Dose Constraints
and other Policy and Practical Issues in Occupational Radiation Protection

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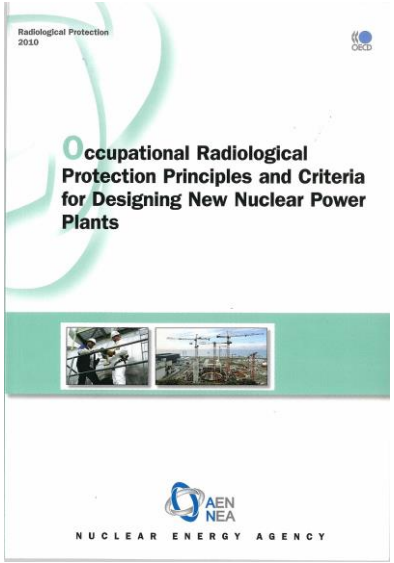
EGOE – Expert Group on Occupational Exposure

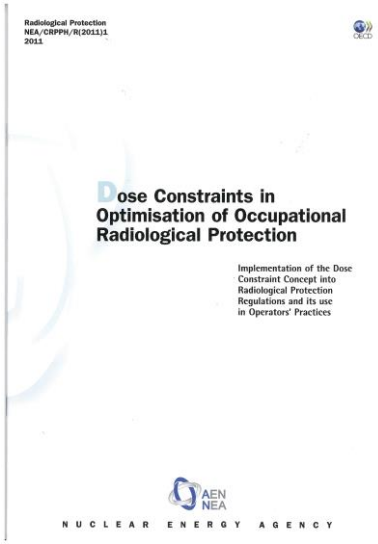
- **Established**: by the Committee on Radiation Protection and Public Health (CRPPH) of OECD/NEA in 2006

- **Scope**: to broadly identify and scope out issues in policy and strategic areas of Occupational Radiation Protection (ORP) in OECD/NEA countries with focus on the nuclear power sector

- **Members**: approx. 30 experts from NEA countries plus observers from International Organizations (IAEA, EC, HERCA, etc.) and consultants.

Case studies of EGOE





1. Occupational Radiation Protection Principles and Criteria for Designing New Nuclear Power Plants *(published 2010)*

2. Dose Constraints in Occupational Radiation Protection *(published 2011)*

3. Policy and Practical Issues in Occupational Radiation Protection – Management of Total Risk – Cross-boundary Outside workers *(working title - under preparation)*

Dose Constraints in ICRP Publ. 103

Purpose

- *… **to limit the inequity** that is likely to result from inherent economic and societal judgements.“*

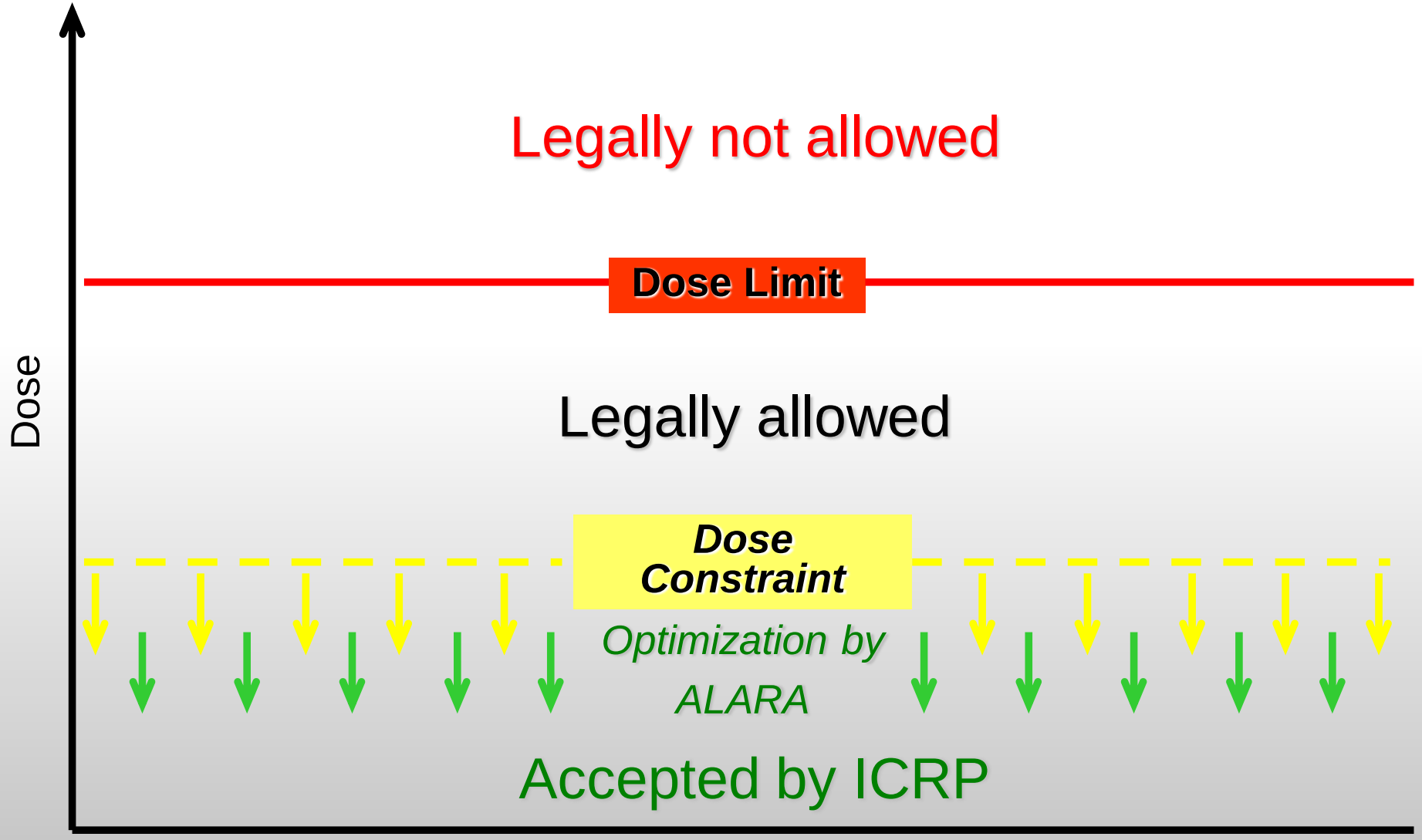
- *… to establish an **acceptable level of dose** below the constraint “*

Dose Constraints in ICRP Publ. 103 (cont.)

Characteristics

- *"A **prospective** and **source-related** restriction on the individual dose …"*
- *"… serves as an **upper bound** on the dose in optimisation of protection for that source …"*
- *… used to **limit the range of options** considered in the process of optimisation."*

Dose Constraints in Planned Exposure Situations



Dose Constraints in ICRP Publ. 103 (cont.)

Dose constraints in planned exposure situations

should be

- *prospective planning values for acceptable future doses*
- *tools in the hand of radiation protection professionals.*

should not be

- *additional dose limits below legal dose limits*
- *retrospectively controlled and sanctioned by regulators.*

Misunderstandings and Irritations

- *Linguistic:* *constraint = limitation ? = limit ?*
- *Dynamic:* *constraint as a starting point of an infinite, cyclic optimization process ?*
- *Superiority:* *is radiation the only or dominant work place risk ?*

Practical Problems and Concerns

- *How to choose an appropriate dose constraint value ?*
  (long term, generic, from dose statistics vs. short term, specific and task related)

- *Can the keeping of an individual dose constraint lead to higher collective doses in a team ?*

- *Can dose constraints "attract" regulators to more control activities and increase regulatory burden?*

ERPAN Survey 2010

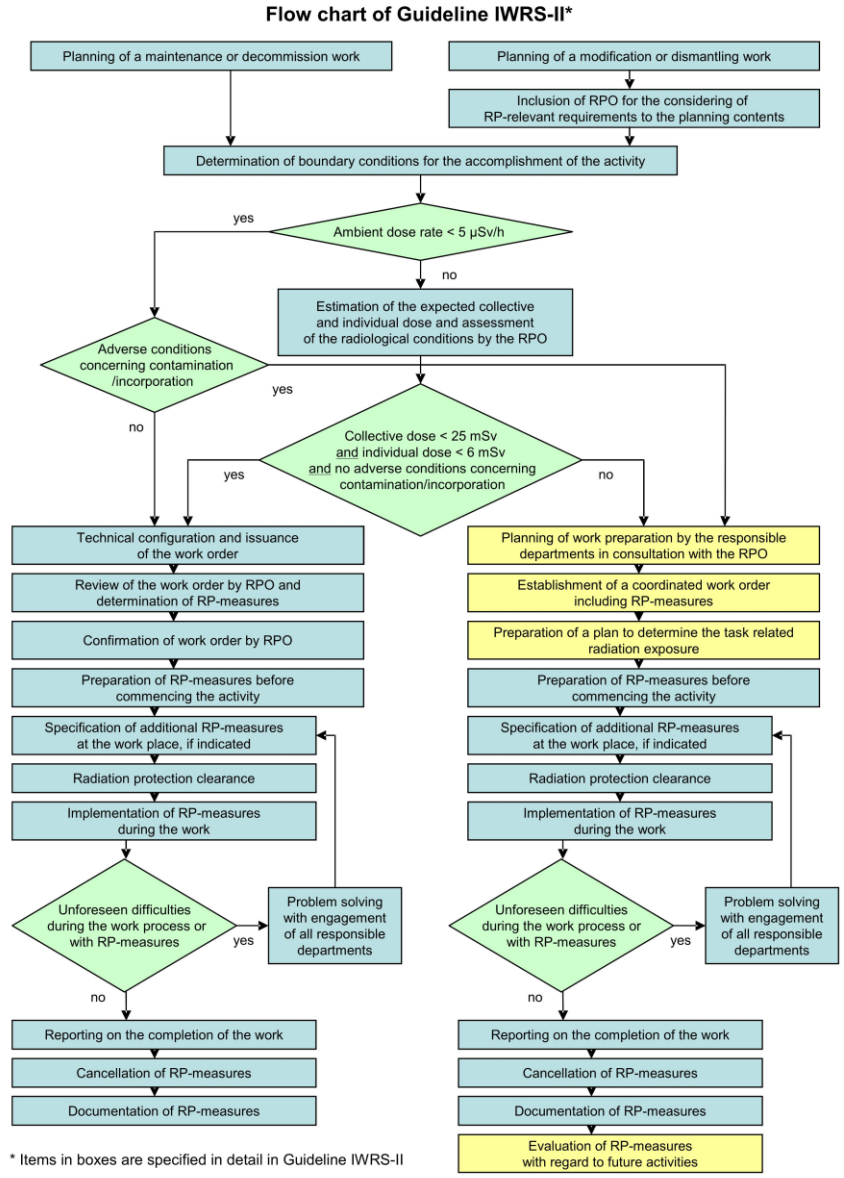
Dose constraints in the non-nuclear sector

- *Survey in 11 European countries*
- *Something like "dose constraints" are widely used*
- *Inconsistent "constraint"-terminology (dose constraint, dose level, dose objective)*
- *Application on design (facility) or on tasks (operational)*
- *Set by licensee, employer, regulatory body or all in joint decision.*

ISOE Survey

Dose constraints in the nuclear sector

- *Constraint-like dose values for optimization in all NPPs*
- *Specific dose values for site, task, time (d/m/y)*
- *Complex constraint rules instead of one dose constraint*
- *No harmonized dose values in the nuclear sector.*



Example

Reality can be complex

A set of constraining criteria in a decision flow chart with

- ambient dose rate < 5 µSv/h
- collective dose < 25 mSv
- individual dose < 6 mSv
- contamination / incorporation risk
- etc.

Applied in planned exposure situations for maintenance, decommission, modification, dismantling work in NPPs

(From: German Guideline IWRS-II)

Dose Constraints OECD/NEA

Adoption of ICRP dose constraint concept:

Europe: *in principle well adopted (often different terminology and complex constraint regime)*

United States: *accepted with reservations (no superiority of dose constraints in total risk management)*

Japan: *strictly rejected (optimization by "target dose").*

EU-BSS Draft 29th Sept. 2011

Dose constraint concept in EU-BSS – *in brief*
defined for the requirements of legal EU documents

Article 6

" … For occupational exposure, the dose constraint shall be established as an operational tool for optimisation by the undertaking under the general supervision of the competent authorities. In the case of outside workers the dose constraint shall be established in cooperation between the employer and the undertaking. "

IAEA International Basic Safety Standards INTERIM EDITION

Dose constraint concept in IAEA BSS – *in extension elaborated for practical purposes in IAEA Safety documents*

Dose constraints and reference levels

"1.22. Dose constraints and reference levels are used for optimization of protection and safety, the intended outcome of which is that all exposures are controlled to levels that are as low as reasonably achievable, economic, societal and environmental factors being taken into account. Dose constraints are applied to occupational exposure and to public exposure in planned exposure situations. Dose constraints are set separately for each source under control and they serve as boundary conditions in defining the range of options for the purposes of optimization. Dose constraints are not dose limits; exceeding a dose constraint does not represent non-compliance with regulatory requirements, but it could result in follow-up actions."

etc.

Management of Total Risk – Key Issues

ORP is not practiced in a vacuum

- Radiation is not always the one or overriding risk to workers,
- Other legitimate goals must also be considered

  (e.g. industrial safety, nuclear safety, public and environmental safety, facility reliability),
- All relevant risks to workers must be balanced.

Management of Total Risk - Motto

Motto:

- ALARA principle as the "**driving force**",
- Application of the ALARA approach to other industrial risks,
- Management of Total Risk has an overall perspective:

"As save as reasonably achievable!"

Conclusion

ICRP Publ. 103 Dose constraint concept:

- Reasonable element of the optimization principle
- Some concerns and practical problems
- Praxis often more complex than theoretical concept
- Broadly accepted in Europe
- Some reluctance in other continents
- Inherent part of future EU-BSS and IAEA BSS

EGOE: Overall perspective through management of total risk.

"As Low As Reasonably Achievable"

Thank you!

"As <u>Save</u> As Reasonably Achievable"