



United Arab Emirates

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## Regulation

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# Regulation for Existing Exposure Situations (FANR-REG-19) Version 0

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## Definitions

### Article (1)

For the purposes of this regulation, the following terms have the meanings set forth below. Other capitalised terms used but not defined herein shall have the meaning ascribed to them in Article 1 of the Federal Law by Decree No. 6 of 2009 Concerning the Peaceful Uses of Nuclear Energy (the Law):

**Absorbed Dose** The fundamental dosimetric quantity  $D$ , defined as

$$D = \frac{d\bar{E}}{dm}$$

Where  $d\bar{E}$  is the mean energy imparted by ionizing radiation to matter in a volume element and  $dm$  is the mass of matter in the volume element.

**Activity Concentration** The activity per unit mass of a material in which the radionuclides are essentially uniformly distributed.

**Effective Dose** The quantity  $E$  defined as a summation of the tissue Equivalent Doses, which is each multiplied by the appropriate tissue weighting factor where  $H_T$  is the Equivalent Dose in tissue  $T$  and  $w_T$  is the tissue weighting factor for tissue  $T$ .

$$E = \sum_T w_T \cdot H_T$$

From the definition of Equivalent Dose, it follows that where  $w_R$  is the Radiation Weighting Factor for radiation  $R$  and  $D_{T,R}$  is the average Absorbed Dose in the organ or tissue.

$$E = \sum_T w_T \sum_R w_R \cdot D_{T,R}$$

**Equivalent Dose** The quantity  $H_{T,R}$ , defined as where  $D_{T,R}$  is the Absorbed Dose delivered by radiation type  $R$  averaged over a tissue or organ  $T$  and  $w_R$  is the Radiation Weighting Factor for radiation type  $R$ :

$$H_{T,R} = w_R \cdot D_{T,R}$$

When the radiation field is composed of different radiation types with different values of  $w_R$  the Equivalent Dose is:

$$H_T = \sum_R w_R \cdot D_{T,R}$$



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**Existing Exposure Responsible Entity**

Person that is to undertake management of existing Exposure situation based on the decision taken by the Authority and relevant governmental entities.

**Exposure**

The state or condition of being subject to irradiation.

**Optimisation**

The process of determining what level of Protection and Safety makes Exposures, and the probability and magnitude of potential Exposures, “as low as reasonably achievable (ALARA), economic and social factors being taken into account”, as required by the International Commission on Radiological Protection System of Radiological Protection.

**Protection and Safety**

The protection of people against Exposure to Ionizing Radiation or Radioactive Material and the Safety of Radiation Sources, including the means for achieving this, and the means for preventing Accidents and for mitigating the consequences of Accidents should they occur.

**Protective Action**

An action for the purposes of avoiding or reducing Doses that might otherwise be received in an Emergency Exposure situation or an existing Exposure situation.

**Radiation Weighting Factor**

The number by which the Absorbed Dose in a tissue is multiplied to reflect the relative biological effectiveness of the radiation in inducing stochastic effects at low Doses, the result being the Equivalent Dose.

The Radiation Weighting Factors published in “The 1990 Recommendations of the International Commission on Radiological Protection (ICRP 60)” shall be applied until the Authority determines that the revised Radiation Weighting Factors published in “The 2007 Recommendations of the International Commission on Radiological Protection (ICRP 103)” shall be applied.

**Reference Level**

A level of Dose, risk or Activity Concentration above which it is not appropriate to plan to allow Exposures to occur and below which Optimisation of Protection and Safety continues to be implemented.

**Remedial Action**

The removal of a source or the reduction of its magnitude (in terms of activity or amount) for the purposes of preventing or reducing Exposures that might otherwise occur.

<b>Remediation</b>	Any measures that may be carried out to reduce the radiation Exposure from existing contamination of land areas through actions applied to the contamination itself (the source) or to the Exposure Pathways to humans.
<b>Representative Person</b>	An individual receiving a Dose that is representative of the more highly exposed individuals in the population.
<b>Safety Assessment</b>	Assessment of all aspects of a practice that are relevant to Protection and Safety; for an authorised Facility this includes siting, Design and Operation of the Facility.

## Objective and Scope

### Article (2)

Requirements from this regulation shall apply to Exposures due to:

- (a) Contamination of areas by residual Radioactive Material arising from:
  - (i) past activities that were not subject to Regulatory Control or that were subject to Regulatory Control but not in accordance with the Authority's requirements;
  - (ii) A nuclear or radiation Emergency, after Exposure due to an Emergency situation has been declared ended.
- (b) Radon in workplaces, in dwellings and in other buildings with high occupancy factors for members of the public.
- (c) Commodities, including food, feed and drinking water, that incorporate radionuclides of natural origin or radionuclides arising from the circumstances set out in Article (2)(a) of this regulation.

### Article (3)

When an Exposure situation referred to in Article (2) of this regulation is identified, the Authority, in coordination with relevant governmental entities shall determine the Existing Exposure Responsible Entity that shall undertake the management of the Exposure situation. Where possible, the Existing Exposure Responsible Entity that manages the radiation risks for Facilities and Activities shall be the Licensee or any other responsible Person.

#### Article (4)

The Existing Exposure Responsible Entity determined in Article (3) of this regulation shall establish a protection strategy for the management of the identified Exposure situation. The protection strategy shall define the objective to be achieved taking into account the Reference Levels set out in this regulation.

#### Article (5)

1. A protection strategy for the management of an identified Exposure situation as per Article (2) of this regulation shall be commensurate with the radiation risks associated with the existing Exposure situation. Remedial Actions or Protective Actions shall be expected to yield sufficient benefits to outweigh the detriments associated with taking them, including detriments in the form of radiation risks.
2. The form, scale and duration of Remedial Actions and Protective Actions included in a protection strategy for an existing Exposure situation must be subject to a process of Optimisation of Protection and Safety. Priority shall be given in the process of Optimisation to any groups for whom the residual Dose exceeds the Reference Level established in this regulation.

### Exposure due to contamination of areas by residual Radioactive Material

#### Article (6)

The Reference Level to be applied in consideration of Exposure due to contamination of areas by residual Radioactive Material as defined in Article (2)(a) of this regulation is an annual Effective Dose to the Representative Person of 20 mSv.

#### Article (7)

The Existing Exposure Responsible Entity designated in accordance with Article (3) of this regulation shall ensure that:

- (a) a plan of Remedial Action, supported by a Safety Assessment, is prepared and is submitted to the Authority for approval;
- (b) the plan of Remedial Action is aimed at the timely and progressive reduction of the radiation risks and eventually, if possible, the removal of restrictions on use of or access to the area;
- (c) any additional Dose received by members of the public as a result of the Remedial Actions is justified on the basis of the resulting net benefit, including consideration of the consequent reduction of the annual Dose;
- (d) in the choice of the optimised Remediation option:

- (i) the radiological impacts on people and the environment are considered together with non-radiological impacts on people and the environment, and technical, societal and economic factors; and
- (ii) the costs of the transport and management of Radioactive Waste, the radiation Exposure of and health risks to the workers managing the waste, and any subsequent public Exposure associated with its Disposal are all taken into account;
- (e) a mechanism for public information is in place and the interested parties affected by the existing Exposure situation are involved in the planning, implementation and verification of the Remedial Actions, including any monitoring and surveillance following Remediation;
- (f) a monitoring programme is established and implemented;
- (g) a system for maintaining adequate records relating to the existing Exposure situation and actions taken for Protection and Safety is in place; and
- (h) procedures are in place for reporting to the Authority on any abnormal conditions relevant to Protection and Safety.

#### Article (8)

When carrying out the Remedial Actions, the Existing Exposure Responsible Entity shall:

- (a) ensure that the work, including management of the arising Radioactive Waste, is conducted in accordance with the plan of Remedial Action;
- (b) take responsibility for all aspects of Protection and Safety, including the performance of a Safety Assessment;
- (c) monitor and perform a radiological survey of the area regularly during the Remediation work so as to verify levels of contamination, to verify compliance with the requirements for waste management, and to enable any unexpected levels of radiation to be detected and the plan of Remedial Action to be modified accordingly, subject to approval by the Authority;
- (d) perform a radiological survey after completion of Remedial Actions to demonstrate that the end point conditions, as established in the plan of Remedial Action, have been met; and
- (e) prepare and retain a final Remediation report and shall submit a copy to the Authority.

### Article (9)

After the Remedial Actions have been completed, the Authority in consultation with the relevant competent authorities shall:

- (a) review, amend as necessary and formalise the type, extent and duration of any post Remediation control measures already identified in the plan of Remedial Action, with due consideration of the residual radiation risks;
- (b) identify the person or organisation responsible for any post-Remediation control measures;
- (c) where necessary, impose specific restrictions for the remediated area to control:
  - (i) access by unauthorised Persons;
  - (ii) removal of Radioactive Material or use of such Radioactive Material, including its use in commodities; and
  - (iii) future use of the area, including the use of water resources and use for the production of food or feed, and the consumption of food or feed from the area; and
- (d) periodically review conditions in the remediated area and, if appropriate, shall amend or remove any restrictions.

### Article (10)

If the Authority does not prescribe any restrictions or controls, the conditions prevailing after the completion of the Remedial Actions or Protective Actions shall be considered to constitute the background conditions for any new Facilities and Activities or for habitation of the land.

### Exposure due to radon in workplaces, in dwellings and in other buildings with high occupancy factors for members of the Public

### Article (11)

The Reference Levels to be applied in consideration of Exposure due to radon are:

- i. for dwellings and other buildings with high occupancy factors for members of the public, an annual average Activity Concentration of  $^{222}\text{Rn}$  of 300 Bq/m<sup>3</sup>; and
- ii. for workplaces, an annual average Activity Concentration of  $^{222}\text{Rn}$  of 1000 Bq/m<sup>3</sup>.

### Article (12)

Where Activity Concentrations above the Reference Level established in Article (11)(i) of this regulation are identified, the Existing Exposure Responsible Entity, in consultation with the Authority, shall establish a protection strategy comprising coordinated actions to reduce radon



levels for existing buildings and for future buildings with the aim of reducing Activity Concentrations of  $^{222}\text{Rn}$  and consequent Exposures to a level at which protection is optimised.

#### Article (13)

Employers shall ensure that the Activity Concentration of  $^{222}\text{Rn}$  in the workplace are as low as reasonably achievable below the Reference Level established in Article (11)(ii) of this regulation and shall ensure that protection is optimised.

#### Article (14)

If, despite all reasonable efforts by the employer to reduce radon levels, the Activity Concentration of  $^{222}\text{Rn}$  in the workplace remains above the Reference Level established in Article (11)(ii) of this regulation, the relevant requirements for occupational Exposure as stated in FANR Regulation for Basic Safety Standards for Facilities and Activities involving Ionising Radiation other than in Nuclear Facilities (FANR-REG-24) (Version 1) shall apply.

#### **Exposure due to commodities, including food, feed and drinking water, that incorporate radionuclides of natural origin or radionuclides arising from contamination by residual Radioactive Material**

#### Article (15)

The Reference Levels to be applied in consideration of Exposures due to commodities, including food, feed and drinking water, that incorporate radionuclides of natural origin or radionuclides arising from contamination by residual Radioactive Material as defined in Article (2)(a) of this regulation are:

- a) Food having concentrations higher than concentrations stated in Schedule 1- Radionuclides of the JOINT FAO/WHO FOOD STANDARDS PROGRAMME, CODEX ALIMENTARIUS COMMISSION, Codex General Standard for Contaminants and Toxins in Foods, CODEX STAN 193-1995, CAC, Rome (2006).
- b) Drinking water having concentrations higher than concentrations stated in Table 9.2 and ANNEX 6 of the WORLD HEALTH ORGANIZATION, Guidelines for Drinking-water Quality 4<sup>th</sup> Ed., WHO, Geneva (2011).
- c) Commodities, other than under 1. and 2. of this Paragraph, having concentrations higher than concentrations stated in Table 1 and Table 2 from IAEA RS-G-1.7, Application of the Concepts of Exclusion, Exemption and Clearance, Vienna, 2004.

#### Article (16)

Where Activity Concentrations above the Reference Level established in Article (15) of this regulation are identified, the Existing Exposure Responsible Entity, in consultation with the Authority, shall establish a protection strategy comprising coordinated actions with the aim of ensuring that the Effective Dose to the Representative Person does not exceed 1 mSv per annum and that Protection is optimised.