Radiation protection –theortical lecture 1.

Asst.Lec.Dumoaa Haider Shakir

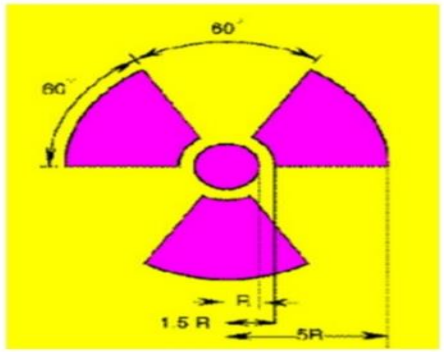
Introduction

- Radiation protection, sometimes known as Radiological protection, is the science of protecting people and the environment from the harmful effects of ionizing radiation, which includes both particle radiation and high energy electromagnetic radiation.

  Ionizing radiation is widely used in industry and medicine, but presents a significant health hazard. It causes microscopic damage to living tissue, resulting in skin burns and radiation sickness at low exposures and statistically elevated risks of cancer, tumors and genetic damage at high exposures.

  Ionizing radiation is invisible and not directly detectable by human senses, so instruments such as Geiger counters are usually required to detect its presence.

- **Origin of the Radiation Warning Symbol (Trefoil) | Museum of Radiation and Radioactivity Radiation Protection ionizing radiation Hazard symbol Radioactive decay Radiation**





Aim Of Radiation Protection

- "To provide an appropriate standard of protection for man without unduly limiting the beneficial practices giving rise to radiation exposure".

Groups of Radiation protection

- Radiation protection can be divided into:

  1. Occupational radiation protection, which is the protection of workers.

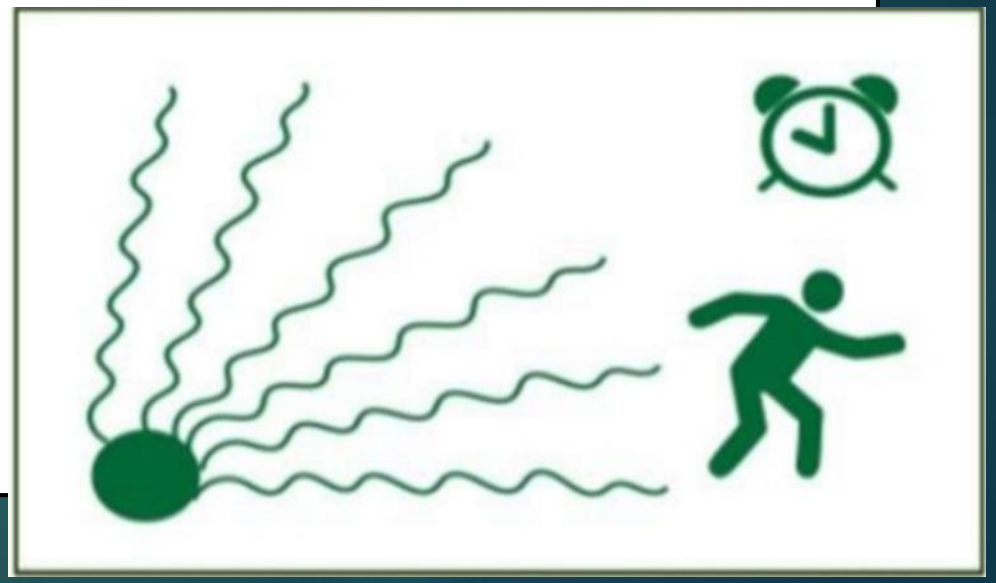
  2. Medical radiation protection, which is the protection of patients.

  3. Public radiation protection, which is protection of individual members of the public, and of the population as a whole. The types of exposure, as well as government regulations and legal exposure limits are different for each of these groups, so they must be considered separately.

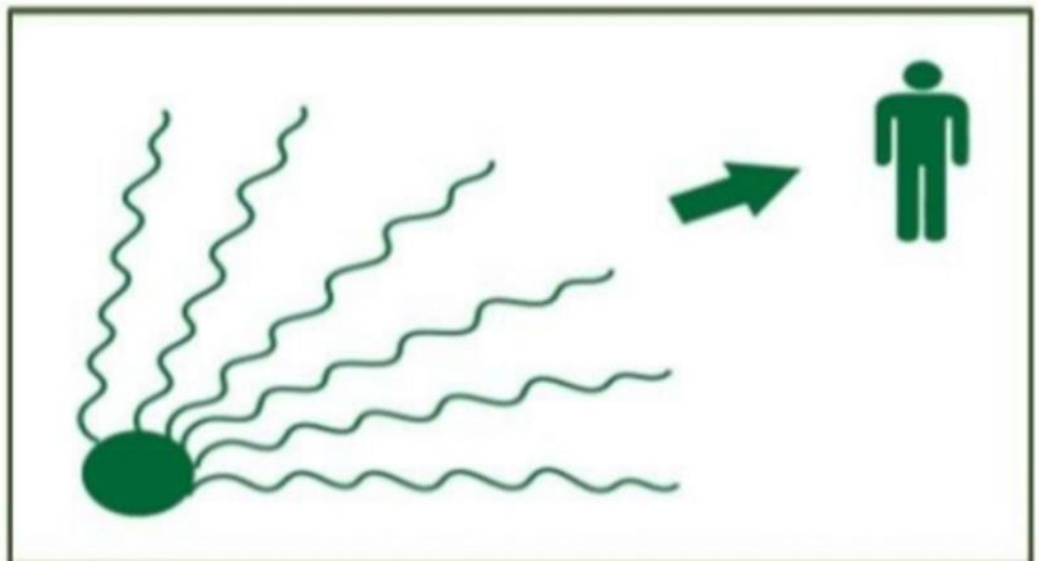
Principles of radiation protection according to “ALARA”.

- There are three factors that control the amount or dose of radiation received from a source according to “ALARA”. ALARA stands for “as low as reasonably achievable”. . Radiation exposure can be managed by a combination of these factors:

- 1.Time: Reducing the time of exposure to radiation reduces the dose received, and the percentage of reduction is directly proportional to time.

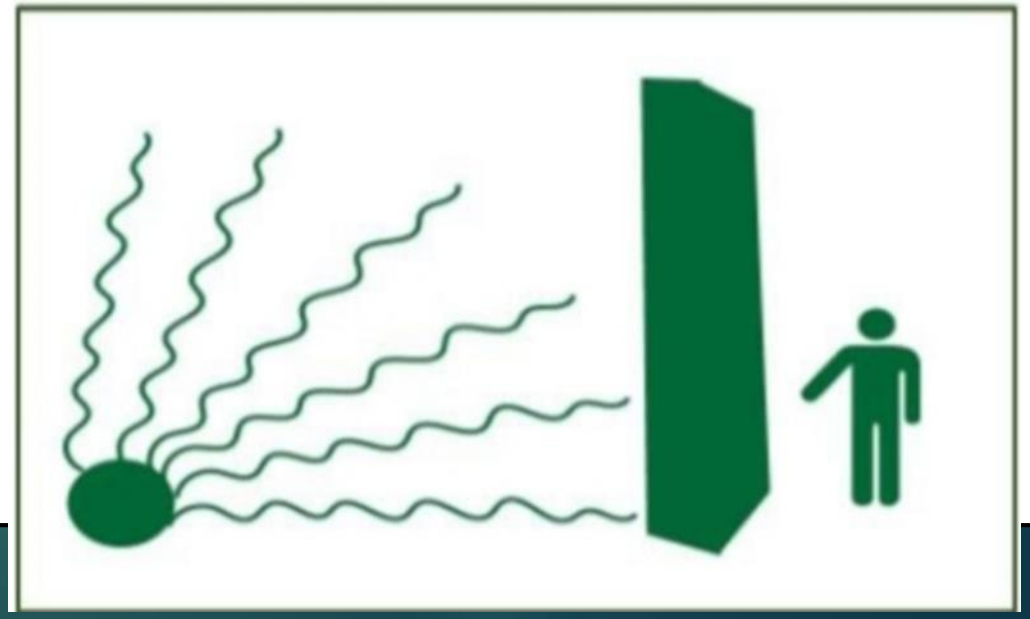


- 2.Distance :The greater the distance between a person and the source of radiation, the smaller the amount of receive dose. Accordingly, the amount of dose received decreases inversely with the square of the distance from the radiating source (inverse square law)



- 3. Shielding: Radiation shielding is a method used to reduce the amount of radiation that passes through a material by absorbing or scattering the radiation. This is important in radiation protection to ensure that people and equipment are not exposed to harmful levels of radiation .

  Radiation shielding can be accomplished by using materials that are dense and capable of absorbing radiation, such as lead or concrete. The thickness of the shielding material needed depends on the type of radiation being emitted and the energy of the radiation



Principles of radiation protection according to (ICRP)

- In most countries a national regulatory authority works towards ensuring a secure radiation environment in society by setting requirements that are also based on the international recommendations for ionizing radiation (ICRP- International Commission on Radiological Protection)
- 1.Justification: No unnecessary use of radiation is permitted, which means that the advantages must outweigh the disadvantages

- 2.Limitation: Each individual must be protected against risks that are far too large through individual radiation dose limits.

- 3.Optimization: Radiation doses should all be kept as low as reasonably achievable. This means that it Is not enough to remain under the radiation dose limits.