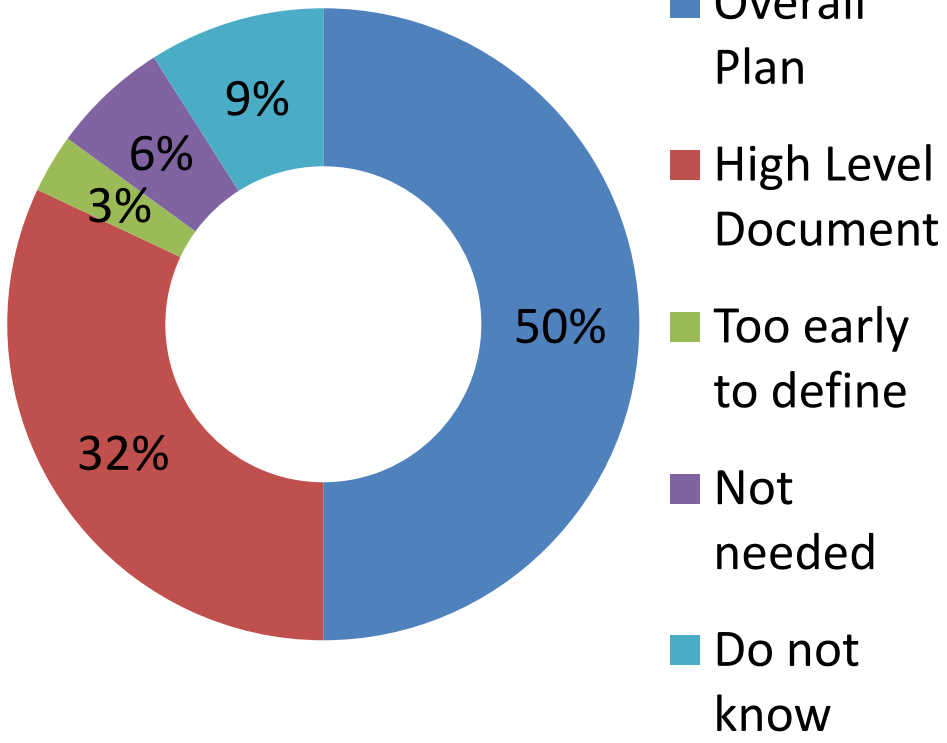
National Context



- 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.

Initiation

Defining Characterisation Objectives



- 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.

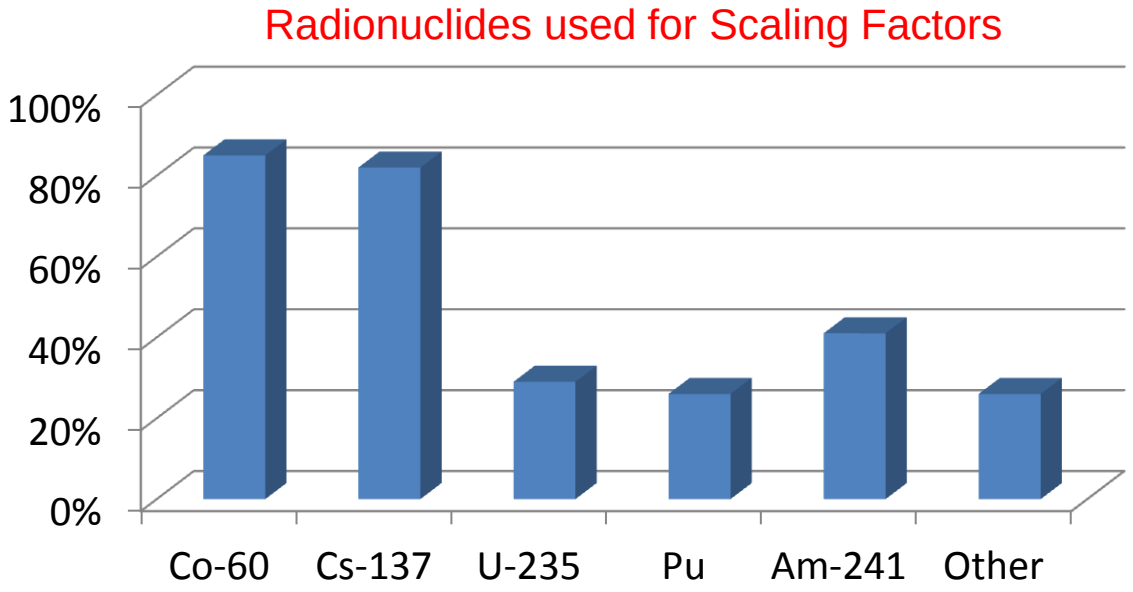
Planning

Importance of Existing Information Resources

	Prior to dismantling	During dismantling
Facility documentation	95%	64%
Operational history	96%	64%
Past Characterisation results	85%	64%
Interviews of former staff	83%	45%
Use of literature	68%	38%
Data from similar facilities	64%	34%
Radiological inventory calculations	85%	64%
Radiological impact calculations	78%	71%

- 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.

Planning



- 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.

Implementation

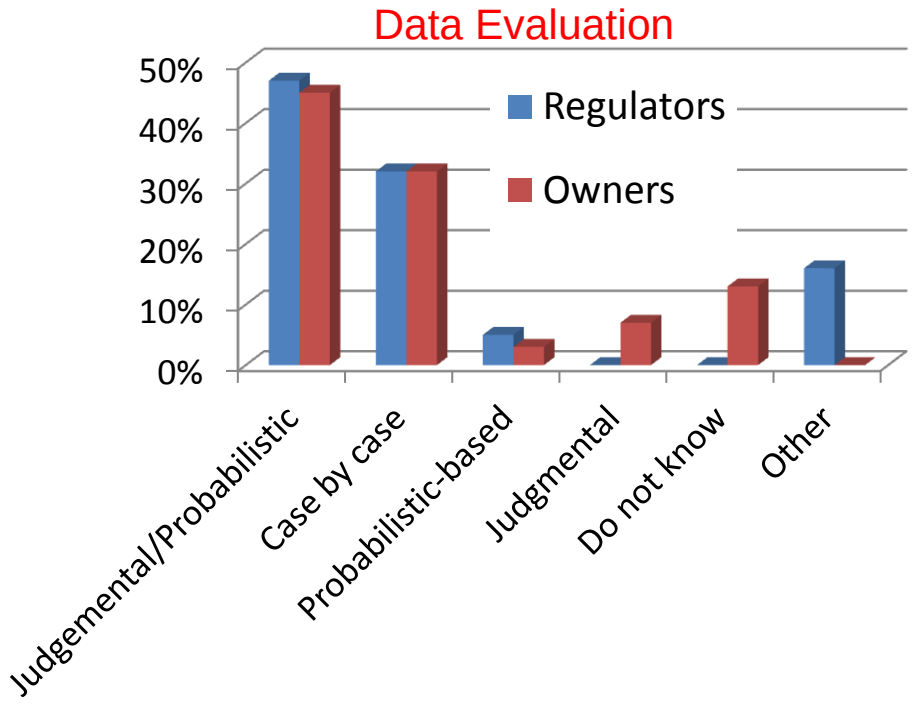
Focus of Characterisation Effort

	Prior to dismantling	During dismantling
Areas with very low risk for contamination	40%	49%
Areas with low risk for contamination	58%	62%
Areas with risk for contamination	74%	82%
Contaminated areas	83%	86%
Highly contaminated areas	83%	85%
Areas affected by neutron activation	75%	69%

- 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

Assessment

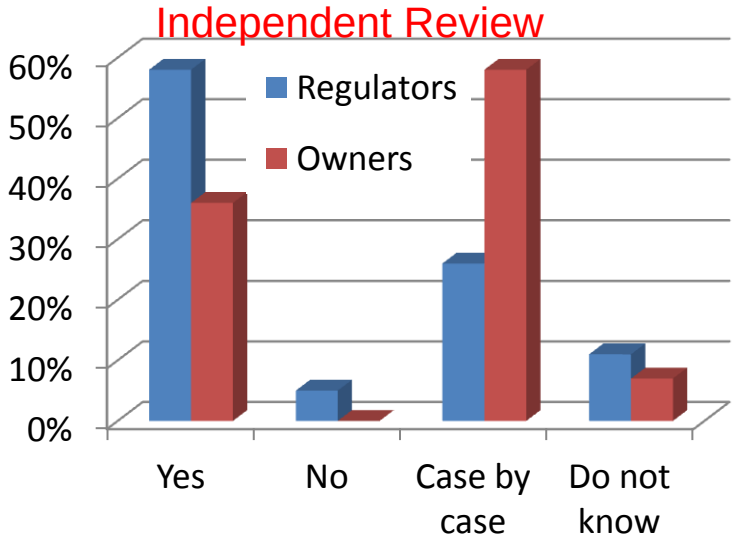


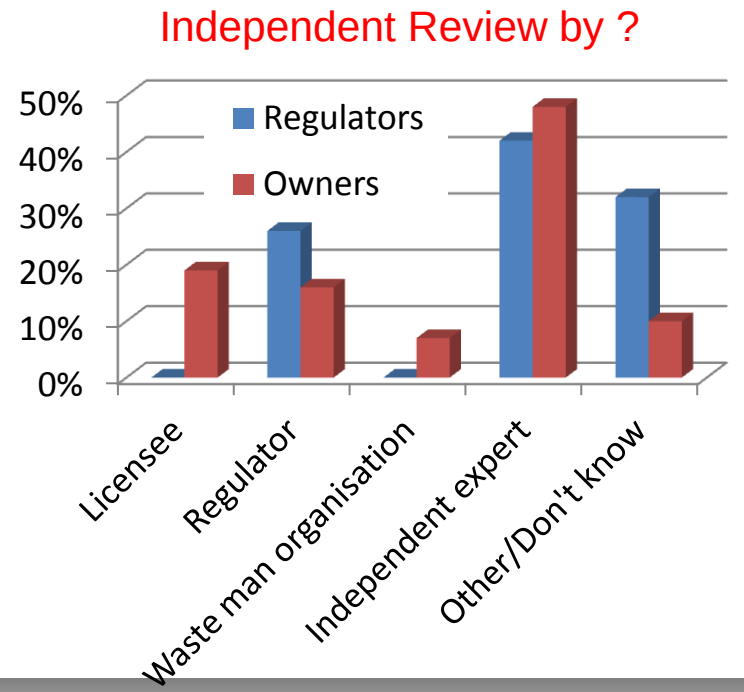
- Split views on use of a systematic plan for data assessment and case by case approach.
- Data evaluation (uses judgmental & probabilistic approaches) select on case by case basis.

- 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.



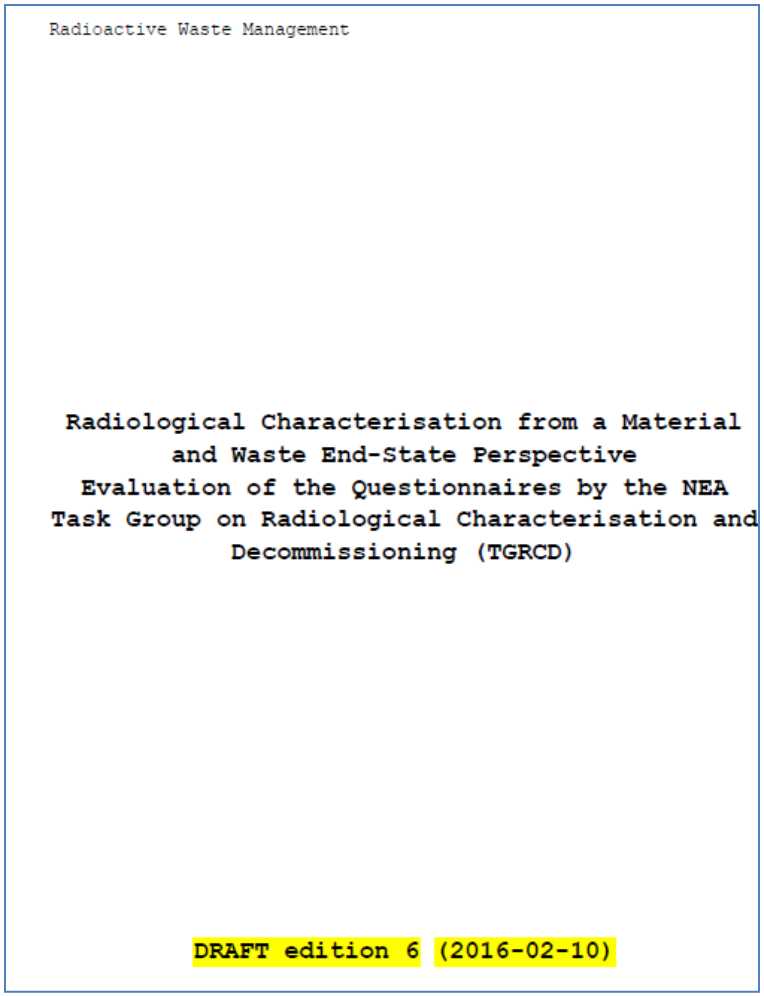


Survey Preliminary Conclusions

- 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


Radioactive Waste Management

Radiological Characterisation from a Material and Waste End-State Perspective
Evaluation of the Questionnaires by the NEA Task Group on Radiological Characterisation and Decommissioning (TGRCD)

DRAFT edition 6 (2016-02-10)

Thank you for your Attention!

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