

# **Dose Constraints in Occupational Radiation Protection: Regulations and Practices**

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## Dose Constraint Discussions at the NEA

- Concept first introduced in ICRP Publication 60 to assist with optimisation in occupational protection

*“...dose constraints, the source-related values of individual dose used to limit the range of options considered in the procedure of optimisation.”*

- Discussed intensively by ICRP and NEA during the development of Publication 103
- Concepts have evolved and are now a much more important tool for optimisation than previously

*“The concepts of a dose constraint and a reference level are used in the process of optimisation of protection to assist in ensuring that all exposures are ALARA, economic etc.”*

*“.....key parts in the optimisation process that will ensure appropriate levels of protection under the prevailing circumstances.” (ICRP 103)*

- But... questions remain....

## Expert Group on Occupational Exposure

- The NEA's Committee on Radiation Protection and Public Health (CRPPH) asked its Expert Group on Occupational Exposure (EGOE)
  - to analyse **experiences with interpretation and implementation of dose constraints** following ICRP 60
  - to discuss **operational and regulatory issues that may arise with implementation** as described in ICRP 103
  - to provide suggestions regarding **operational objectives and uses of dose constraints** in light of ICRP 103

# The ICRP Concept of Dose Constraints

- **Dose constraints**
  - are not dose limits
  - are selected at some fraction of the dose limit
  - should be selected based on good practice and on what can reasonably be achieved
- **Use of dose constraints**
  - for planned exposure situations, plan so that occupational exposures will be below the dose constraint for a particular source
  - optimisation of protection is required for all exposures, even below the dose constraint
  - is intended to satisfy the equity of distribution of exposure among a group of individuals

## Questions about Dose Constraints and their use

- What are benefits from the use of dose constraints in an optimisation process?
- Are dose constraints used as a regulatory instrument?
- Dose constraints and other ORP criteria
- Setting of dose constraints
- Ways of implementing and controlling dose constraints
- Dose constraints as a new “standard of care” for workers?
- Reinforcement of individual dose constraints *versus* higher collective doses

## Dose Constraints in International Regulations

- The revisions of the International Basic Safety Standards, and of the Euratom Basic Safety Standard Directive both aim to implement new ICRP recommendations
- Both documents have requirements to use dose constraints, defined broadly along the lines provided by the ICRP, and suggest that values be selected from the bands recommended by the ICRP

# Dose Constraints in National Regulations

## Within the European Union:

- Following ICRP 60, the use of dose constraints was mandated for all EU countries in the 1996 Euratom Basic Safety Standard
- *“..a restriction on the prospective doses to individuals which may result from a defined source, for use at the planning stage in radiation protection whenever optimisation is involved.”*

## In North America

- In general, the concept of an action level is used, requiring actions to be taken if actual doses exceed the action level
- In general, optimisation below action levels is not needed
- In the US the term “dose constraint” is used, but it has a somewhat different meaning to the ICRP concept.

## In Japan

- Dose limitation and optimisation are viewed as sufficient for the management of occupational exposures

## Dose Constraint use in Nuclear Power Plants

- Optimisation of protection for workers is carried out at all nuclear power plants
- Numerical criteria are used as optimisation tools but - in general, the tools used do not resemble dose constraints as defined by the ICRP
- Action levels are commonly used
- Dose constraints or dose-constraint-like-instruments are used for radiation protection purposes in operation of NPPs, their use is not uniform and the optimisation is not necessarily linked to their use.

## Implementation Issues

1. Constraint *versus* limit –just a linguistic problem?
2. Dose constraints in prospective evaluations of new facilities/sources
3. Risk of dose constraint being interpreted as an “additional” limit or as a new “standard of care” for workers
4. Dose constraints - one of many factors in total risk management
5. Guidance on the use of dose constraints in the process of optimisation
6. Need for education and training specifically addressing dose constraint?

# Conclusions

## Use of Dose Constraints in OECD:

- Implementation continues to be discussed and no common understanding currently exists
- Implementation depends on co-operation between registrant, licensee and regulator

## The Value of Using Dose Constraints:

- Use of dose constraints can limit inequity in individual exposure distributions **BUT** radiation exposure is not always the only or predominant workplace risk or consideration

# Conclusions (contd)

## Setting of Dose Constraints:

- Individual approaches are used
- Can be in units of individual dose, collective doses, ambient dose rate, etc. embedded in a decision flow chart

## Regulatory Use:

- Have been used as regulatory benchmark values for retrospective evaluation of worker protection measures (by utilities also). Concerns over this approach, which can be seen as establishing a new standard of worker care

## Way forward:

- Recognise the need for comprehensive explanations and guidance by regulatory authorities