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Recursos educativos

Radiation & X Rays

# Protection of workers in radioactive facilities and the public. Delimitation of areas in radioactive facilities.

Origen:

Propias

Tipo:

Theory

Edad:

All audiences

Radiological Protection

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The International Commission on Radiological Protection (ICRP) is responsible for establishing the philosophy of radiation protection, based on existing scientific knowledge on the biological effects of ionizing radiation. Its conclusions are conveyed through recommendations, which constitute a solid basis for preparing the corresponding legislation in each country.

## Protection of workers

One of the basic principles of radiological protection is dose limitation. In the case of workers the effective dose limit is 20 mSv per year which can be averaged in five consecutive years; that is, in those five years a total of 100 mSv can be received, as long as it does not exceed 50 mSv per year. There are equivalent dose limits for specific tissues or organs: crystalline (150 mSv per year), skin (500 mSv per year; this limit is applied to the dose averaged over any surface of 1 cm<sup>2</sup>, regardless of the exposed area) and hands, forearms, feet and ankles (500 mSv per year).

To implement the radiological protection of workers, control and surveillance measures must be established to prevent their exposure to ionizing radiation and the dose limits mentioned above must not be exceeded. Some of these measures include:

- ? Evaluating working conditions.
- ? Classifying and designating workplaces according to the amount of radiation that may exist.
- ? Classifying workers in different categories according to their working conditions.
- ? Carrying out radiological surveillance of professionally exposed workers, using dosimeters.
- ? Establishing radiological protection information and training programs.
- ? Applying the rules and measures of surveillance and control of the different zones
- ? Performing periodic medical surveillance for authorized prevention services.

## Delimitation of the areas within the radioactive facilities



Depending on the way in which exposure to radiation can occur in workers (external irradiation, pollution or both), working areas are classified as:

? **Guarded area.** This is the area where there is possibility of receiving effective doses of more than 1 mSv per official year, or an equivalent dose greater than 1/10 of the equivalent dose limits for the lens (150 mSv), skin and limbs (500 mSv).

? **Controlled area.** This is the area where: (1) There is possibility of receiving effective doses above 6 mSv per official year or an equivalent dose greater than 3/10 of the equivalent dose limits for the lens (150 mSv), skin and limbs (500 mSv), or (2) It is necessary to follow work procedures in order to restrict exposure to ionizing radiation, prevent the spread of radioactive contamination or prevent or limit the likelihood and magnitude of radiological accidents or their consequences.

Controlled zones can be subdivided into:

? **Areas of limited permanence:** those in which there is a risk of receiving a dose above the dose limits (100 mSv during any period of five consecutive official years, subject to a maximum effective dose of 50 mSv in any official year).

? **Areas of regulated permanence:** those where there is risk of receiving a dose higher than the dose limits in a short period of time, requiring special prescriptions from the optimization viewpoint.

? **Areas of prohibited access:** those where there is risk of receiving, in a single exposure, doses above the dose limits.

The classification of workplaces in the established areas should always be updated according to the actual existing conditions, and will be revised if there are variations in working conditions.



## Protection of the public

As in the case of workers, there are dose limits for the public that cannot be exceeded by law. The effective dose limit for the public is 1 mSv per year, with the equivalent dose limits of 15 mSv per year for crystalline and 50 mSv per year for skin of (this limit will be applied to the dose averaged over any skin surface of 1 cm<sup>2</sup>, regardless of the exposed surface).

It is important to know that in the dose limits, both for workers and the public, the received doses of natural background radiation are not included and neither are those that may be received as a consequence of medical treatments.

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