IAEA
International Atomic Energy Agency

1. Foreword : Training Course on Optimization of Protection and Safety

Training Course Content

Mainly developed for Radiation Protection Officer and Qualified Experts based on GSR Part 3 and GSG-7

General approach :

- Basics of the optimization principle
- Examples
- 9 case studies (different exposure situations and areas)
- Existing networks
- Working Group session
- Many references updated on basis of the IAEA GSR Part 3 and GSG-7

Terminology
Definition of Optimization
(GSR Part 3 & IAEA Glossary 2018)

optimization (of protection and safety)

1. The *process* of determining what level of *protection and safety* would result in the magnitude of *individual doses*, the number of individuals (*workers* and *members of the public*) subject to *exposure* and the likelihood of *exposure* being *as low as reasonably achievable*, economic and social factors being taken into account (*ALARA*).

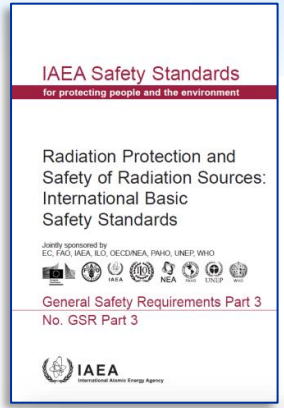
2. The management of the radiation dose to the patient commensurate with the medical purpose.

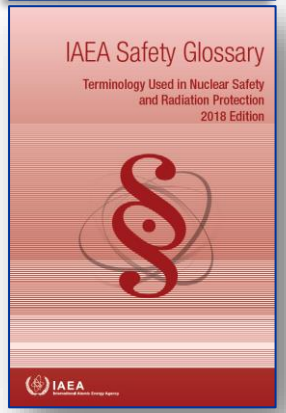
ⓘ For *medical exposures* of *patients*.

ⓘ '*Optimization of protection and safety* has been implemented' means that *optimization of protection and safety* has been applied and the results of that *process* have been implemented.

! This is not the same as optimization of the *process* or *practice* concerned. An explicit term such as *optimization of protection and safety* should be used.

! The acronym *ALARA* should not be used to mean *optimization of protection and safety*.





Terminology - Clarification

Optimisation of Protection and Safety

Protection

Radiation Protection (RP)

01

Safety

more risks than radiations (global approach/management of risks on the workplaces) (examples of interaction between risks : see Case Study 7 and 14)

02

Optimization of RP

catalyst for a global safety

03

The use of the acronym A.L.A.R.A is still quite common:

* nowadays very often used (networks, programme, procedure, culture, publications …)

* is used in the IAEA technical assistance projects for the sake of coherence and with the daily practice and for easiness

ICRP (1/2)

"ALARA" has been used for more than 20 years by radiation protection professionals. It is considered that the two expressions – optimization of radiation protection and ALARA - are synonymous and interchangeable (ICRP, 2006).

According to ICRP Publication 103 (ICRP, 2007), optimization of protection is the process by which "the likelihood of incurring exposures, the number of people exposed, as well as the magnitude of their individual doses should be kept ALARA by taking into account economic and societal factors".

ICRP (2/2)

According to ICRP Publication 101 (ICRP, 2006), ALARA is a frame of mind, always questioning whether the best has been done in the prevailing circumstances.

- It requires a forward-looking iterative process aimed at preventing exposures before they occur.
- It is continuous, taking into account feedback experience as well as technical and socio-economic developments. It requires both qualitative and quantitative judgments.
- ALARA is an obligation of means, and not an obligation of results, in the sense that the result of ALARA depends on processes, procedures, and judgements and is not a given value of exposure.

The principle of optimization of radiation protection is a direct consequence of the adoption of the linear dose-effect relationship with no threshold for "stochastic effects". It resulted in a search for risk reduction whatever the level of exposure, while taking into account economic and societal factors.

The wording of the ALARA principle has evolved through various ICRP publications, developing the question of how far the risk should be reduced

EC

The principle is included in Article 5 of the European EURATOM Basic Safety Standards (EC, 2013) with the following wording:

01

Radiation protection of individuals subject to public or occupational exposure shall be **optimized** with the aim of keeping the magnitude of **individual doses**, the **likelihood of exposure** and the **number of individuals exposed** as low as reasonably achievable taking into account the current state of technical knowledge and economic and societal factors

The optimization of the protection of individuals subject to medical exposure shall apply to the magnitude of individual doses and be consistent with the medical purpose of the exposure, as described in Article 56.

02

03

This principle shall be applied not only in terms of effective dose but also, where appropriate, in terms of equivalent doses, as a precautionary measure to allow for uncertainties as to health detriment below the threshold for tissue reactions."