

Development of decommissioning standards in Germany, integration at EU level

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Decommissioning and clearance

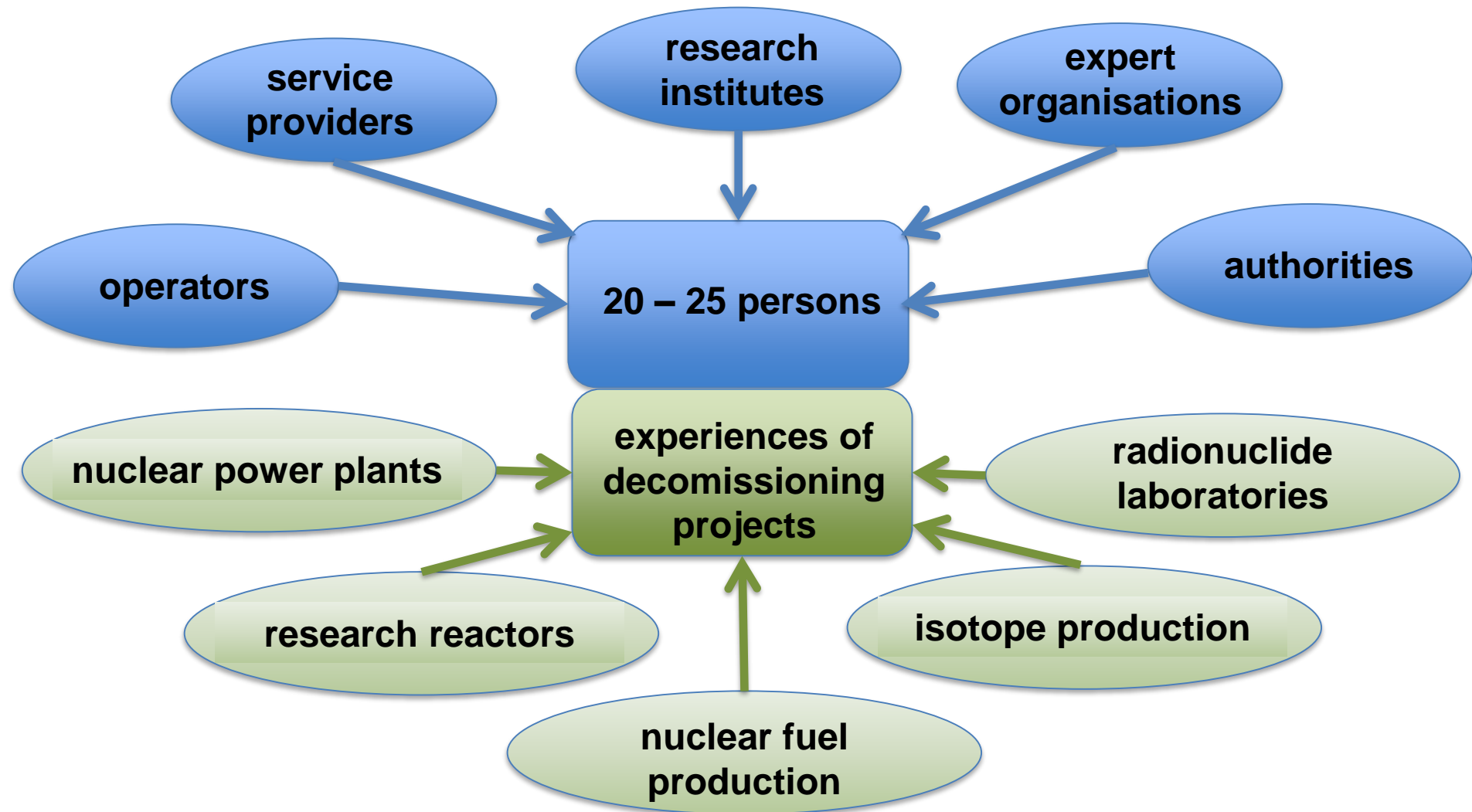
Clearance

- part of decommissioning
- material and areas may be handled as non-radioactive
 - according to a decision by the authority
 - if the effective dose is below 10 μSv per year
 - verified by measurements (specific activity and/or surface activity) or by other means (e.g. calculations)
- general procedure is regulated in the German Radiation Protection Ordinance

normally **about 95 %** of the mass of a nuclear installation may be cleared

- less radioactive waste
- recycling/reuse of materials, buildings and areas

Working group on clearance measurement standards



Activity measurement methods for the clearance of radioactive substances and nuclear facility components

- first edition 1993 - 2008
- revision 2010 - 2017
- main changes:
 - new technical developments
 - practical experiences
 - integration of ISO 11929:2010: “Determination of the characteristic limits (decision threshold, detection limit and limits of the confidence interval) for measurements of ionizing radiation – Fundamentals and application”

General approach

- **toolbox of measurement methods**
 - requirements
 - how to use the methods
 - avoid mistakes
 - advantages and disadvantages
- **how to establish measurement strategies**
 - combination of measurement methods
 - statistical approaches
- **implementation of ISO 11929**

Activity measurement methods for the clearance of radioactive substances and nuclear facility components –

Part 1: Fundamentals

- 2014-12
- ~ 120 pages (incl. 11 annexes)

Part 4: Contaminated and activated metal scrap

- 2013-04
- ~ 30 pages (incl. 5 annexes)

Part 6: Rubble and buildings

- 2015-11 (new draft 2017-09)
- ~ 50 pages (incl. 3 annexes)

Part 7: Ground surfaces and excavated soil

- 2017-08
- ~ 50 pages (incl. 4 annexes)

DIN 25457-1: Fundamentals

- **general model of measurement methods, e.g.**
 - decision threshold
 - detection limit
 - limits of confidence interval
- **application to particular activity measurement methods**
 - requirements for measurement devices
 - calibration
 - measurement procedure
 - quality assurance
- **detailed descriptions for application**

Activity measurement methods

- surface total-activity measurement
- spectrometric measurements
 - gamma spectrometry of samples
 - in-situ gamma spectrometry
 - alpha spectrometry of samples
- total gamma activity measurement



DIN 25457-4, -6 and -7: Application to particular situations

Part 4: Metal scrap

Part 6: Rubble and buildings

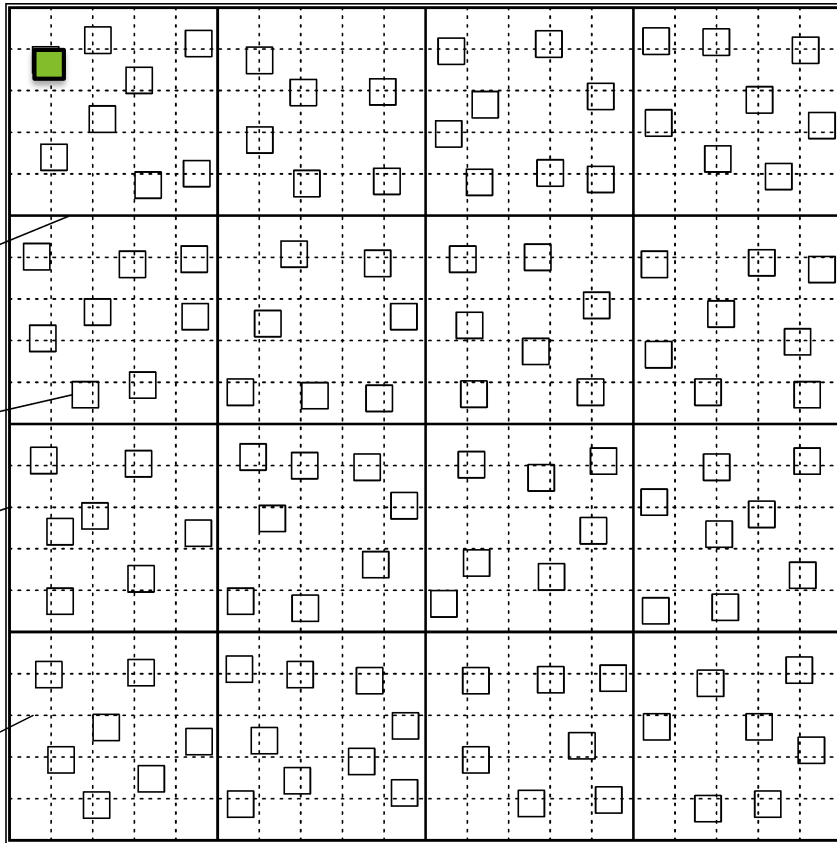
Part 7: Ground surfaces and excavated soil

General content

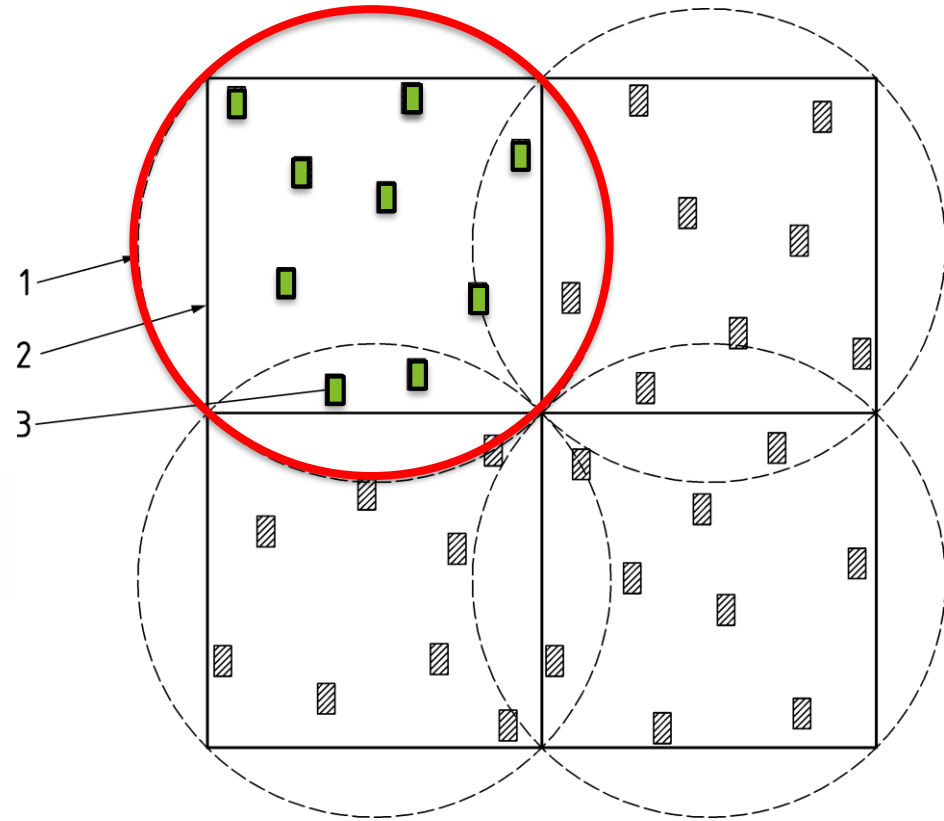
- clearance strategy
- preliminary examination (e.g. scaling factors, nuclide vectors)
- methods of decision measurement
- clearance procedures
 - total area covering methods of decision measurement
 - non area covering methods with statistical evaluation of results
 - combination of both methods
- documentation

DIN 25457-4, -6 and -7: Application to particular situations

Examples



non area covering method with statistical evaluation of results



combination of
total area covering methods (→ average)
non area covering methods (→ variation)

Plans

- **launch the standard series as a new work item proposal in ISO or CEN**
 - English translations
 - parts 1, 4 and 6: ready, will be published in 2018
 - part 7: planned for 2018
 - funding is still open
- **next revision after new edition of ISO 11929 (2018/19?)**

Summary

- **Orientation and assistance for clearance process and measurement methods**
 - as a toolbox
 - not as a cookbook or instruction
- **Application and simplification of ISO 11929 for clearance measurements**
- **Fundamentals of measurement methods**
- **Application to**
 - metal scrap
 - rubble and buildings
 - ground areas and excavated soil
- **May be a German contribution to international guides or standards on clearance procedures and decision measurements**

Thank you for your attention!

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