Key Principles of Radiological Protection

**Justification [source related]**
- actions involving changes in exposure of individuals to be justified in advance - positive net benefit

**Optimisation [source related]**
- exposures should be as low as reasonably achievable [ALARA] and below dose constraints and reference levels
- **Dose Constraints** – planned exposure situations
- **Reference Levels** – existing & emergency exposure situations

**Dose Limits [individual related]**
- No change in ICRP 103 from ICRP60 except DL for lens of the eye reduced for workers
The term Dose Constraints was first introduced in ICRP Publication 60 in the 1990 recommendations.

The concept has evolved - in ICRP 103 dose constraints are a much more important tool for optimisation.

In planned exposure situations, it should be planned that exposures will be below the selected dose constraint (limits inequity in individual occupational exposure, and allows for exposure from several sources for public exposure).

Optimisation of protection is required for all exposures, even those below the dose constraint.
Dose Constraint

• A prospective and source-related restriction on the individual dose from a source, which provides a basic level of protection for the most highly exposed individuals from a source, and serves as an upper bound on the dose in optimisation of protection for that source

• Not a limit!
Concepts of dose limit and dose constraint

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<th>Constraints and Reference Levels</th>
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<td>Protect individual workers from occupational exposure and the Representative Person from public exposure</td>
<td>From all regulated sources in planned exposure situations</td>
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<td>From a source in all exposure situations</td>
<td>From a source in all exposure situations</td>
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Requirement 11: Optimization of protection and safety: The government or regulatory body shall establish and enforce requirements for the optimization of protection and safety, and registrants and licensees shall ensure that protection and safety is optimized.

Supporting requirements include the following 2 paragraphs:

3.22. The government or regulatory body:
(a) shall establish and enforce requirements for the optimization of protection and safety;
(b) shall require documentation addressing the optimization of protection and safety;
(c) shall establish or approve constraints on dose and on risk, as appropriate, or shall establish or approve a process for establishing such constraints, to be used in the optimization of protection and safety.

3.25. For occupational exposure and public exposure, registrants and licensees shall ensure, as appropriate, that relevant constraints are used in the optimization of protection and safety for any particular source within a practice.
Requirement 12: Dose limits

The government or the regulatory body shall establish dose limits for occupational exposure and public exposure, and registrants and licensees shall apply these limits.

Supporting requirements are the following

- 3.26. The government or the regulatory body shall establish and the regulatory body shall enforce compliance with the dose limits specified in Schedule III for occupational exposures and public exposures in planned exposure situations.

- 3.27. The government or the regulatory body shall determine what additional restrictions, if any are required to be complied with by registrants and licensees to ensure that the dose limits specified in Schedule III are not exceeded owing to possible combinations of doses from exposures due to different authorized practices.

- 3.28. Registrants and licensees shall ensure that the exposures of individuals due to the practices for which the registrants and licensees are authorized are restricted so that neither the effective dose nor the equivalent dose to tissues or organs exceeds any relevant dose limit specified in Schedule III.
DOSE LIMITS FOR PLANNED EXPOSURE SITUATIONS

- Dose limits apply for planned exposure situations only
- Dose limits are set by government or the regulatory body
- Dose limits are enforced by the regulatory body
- Registrants and licensees are required to ensure that the exposure of workers and of the public is not to exceed the dose limit
- Dose limits are essentially unchanged from SS115, except that
  - Dose limits for the lens of the eye have been reduced*
  - For workers over the age of 18 years, an equivalent dose to the lens of the eye of 20 mSv per year averaged over five consecutive years (100 mSv in 5 years), and of 50 mSv in any single year;
  - For apprentices, age from 16 to 18 years of age, an equivalent dose to the lens of the eye of 20 mSv per year;

* In line with ICRP Statement on Tissue Reactions approved April 21, 2011
Dose constraints

- Dose constraints are not limits.
- Dose constraints are part of the optimization process. They are used prospectively.
Issues – dose limits - workers

- Compliance with dose limit / Optimization of protection and safety
- Workers who work for employer who is not licensee for the source (itinerant workers)
- Workers who work for more than one employer
- Pregnant workers and breast-feeding workers
  - Embryo/fetus and breast fed infant – public
- Reduced dose limit for lens of the eye – Session 2
- Exposure to radon – planned exposure situations and existing exposure situations
- The use of investigation levels
  - Dose, intake, contamination levels
Issues – dose constraints - workers

- Licensees establish dose constraints
- Regulatory body reviews dose constraint as part of the regulatory process
- Licensee involves workers in the process of optimization
- Design aspects:
  - Design of equipment / new facility
  - Preparing for new operation e.g. modification
- Operational aspects:
  - Evaluation of trends
  - Evaluation of effectiveness of RPP
  - Identify areas for improvement
  - Training of workers
Issues – dose limits - public

- Representative person (critical group)
- Who ensures that the dose limit for the public is not exceeded?
- Monitoring programmes and assessment of doses to the public
- Provision for independent monitoring – when, why
Issues – dose constraints - public

• Government or the regulatory body sets the dose constraint for the public

• Factors to consider in setting dose constraint
  • The characteristics of the source and the practice
  • Good practice in the operation of similar sources
  • Dose contributions from other authorized practices
  • The views of interested parties
Thank you for your attention