Fundamental Consideration on Reference Levels in Radiological Protection for Implementation of Practical Off-site Remediation

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CRIEPI
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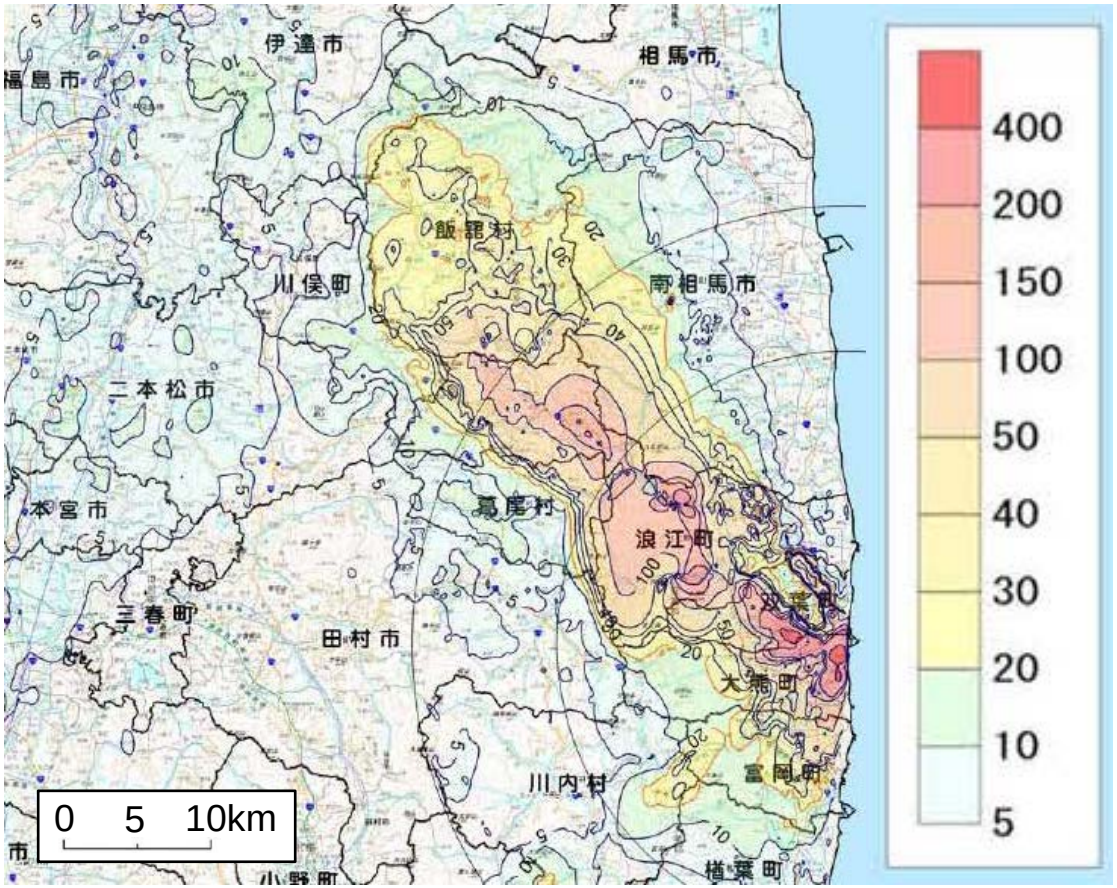
Background



Annual dose [mSv/y]
(12 March 2011 – 11 March 2012)

http://radioactivity.mext.go.jp/en/contents/5000/4171/24/1750_1108_set.pdf

Appropriate RP guidelines should be applied to the remediation activities in existing exposure situations :

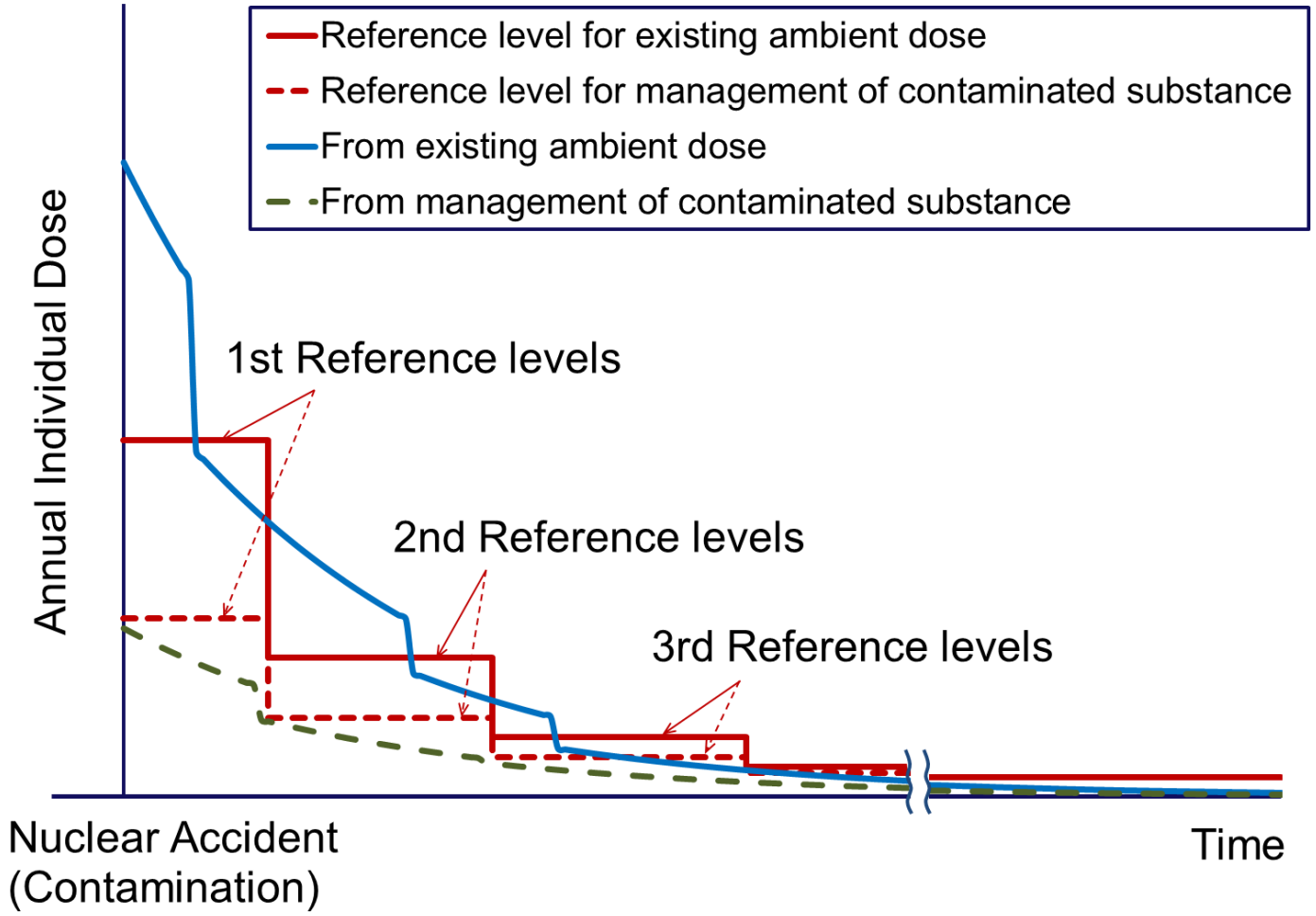
- Decontamination
- Management of contaminated substances

Framework of RP for Remediation in Existing Exposure Situations

- Reference level (ICRP Pub. 103 & 111)
  - Source-related restriction to individual dose
  - Selected in 1-20 mSv/y dose band

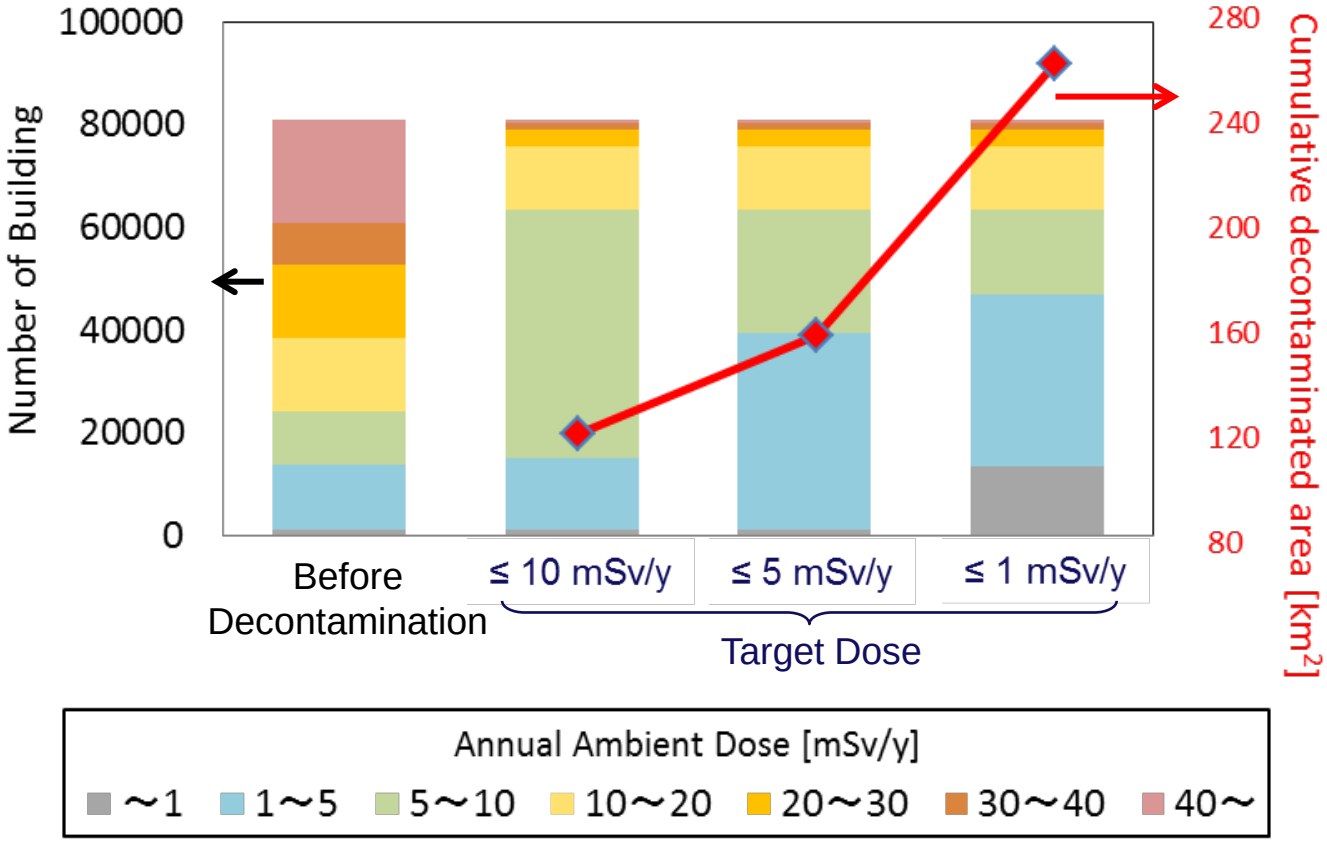
- ✓ **Intermediate reference levels should be selected progressively**
- ✓ Potential exposure from management of contaminated substances is:
  - Justified when the individual dose reduced
  - Optimised taking the averted existing ambient dose into account

Adoption of Intermediate Reference Levels



Daisuke Sugiyama and Takatoshi Hattori, Radiological Protection from Radioactive Waste Management in Existing Exposure Situations Resulting from a Nuclear Accident, Radiation Protection Dosimetry, 153, 64-73 (2013). Available at http://rpd.oxfordjournals.org/content/153/1/74.full.pdf+html.

Preliminary Estimation of Decontamination



Ambient dose is assumed to be reduced;

- by 60% (according to decontamination of circle area of 20 m around buildings)
- by 70% (50 m)
- by 80% (100 m)

Ex. Decontamination in (former) Restricted Zone and Planned Evacuation Zone

- Intermediate reference levels should be selected progressively.

Decontamination Policy for Special Decontamination Area

Policy in FY 2012 and 2013

Decontamination should be implemented taking into account the level of air dose rate.

- **Area less than 20 mSv/year** : Aiming for reducing additional exposure dose less than 1mSv/year as long-term goal.
- **Area from 20~50 mSv/year** : Aiming for reducing exposure dose in residential and farmland area less than 20 mSv/year by the end of FY 2013.
- **Area more than 50 mSv/year** : Demonstration projects will be implemented. Lessons learnt will be reflected Into future decontamination policy.

Policy after FY 2014

Aiming for reducing additional exposure dose less than 1mSv/y as long-term goal
Check and evaluate two-year decontamination results, consider proper actions, and revise implementation plans as needed.

http://josen.env.go.jp/en/

- Proposed framework is harmonised with the current policy.
- ✓ Intermediate target values can be selected stepwisely according to the progress of remediation process.

Current Guideline for Contaminated Substances (Ministry of the Environment)

- Appropriate target values could be selected according to the proposed framework.
  - ✓ '1 mSv/y' can be regarded as the lower bound of the band of reference level, 1-20 mSv/y, in existing exposure situations.

Radioactivity of Cs-134 and Cs-137

- Interim Storage (< ~ 30 years)
- Isolated Landfill Disposal

100,000 Bq/kg : 1 mSv/y for Public (Operation)
10 μSv/y for Public (Post-closure)

- Temporary Storage
- Controlled Landfill Disposal

8,000 Bq/kg : 1 mSv/y for Worker (Operation)

(Disposed as Generic Wastes)

http://www.env.go.jp/jishin/rmp/attach/roadmap111029_a-6.pdf

Concluding remarks

- Intermediate reference levels should be selected gradually to make the remediation activities reasonably practical, according to the progress of the reduction in the existing annual ambient dose in the environment to or below the order of 1 mSv/y that corresponds to the natural background level.

- Remediation plans and activities can be more reasonable when actual effective dose to individual is evaluated and is fed back into the radiation protection strategy.