#### **Unofficial English Translation**

## The Protection from Ionizing Radiation Law of 2002

Regulations made under Section 40

## The Protection from Ionizing Radiation (Basic Principles) Regulations of 2002

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#### The Protection from Ionizing Radiation Law of 2002

Regulations made under Section 40

For the purpose of harmonization with the European Community Acts with titles:

"Council Directive of 31<sup>st</sup> May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation (96/29/Euratom)", (OJ L159, 29.6.1996, p1) and

"Council Directive of 4<sup>th</sup> December 1990 on the operational protection of outside workers exposed to the risks of ionizing radiation during their activities in controlled areas (90/641/Euratom)", (OJ L349, 13.12.1990, p21).

The Council of Ministers, in exercise of the power conferred on it by Section 40 of the Protection from ionizing Radiation Law of 2002, after proposal by the Minister, hereby makes the following Regulations:

<sup>Citation</sup> 1. These Regulations may be cited as the Protection from Ionizing Radiation (Basic Principles) Regulations of 2002.

Interpretation 2.(1) In these Regulations, unless the context otherwise requires,

"Law" means The Protection from Ionizing Radiation Law of 2002.

"Absorbed dose, (D)" means the energy absorbed per unit mass

$$D = \frac{dE}{dm}$$

#### where

-dE is the mean energy imparted by ionizing radiation to the matter in a volume element,

-dm is the mass of the matter in this volume element.

In these Regulations absorbed dose denotes the dose averaged over a tissue or an organ. The unit for absorbed dose is the Gray (Gy).

"Accelerator" means apparatus or installation, in which particles are accelerated, emitting ionizing radiation with an energy higher than 1 mega-electron volt (MeV).

"Approved dosimetric service" means a body responsible for the calibration, reading or interpretation of individual monitoring devices, or

for the measurement or radioactivity in the human body or in biological samples, of for assessment of doses, whose capacity to act in this respect is recognized by the Minister under regulation 53.

**"Approved medical practitioner**" means a medical practitioner responsible for the medical surveillance of category A workers, as defined in regulation 28 whose capacity to act in that respect is defined in regulation 17.

"Approved occupational health services" means a body or bodies to which may be assigned responsibility for the radiation protection of exposed workers and/or medical surveillance of category A workers as defined in Regulation 17, and its capacity to act in that respect is recognized by the Minister under regulation 53.

"**Controlled area**" means an area subject to special rules for the purpose of protection against ionizing radiation or of preventing the spread of radioactive contamination and to which access is controlled.

"**Dose limits**" means the dose limits laid down in Regulation 6, 7, 8, 10 and 51.

"**Gray, (Gy)**" means the special name of the unit of absorbed dose. One Gray is equal to one Joule per kilogram:

"**Reference group of the population**" means a group comprising individuals whose exposure to a source is reasonably uniform and representative of that of the individuals in the population who are the more highly exposed to that source.

"**Sealed source**" means a source whose structure is such as to prevent, under normal conditions of use, any dispersion of the radioactive substances into the environment.

**"Sievert**" means the special name of the unit of equivalent or effective dose. One sievert is equivalent to one Joule per kilogram:

"Ambient dose equivalent,  $(H^*(d))$ " means the dose equivalent at a point in a radiation field that would be produced by the corresponding expanded and aligned field in the ICRU sphere at a depth d, on the radius opposing the direction of the aligned field. The special name for the unit of ambient dose equivalent is Sievert (Sv).

"Directional dose equivalent,  $(H'(d,\Omega))$ " means the dose equivalent at a point in a radiation field that would be produced by the corresponding expanded field, in the ICRU sphere at a depth d, on a radius in a

specified direction  $\Omega$ . The special name for the unit of directional dose equivalent is Sievert (Sv).

"**Expanded and aligned field**" means a radiation field in which the fluence and its directional and energy distribution are the same as in the expanded field, but the fluence is unidirectional.

"**Expanded field**" means a field derived from the actual field, where the fluence and its directional and energy distributions have the same values throughout the volume of interest as in the actual field at the point of reference.

**"Fluence,** ( $\Phi$ )" means the quotient of dN by d $\alpha$ , where dN is the number of particles which enter a sphere of cross-sectional area d $\alpha$ :

 $\Phi = \frac{dN}{d\alpha}$ 

"Mean quality factor,  $(\overline{Q})$ " means the average value of the quality factor at a point in tissue where the absorbed dose is delivered by particles with different L values. It is calculated according to the expression.

$$\overline{Q} = \frac{L}{D} \int_{0}^{\infty} Q(L) \cdot D(L) \cdot dL$$

Where

- D(L) is the absorbed dose at 10mm between linear energy transfer L and L-dh, and

- Q(L) is the corresponding quality factor at the point of interest. The Q-L relationships are given in Part B of the Second Schedule.

"**Personal dose equivalent,**  $(H_p(d))$ " means the dose equivalent in soft tissues, at an appropriate depth d, below a specified point in the body. The special name for the unit of personal dose equivalent is Sievert (Sv).

"Quality factor, (Q)" means a function of linear energy transfer (L) used to weight absorbed doses at a point in such a way as to take into account the quality of a radiation.

"Radiation weighting factor,  $(w_R)$ " means a dimensionless factor used to weight the tissue or organ absorbed dose. The appropriate  $(w_R)$  values are given in Part A of the Schedule.

"Tissue or organ absorbed dose,  $(D_T)$ " means the quotient of the total energy imparted in a tissue or organ and the mass of that tissue or organ.

"Tissue weighting factor,  $(w_T)$ " means a dimensionless factor used to weight the equivalent dose in a tissue or organ (T). The appropriate  $(w_T)$ values are specified in Part C of the Second Schedule.

"**Unrestricted linear energy transfer, (L** $_{\infty}$ )" means a quantity defined as:

$$L\infty = \frac{dE}{dl}$$

where dE is the mean energy lost by a particle of energy E in traversing a distance dI in water. In these regulations  $L_{\infty}$  is denoted by L.

"ICRU sphere" means a body introduced by the International Commission on Radiation Units (ICRU) to appropriate the human body as regards energy absorption from ionizing radiation; it consists of a 30 cm diameter tissue equivalent sphere with a density of 1 g cm<sup>-3</sup> and a mass composition of 76,2% oxygen, 11,1% carbon, 10,1% hydrogen and 2,6% nitrogen.

"Radiation Passbook" means the Radiation Passbook issued by the Minister for every outside worker under Regulation 35.

"Pregnant" and "breastfeeding" have the meaning attributed to these terms under the Safety and Health at Work Laws of 1996 to 2002 or any regulations issued under these laws.

(2) Subject to paragraph (1) of this Regulation, all terms used in these Regulations, unless the context otherwise requires, shall have the meaning assigned to them by the Law.

Application

3. (1) These Regulations shall apply in all cases where the law applies.

(2) These Regulations shall also apply for self-employed persons as it is applied for employers and employees, as if the self-employed person was simultaneously employer and employee.

Scope of the Regulations

workers

4. These Regulations prescribe the minimum requirements for the protection of persons against exposure to ionizing radiation and for the safety of sources and require from any person to take additional measures, as long as these measures are necessary and appropriate. for the protection of health and safety of any person or for the protection of the environment against risks of ionizing radiation.

Age limit for 5. Subject to the provisions of regulation 8, nobody may assign work to exposed persons under 18 years of old which would result in their being exposed workers.

Dose limits for 6. Every employer or licensee shall ensure that none of his employees, exposed workers who is engaged in activities, involving or which may involve exposure to ionizing radiation is exposed to radiation doses above the limits prescribed in Part A of the First Schedule.

during

Specially

authorized exposures

Special 7.(1) As soon as a pregnant woman informs her employer, in protection accordance with the provisions of the Maternity Protection Laws of 1977 pregnancy and to 2002, on her condition, the protection of the child to be born shall be breastfeeding comparable with that provided for members of the public.

> (2) In any case where paragraph (1) of this regulation applies, every employer or licensee shall take all appropriate measures in order that the working conditions of the pregnant women shall be such so as the equivalent dose to the child to be born will be as low as reasonably achievable and that it will be unlikely that this dose will exceed 1mSv during the remainder of the pregnancy.

> (3) As soon as a breastfeeding woman informs her employer in writing on her condition, she shall not be employed in work involving a significant risk of bodily radioactive contamination.

Dose limits for 8. Every employer or licensee shall ensure that apprentices or students apprentices and students are not exposed to doses exceeding the dose limits prescribed in Part B of First Schedule.

> 9.(1) In exceptional circumstances, excluding radiological accidents and emergencies, which are evaluated case by case, the Inspection Service may, where some specific operation so requires, authorize in writing individual occupational exposures of some identified by name workers exceeding the dose limits set out in regulation 6, provided that such exposures are limited in time, as well as confined to certain working areas, and that the exposure limits defined for the particular case by the Inspection Service are followed.

(2) In cases where the provisions of paragraph (1) of the present regulation apply, the following conditions shall be taken into account:

- (a) only category A workers, as defined in regulation 17 may be subject to specially authorized exposures,
- (b) apprentices, students, pregnant women and breastfeeding women, who are likely to be bodily contaminated, shall be excluded from such exposures,
- (c) employers or licensees shall precisely justify these exposures in advance and thoroughly discuss them with the voluntary exposed workers, their representatives the approved medical practitioner, the approved occupational health services or the qualified expert.
- (d) information about the risks involved and the precautions to be taken during the specified operation shall be provided to the exposed workers in advance.

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(e) all doses relating to such exposures shall be separately recorded in the medical record referred to in regulation 30 and in the individual record referred to in regulation 25.

(3) The exceeding of dose limits as a result of specially authorized exposures shall not necessarily constitute a reason by the employer for excluding from his usual occupation or relocating the worker, without the agreement of the worker.

Dose limits for 10. Subject to the provisions of regulation 11, members of the public members of the shall not be exposed to doses of ionizing radiation above the dose limits laid down in Part C of the First Schedule.

Exposure of the 11. The Minister shall ensure that all reasonable steps are taken so that population as a whole the contribution to the exposure of the population as a whole from each practice is kept as low as reasonably achievable, economic and social factors being taken into account and that the total of such contributions is regularly assessed.

Estimation of 12.(1) For the estimation of effective and equivalent doses the values effective dose and relationships referred to in paragraph (2) of this regulation or any other equivalent method, approved by the Minister, shall be used.

- (2) Subject to the provisions of paragraph (1) of this regulation,
  - (a) for external radiation, the values and relationships of the Second Schedule shall be used to estimate the relevant effective and equivalent doses,
  - (b) for internal exposure, from a radionuclide or from a mixture of radionuclides, the values and relationships of the Third Schedule shall be used.

Fundamental principles governing operational protection of exposed workers. apprentices and students

public

- 13. The operational protection of exposed workers, apprentices and students by their employers or the licensees shall be based in particular on the following principles:
  - (a) Preliminary evaluation to identify the nature and magnitude of the radiological risk to exposed workers and implementation of the optimization of radiation protection in all working conditions.
  - (b) classification of workplaces into different areas where appropriate, by reference to an assessment of the expected annual doses and the probability and magnitude of potential exposures.
  - (c) classification of workers into different categories.
  - (d) implementation of control measures and monitoring relating to the different areas and working conditions including, where necessary, individual monitoring.

#### medical surveillance.

Arrangements in workplaces 14.(1) For the purposes of radiation protection, every employer or licensee, shall make appropriate arrangements, in all workplaces, where there is a possibility of exposure to ionizing radiation in excess of 1 mSv per year or in excess of one tenth of the equivalent dose limits for the lens of the eyes, skin and extremities, as laid down in regulation 6.

(2) The arrangements referred to in paragraph (1) of this regulation, shall be appropriate to the nature of the installations and sources and to the magnitude and nature of the risks, and the magnitude of the precautions and monitoring, as well as their type and quality, shall be appropriate to the risks associated with the work involving exposures to ionizing radiation.

Controlled and Supervised areas

15.(1) Every employer or licensee shall designate as a controlled area any area under his control which has been identified by an assessment made by him, as an area in which -

- (a) it is necessary for any person who enters or works in the area to follow special procedures designed to restrict significant exposure to ionizing radiation in that area or prevent or limit the probability and magnitude of radiological accidents or emergency or their effects, or
- (b) any persons working in the area is likely to receive an effective dose greater than 6 mSv per year or three-tenths of any relevant dose limit referred to in Part B of the First Schedule in respect of an apprentice of 18 years or above.

(2) Every employer or licensee shall designate as a supervised area any area under his control, not being an area designated as a controlled area,

- (a) where it is necessary to keep the conditions of the area under review to determine whether the area should be designated as a controlled area, or
- (b) in which any person is likely to receive an effective dose greater than 1mSv per year or an equivalent dose greater than one-tenth of any relevant dose limit referred to in Part B of the First Schedule in respect of an apprentice aged 18 years or above.

(3) Every employer or licensee shall watch and keep under review the working conditions in controlled or supervised areas.

Requirements for controlled and

- 16.(1) Every employer or licensee shall -
  - (a) delineate the controlled area and ensure that access to it is restricted to individuals who have received appropriate

instructions and that is controlled in accordance with written procedures provided by the employer or the licensee.

- (b) take special measures everywhere in the controlled area where there is a significant risk of spread of contamination, which shall cover among others the entrance and exit of individuals and goods or articles.
- (c) organize, taking into account the nature and extent of radiological risks in the controlled area, radiological surveillance of the working environment in accordance with the provisions of regulation 20.
- (d) display signs indicating type of area, nature of sources and their inherent risks.
- (e) lay down written working instructions appropriate to the radiological risk associated with the sources and the operations involved.
- (2) Every employer or licensee shall -
  - (a) as a minimum, taking into account the nature and extent of radiological risks in the supervised area, organize radiological surveillance of the working environment in accordance with the provisions of regulation 20.
  - (b) if appropriate, display signs indicating type of area, nature of the sources and their inherent risks.
  - (c) if appropriate, lay down working instructions in the supervised area, appropriate to the radiological risk associated with the type of sources and the operations involved.

(3) Every employer or licensee shall carry out the duties referred to in paragraphs (1) and (2) of this regulation after consultation with qualified experts or approved occupational health services.

Classification of exposed workers

For the purposes of monitoring and surveillance exposed workers shall be classified in two categories as following:

- (a) "Category A" are those exposed workers who are liable to receive an effective dose greater than 6 mSv per year or an equivalent dose greater than three-tenths of the dose limits for the lens of the eye, skin and extremities laid down in Part A of the First Schedule.
- (b) "Category B" are those exposed workers who are not classified as exposed category A workers.

Information and

training

- 18. Every employer or licensee shall ensure that -
  - (a) Exposed workers, apprentices and students who in the course of their studies are obliged to use sources, receive adequate education and training on radiation protection matters as well as appropriate instructions and information so that they are in position to know.
    - (i) the health risks involved in their work
    - (ii) the general radiation protection procedures and precautions to be taken and, in particular, those involved with operational and working conditions in respect of both the practice in general and each type of work station or job to which they may be assigned.
    - (iii) the importance of complying with the technical, medical and administrative requirements provided in these regulations.
  - (b) adequate information is provided to any other persons who may be directly affected by the practices involving ionizing radiation which the employer or the licensee is carrying out, for the purpose of securing the safety and health of such persons.
  - (c) those female employees, who are exposed or are liable to be exposed to ionizing radiation are adequately informed of the possible risks to the foetus and to the nursing infant as well as of the importance of those employees informing the employer or the licensee, as soon as possible, on their pregnancy or breastfeeding.

19.(1) Every employer or licensee shall carry out a risk assessment in relation to ionizing radiation and implement appropriate arrangements for the protection of exposed workers.

(2) Every employer or licensee shall consult qualified experts or approved occupational health services on the examination and testing of protective devices and measuring instruments, and in particular for -

- (a) the prior critical examination of plans for installations from the point of view of radiation protection
- (b) the acceptance into service of new or modified sources from the point of view of radiation protection
- (c) the regular checking of the effectiveness of protective devices and techniques.
- (d) the regular calibration of measuring instruments and the regular

Risk assessment and implementation of arrangements for the protection of exposed workers from ionizing radiation checking that they are serviceable and correctly used.

Monitoring of workplaces

20.(1) The surveillance of the working environment referred to in subparagraph (c) of paragraph (1) and sub-paragraph (a) of paragraph (2) of regulation 16, shall comprise, where appropriate:

- (a) The measurement of external dose rates, indicating the nature and quality of the radiation in question
- (b) The measurement of air activity concentration and the surface density of contaminating radioactive substances, indicating their nature and their physical and chemical states.

(2) The results of measurements made under paragraph (1) of this regulation shall be recorded and shall be used, if necessary, for estimating individual doses, as provided in regulation 23.

Individual monitoring of exposed workers of category A

21.(1) Every employer of licensee shall monitor systematically the doses received by exposed workers of category A, who are their employees.

(2) The monitoring referred to in paragraph (4) of this regulation shall be based on individual measurements, which shall be made by an approved dosimetric service.

(3) In cases where category A workers are liable to receive significant internal contamination, the employer or the licensee shall ensure that an adequate system for monitoring is set up.

(4) The Inspection Service may indicate the workers or provide general guidance for identifying such workers as referred to in paragraph (3) of this regulation.

22(1) Individual monitoring of exposed workers of category B shall be at least sufficient to demonstrate that such workers are correctly classified in category B.

(2) The Inspection Service may require any employer or licensee to carry out individual monitoring of exposed workers of category B, and, if necessary, may require individual measurement of doses received by exposed workers are carried out by an approved dosimetric service.

23. In cases where individual measurements are impossible or inadequate, the individual monitoring shall be based on an estimate arrived at either from individual measurements made on other exposed workers or from the results of the surveillance of the workplace provided for in regulation 20.

24.(1) In the case of exposure, which is the result of a radiological accident or emergency, every employer or licensee shall carry out an assessment of the relevant doses and their distribution in the body of the

Individual monitoring of exposed workers of category B

doses for exposed workers

Estimation of

Monitoring in case of a radiological accident or a radiological emergency exposed workers.

(2) In the case of exposure to radiation, which is the result of a radiological accident or emergency, individual monitoring or assessment of the individual doses of the persons being exposed or were exposed shall be carried out as appropriate to the circumstances.

Recording of results of individual monitoring – Record keeping

25.(1) Every employer or licensee shall keep a personal record in a suitable registry, where the results of individual monitoring for each exposed category A worker shall be recorded.

(2) For the purposes referred to in paragraph (1) of this regulation the following data shall be retained during the working life involving exposure to ionizing radiation of exposed workers, and afterwards until the individual has or would have attained the age of 75 years, but in any case not less than 30 years from the termination of the work involving exposure:

- (a) all information concerning exposures where individual doses have been measured or estimated, as the case may be, persuant to regulations 9, 21, 22, 23 and 24.
- (b) in the case of exposures referred to in regulation 24, all information relating to the circumstances and the action taken.
- (c) the results of workplace monitoring used to assess individual doses where necessary.

(3) The information for exposures referred to in regulations and 24 shall be recorded separately in the dose record referred to in paragraph (1) of this regulation.

(4) Every employer or licensee may make appropriate arrangements so that the records referred to in paragraph (1) of this regulation are kept by the approved dosimetric service, which the employer or licensee is cooperating with and which is making the assessment of doses.

Reporting of results of individual monitoring

26.(4) The results of individual monitoring referred to in regulations 21, 22, 23 and 24 shall:

- (a) be made available to the Inspection Service, the employer, and to the licensee.
- (b) be made available to the interested exposed worker
- (c) be submitted to the approved medical practitioner or to the approved occupational health services for the purpose of assessment of the effects on human health, as referred to in regulation 28.

(2) Every employer or licensee and every approved dosimetric service the employer or licensee is cooperating with under paragraph (4) of regulation 25, shall:

- (a) regularly submit to the Inspection Service the results of individual monitoring
- (b) if so requested, submit to the Inspection Service, any information relating to the individual monitoring of any exposed worker
- (c) at the end of a year, submit to the Inspection Service all information concerning individual doses for such a year
- (d) submit without delay to the Inspection Service the results of individual monitoring in the event of radiological accident or radiological emergency

Exceeding of dose limits 27.(1) Where an employer or a licensee suspects or has been informed that a person has probably received a dose of ionizing radiation above the limits set out in regulation 6, the employer or licensee shall:

- (a) inform without delay about the over exposure
  - (i) the Inspection Service
  - (ii) the person concerned
  - (iii) if the person is not his employee, the employer of such a person
  - (iv) the approved medical practitioner or the approved occupational health service
- (b) without delay make appropriate arrangements for the investigation of the reason of over exposure and immediately take adequate measures to avoid over exposure in the future.

Medical surveillance of exposed workers

28.(1) Every employer or licensee shall ensure that each of the exposed workers who are his employees, is under medical surveillance which shall be based on the principles that govern occupational medicine generally.

(2) Every employer or licensee shall ensure that each category A exposed worker who is his employee, is under medical surveillance which is the responsibility of an approved medical practitioner or an approved occupational health service.

(3) The medical surveillance under this regulation shall have as a scope to allow for ascertaining the state of health of workers under surveillance as regards their fitness for the tasks assigned to them.

(4) Every employer or licensee shall make available, to the approved medical practitioner or the approved occupational health service, engaged in health surveillance of his employees, all relevant information they have, including information about environmental conditions existing in the workplace, and shall permit access to and inspection of the workplace by such practitioners and services, if this is necessary to fulfil their obligations under these regulations.

- (5) The medical surveillance under this regulation shall include:
  - (a) a thorough medical examination prior to employment or classification as category A worker, for the purpose to determine the worker's fitness for a post as category A worker for which he is being considered.
  - (b) periodic health reviews, to review the state of health of each category A worker, at least once a year, in order to determine the worker is fit and capable to perform his duties, which shall be performed as many times as the approved medical practitioner considers necessary and shall depend on the type or work and on the individual worker's state or health.

(6) The approved medical practitioner or the approved occupational health services may indicate the need for medical surveillance to continue after cessation of work for as long as they consider it necessary to safeguard the health of the person concerned.

Medical classification

29.(1) During medical surveillance, the following medical classification shall be adopted with respect to fitness and capability for work as a category A worker:

(a) fit

(b) fit, subject to certain conditions

(c) unfit

(2) An exposed worker shall not be employed or classified, for any period, in a specific post as a category A worker, if the medical findings deem him unfit for that specific post.

Medical records

30.(1) A medical record shall be opened for each category A worker by the approved medical practitioner or the approved occupational health services, which shall be kept up to date so long as he remains a worker of that category.

(2) The medical record referred to in paragraph (1) of this regulation shall be retained until the individual has or would have attained the age of 75 years, but in any case not less than 30 years from the termination

of the work involving exposure to ionizing radiation.

(3) The medical record referred to in paragraph (1) of this regulation shall include information regarding the nature of the employment, the results of the medical examinations prior to employment or classification of any person as category A exposed worker, the periodic medical examinations, as well as the record of doses required by regulation 25.

31.(1) Every employer or licensee shall ensure that special surveillance surveillance of is provided to any exposed worker in each case where one of the dose limits laid down in regulation 6 has been exceeded, and the subsequent conditions of exposure shall be subject to the agreement of the approved medical practitioner or approved occupational health services.

> (2) Every employer or licensee shall ensure that the medical surveillance of exposed workers provided for in regulation 28, is supplemented by further actions in relation to the health protection of the exposed individuals considered necessary by the approved medical practitioner of the approved occupational health services, and may include further examinations, decontamination measures of the body or urgent medical treatment.

Appeals

Special

workers

32.(1) Every employer or licensee who disagrees with any conclusion or decision reached to under regulations 29 and 31 and which is affecting him, may request, within fifteen (15) days from the date such decision was taken or such conclusion was announced, that the decision or conclusion is amended and in case he does not agree with the new decision or conclusion the employer or licensee may appeal to the Minister within twenty one (21) days.

(2) Until the amendment of the conclusion or decision or the decision of the Minister for any appeal under paragraph (1) of this regulation, the employer or licensee shall apply the conclusion or decision reached to under regulations 29 and 31 or paragraph (1) of this regulation.

Obligations of employers, licensee and undertakings

33. Every employer or licensee, responsible for practices, which are under these regulations, shall conduct these practices in accordance with the principles of health protection of the population in the zone of radiation protection and in particular, within the premises or installations under his responsibility, he shall:

- (a) achieve and maintain an optimized level of protection of the environment and the population
- (b) check the effectiveness of technical devices for the protection of the environment and the population.
- (c) accept into service, from the point of view of surveillance of radiation protection, of equipment and procedures for measuring assessing as appropriate, exposure and radioactive and

contamination of the environment and the population.

(d) calibrate regularly the measuring instruments and check regularly that they are serviceable and properly used.

Co-operation of 34.(1) Where work with ionizing radiation undertaken by one employer or licensee is likely to give rise to the exposure to ionizing radiation of the employees of another employer, the employer or licensee concerned shall co-operate and exchange information to the extent necessary for the protection of their employees and their compliance with the requirements of these regulations.

> (2) No employer or licensee shall permit outside workers to work in workplaces under their responsibility unless it is ensured that their protection is equivalent to that for the rest of the exposed workers.

Radiation Passbook

employers and licensees

- 35.(1) Each employer or licensee shall ensure that:
  - (a) every outside worker he employs, who is classified as category A worker, has an appropriate Radiation Passbook, which is prohibited to be transferred to another exposed worker, in which the information referred to in Part A of the Ninth Schedule shall be recorded, and
  - (b) the information recorded in the Radiation Passbook of each one of his employees, as referred to in subparagraph (a) of paragraph (1) of this regulation, is kept up to date, at any time during the period of employment of such outside worker by the employer or licensee.

(2) The Radiation Passbook is issued by the Minister and shall bear a unique recognition number.

36.(1) Every employer or licensee, who employs outside workers, shall ensure that, either directly or through contractual agreements with other employers who have the responsibility of the places where a practice will be conducted, the outside workers are protected from risks due to exposure to ionizing radiation to the same level as other exposed workers are protected.

(2) The health protection of an outside worker referred to in paragraph (1) of this regulation shall include in particular:

- (a) the application of the general protection principles and dose limitation.
- (b) the provision of appropriate information and training on radiation protection.
- (c) the individual and medical monitoring.

Obligations of an outside worker's employer

(d) the full updating of the Radiation Passbook with the information referred to in Part B of the Ninth Schedule.

Obligations of 37.(1) Every employer or licensee, who has the responsibility of a controlled area where outside workers perform activities, shall ensure, responsibility of either directly or through contractual agreements, that operational arrangements for the protection of the outside workers have been made. outside workers which are directly related to the nature of the controlled area and of the activities.

> (2) For the protection of health of outside workers referred to in paragraph (1) of this regulation, the employer or licensee shall, in particular, for each outside worker:

- (a) check that the worker concerned has been passed as medically fit for the activities to be assigned to him
- (b) ensure that, in addition to the basic education and training in radiation protection referred to in regulation 18, he has received specific education in connection with the characteristics of the controlled area and the activities
- (c) ensure that he has been issued with the necessary personal protective equipment
- (d) ensure that the exposure of and the doses received by outside workers are monitored systematically and records are kept under the provision of regulation 21, taking into account the nature of the activities
- (e) ensure compliance with the basic principles of protection from ionizing radiation and dose limitation
- (f) ensure or take appropriate steps to ensure that, after every activity, the radiological data of individual exposure monitoring of each outside worker are recorded and contain the information referred to in Part C of the Ninth Schedule.

Obligations of exposed workers, outside workers apprentices and students

an employer who has the

a controlled area where

perform activities

> 38.(1) A person who is engaged in work with ionizing radiation shall not expose himself or any other person to ionizing radiation to an extent greater than is reasonably necessary for the purposes of his work.

> (2) Every exposed worker, outside worker, apprentice, student or any other person who remains within a controlled area shall contribute, to an extent reasonably achievable, to the provision of the best reasonably achievable protection from risks of ionizing radiation, which is the scope of the monitoring system.

> (3) An employee, who is engaged in work with ionizing radiation and uses personal protective equipment shall:

- (a) use the personal protective equipment properly and always
- (b) report without delay to his employer any defect or reduced performance of such equipment that comes to his knowledge, and
- (c) return such equipment for storage, after each use, to the specific storage place which is available for this purpose.

(4) Every outside worker shall use the Radiation Passbook with care and shall not falsify any information included in it.

(5) An employee under medical surveillance in accordance with regulation 28, shall, if so requested by his employer and at the cost of the employer, present himself, during working hours, for medical examinations and shall give to the approved medical practitioner, if so requested, any information relating to his health.

- (6) Where an employee has reasonable cause to believe that:
  - (a) he or any other person has been over exposed to radiation, or
  - (b) an incident has occurred which resulted or would have been resulted to a radiological accident or radiological emergency

he shall, without delay, inform his employer or the licensee or other person who has the responsibility of the controlled area, about the occurrence of the incident.

39.(1) The exposure conditions and operational protection of apprentices and students aged 18 years or over, referred to in regulation 8, shall be equivalent to that of exposed workers of category A and B, as appropriate.

(2) The exposure conditions and operational protection of apprentices and students aged between 16 and 18 years, referred to in regulation 8, shall be equivalent to that of exposed workers of category B.

Protection from natural radiation sources

Operational

students

protection of apprentices and

40.(1) The Minister may identify, by notice published in the Official Gazette of the Republic, practices, referred to in sub-paragraph (d) of paragraph (1) of Section 3 of the Law, within which the presence of natural radiation sources leads to a significant increase in the exposure of persons of work or of members of the public, which cannot be disregarded from the radiation protection point of view.

(2) The work activities referred to in paragraph (1) of this regulation are identified by the Inspection Service, by means of inspections or by any other means, and among others they include:

- (a) work activities where workers, and where appropriate members of the public are exposed to thoron or radon daughters or y-radiation or any other exposure in workplaces such as spas, caves, mines, underground workplaces and aboveground workplaces in identified areas.
- (b) work activities involving use and storage of materials, not usually regarded as radioactive, but which contain naturally occurring radionuclides, causing significant increase in the exposure of workers and, where appropriate, of members of the public.
- (c) work activities which lead to the production of residues not usually regarded as radioactive but which contain naturally occurring radionuclides causing a significant increase in the exposure of members of the public and, where appropriate, of persons at work.
- (d) work activities related to the operation of aircrafts.

(3) Regulations 41 and 42 shall apply to exposures from natural radiation sources resulting from work activities identified in the notice of the Minister, referred to in paragraph (1) of this regulation.

41. Subject to the provisions of paragraph (3) of regulation 40, every exposure from employer performing activities which result to exposure from natural radiation sources, shall set up an appropriate mechanism for monitoring natural radiation exposure of his employees or of members of the public and if necessary he shall implement corrective measures to reduce exposure and shall apply radiation protection measures pursuant to these regulations.

Protection of aircrew

Protection

against

terrestrial

sources

42. Subject to the provisions of paragraph (3) of regulation 40, every employer and every undertaking operating aircrafts shall take account of exposure to cosmic radiation of air crew who are liable to be subject to exposure to more than 1 mSv per year, and shall take appropriate protection measures, in particular he shall:

- (a) assess the exposure of the crew concerned
- (b) take into account the assessed exposure when organizing working schedules, with a view to reducing the doses of highly exposed aircrew
- (c) inform the workers concerned of the health risks their work involves
- (d) apply regulation 7 to female aircrew.

Conditions for licensing practices involving a risk from ionizing radiation to the population

43.(1) The operational protection of the population, in normal circumstances, from practices subject to prior licensing shall include measures and surveys for detecting and eliminating the factors which, in the course of radiation production and use or exposure to radiation, are liable to create a risk of exposure for the population, which cannot be disregarded from the radiation protection point of view.

(2) The protection referred to in paragraph (1) of this regulation shall include the following tasks:

- (a) examination and approval, from the point of view of radiation protection, of plans for installations involving an exposure risk, and of the proposed siting of such installation.
- (b) acceptance into service of new installations subject to adequate protection being provided against any exposure or radioactive contamination liable to extent beyond the perimeter, taking into account, if relevant, the demographic, meteorological, geological, hydrological and ecological conditions.
- (c) examination and approval of plans for the disposal of radioactive waste.

44. The Inspection Service shall -

- (a) ensure that dose estimates from practices referred to in regulation 43, are made as realistic as possible for the population as a whole and for reference groups of the population in all places where such groups may occur.
- (b) decide on the frequency of assessments and take all necessary steps to identify the reference of population, taking into account the effective pathways of transmission of the radioactive substances.
- (c) ensure, taking into account the radiological risks, that the estimates of the population doses include:
  - (i) the assessment of the doses due to external radiation, indicating, where appropriate, the quality of the radiation in question
  - (ii) the assessment of the intake of radionuclides, indicating the nature of the radionuclides, and where appropriate, their physical and chemical states, and determination of the activity and concentrations, of these radionuclides.
  - (iii) the assessment of the doses that the reference groups of the population are liable receive and specification of the characteristics of these groups. to
- (d) require records to be kept or keeps records relating to measurements of external exposure, estimates of intakes of

Estimates of population doses

radionuclides and radioactive contamination as well as the results of the assessment of the doses received by the reference groups and by the population.

Sealed sources and articles containing radioactive substances

45.(1) A licensee, who is using radioactive substances as a source of ionizing radiation, shall ensure that, to the extent this is reasonably practicable, the substances are in the form of a sealed source.

(2) Every licensee shall ensure that the design, construction and maintenance of any article containing radioactive substances is such as to prevent the leakage of any radioactive substance.

(3) Every licensee, where necessary, shall ensure that suitable tests are carried out periodically to detect leakage of radioactive substances from any article containing such radioactive substances.

(4) The results of the tests referred to in paragraph 3 of this regulation shall be recorded and kept in a suitable registry and this information shall be kept for at least two years after the disposal of the article or until new test results are recorded.

Recording of radioactive substances

Approval of dosimetric services and occupational health services 46. Every licensee, for the purpose of controlling the radioactive substances which he possess, shall keep records in a suitable inventory, of the quantities and location of storage or use of such substances, and shall keep those records for at least two years from the date on which they were made and in addition, for at least two years from the date of disposal of that radioactive substance.

53.(1) The Minister or any other person authorized in writing by him, may approve, by issuing a relevant certificate, approve, in accordance to criteria he may specify from time to time, suitable dosimetric services or occupational health services, which shall be named approved dosimetric services and approved occupational health services, respectively, for purposes of application of these regulations as are specified in the certificate.

(2) In case the occupational health services are involved in medical surveillance, the approval referred to in paragraph (1) of this regulation shall be granted only if such surveillance is carried out by an approved medical practitioner.

(3) The approval referred to in paragraph (1) of this regulation may be subject to conditions and may be amended or revoked by the Minister, whenever he deems appropriate, by a letter to the holders of the approval.

<sup>Interventions</sup> 47.(1) In cases of radiological accidents or radiological emergencies or lasting exposure resulting from the after-effects of a radiological accident or radiological emergency or a past or old work activity, the Minister ensures that adequate interventions are undertaken for the purpose of protection from ionizing radiation.

(2) The need for implementation and the extent of any intervention shall be considered in compliance with the following principles:

- (a) intervention shall be undertaken only if the reduction of detriment due to radiation is sufficient to justify the harm and cost, including social costs of the intervention.
- (b) the form, scale and duration of the intervention shall be optimized so that the benefit of the reduction in health detriment less the detriment associated with the intervention will be maximized.
- (c) dose limits, as laid down in Regulations 6 and 10, shall not apply in case of intervention.
- (d) the intervention levels established in application of paragraph (2) of Regulation 49 constitute indications as to the situation in which intervention is appropriate.
- (e) in cases of lasting exposure covered by Regulation 52 the dose limits set out in Regulation 6 should normally be appropriate for workers involved in interventions.

48. The Minister may, where appropriate, require any employer or licensee:

- (a) to assess the possibility of radiological emergencies resulting from practices subject to reporting or licensing,
- (b) to assess the spatial and temporal distributions of the radioactive substances dispersed in the event of a possible radiological emergency,
- (c) to assess the corresponding potential exposures.

Intervention preparation

49.(1) The Minister ensures, and may, where appropriate, require any employer or licensee or other person:

- (a) that appropriate intervention plans are drawn up at national or local level, including within installations, taking account of the general principles referred to in paragraph (2) of Regulation 47 and of the appropriate intervention levels established under paragraph (2) of this Regulation, in order to deal with various types of radiological emergency and that such plans are tested to an appropriate extent at regular intervals.
- (b) that provision is made, where appropriate, for the creation and

Potential exposures

appropriate training of special teams for technical, medical and health intervention.

(2) The Minister may prescribe appropriate intervention levels which shall be applied in cases of intervention for various types of radiological accidents or radiological emergency.

Implementation of intervention

<sup>1</sup> 50(1) In the event of a radiological accident or radiological emergency, every employer or licensee shall:

- (a) immediately notify the Inspection Service,
- (b) take all appropriate measures to reduce the consequences,
- (c) make an initial provisional assessment of the circumstances and consequences of the emergency, and
- (d) assist with intervention.

(2) The interventions undertaken in the event of a radiological accident or radiological emergency, if the situation so requires, shall be related to:

- (a) the source, to reduce or stop the direct radiation and emission of radionuclides,
- (b) the environment, to reduce the transfer of radioactive substances to individuals, and
- (c) the individuals, to reduce exposure and organize the treatment of victims.

(3) In the event of a radiological accident or a radiological emergency, the Minister ensures, and may, where appropriate, require every employer or licensee or other person:

- (a) the organization of appropriate intervention, taking into account the real characteristics of the emergency, and
- (b) the assessment and recording of the consequences of the radiological accident or radiological emergency and of the effectiveness of the intervention.

Exposure of individuals during interventions

51(1) The Minister may prescribe specific dose limits for employees or intervention personnel, which may be higher than the dose limits for exposed workers and shall be operational guides, which shall not be exceeded during interventions in cases of radiological accidents or radiological emergencies.

(2) Exposure above the specific dose limits prescribed under paragraph(1) of this Regulation may be admitted exceptionally to save human lives

and only for volunteers who are informed about the risks involved in their intervention.

(3) The Minister ensures, and may, where appropriate, require any employer, licensee or other person, the provision of adequate radiological monitoring and medical surveillance of the special emergency intervention teams in cases of radiological accidents or radiological emergencies.

Intervention in cases of lasting exposure

52. The Minister ensures, and may, where appropriate, require any employer or licensee, or other person that, where a situation leading to lasting exposure, resulting from the after-effects of a radiological accident or radiological emergency or a past practice, has been identified, if necessary and to the extent of the exposure risk involved,

- (a) the area concerned is properly demarcated
- (b) arrangements for the monitoring of exposure are made
- (c) appropriate interventions are implemented, taking account of the real characteristics of the situation
- (d) access to or use of land or buildings or installations situated in the demarcated area is regulated.

#### FIRST SCHEDULE (Regulations 6, 7, 8 and 10)

#### PART A: Dose limits for exposed workers

- The limit on effective dose for exposed workers shall by 100mSv in a consecutive five-year period, subject to a maximum effective dose of 50 mSv in any single year or the limit on effective dose for exposed workers shall be 20 mSv per year as average value in a consecutive fire-year period. Subject to a maximum effective dose of 50 mSv in any single year.
- 2. Without prejudice to paragraph 1:
  - (a) the limit on equivalent dose for the lens of the aye shall be 150 mSv in a year.
  - (b) the limit on equivalent dose for the skin shall be 500 mSv in a year, and this limit shall apply to the dose averaged over any area of 1 cm<sup>2</sup>, regardless of the area exposed, and
  - (c) the limit on equivalent dose for the hands, forearms, feet and ankles shall be 500 mSv in a year.

#### PART B: Dose limits for apprentices and students

- 1. The dose limits for apprentices aged 18 years or over and students aged 18 yeart or over who, in the course of their studies, are obliged to use sources shall be the same as the dose limits for exposed workers laid down in Part A of this Schedule.
- 2. (1) The limit for effective dose for apprentices aged between 16 and 18 years and for students aged between 16 and 18 years who, in the course of their studies, are obliged to use sources shall be 6 mSv per year.

(2) Without prejudice of sub-paragraph (1) of this paragraph, for apprentices and students between 16 and 18 years.

- (a) the limit on equivalent dose for the lens of the eye shall be 50 mSv in a year.
- (b) the limit on equivalent dose for the skin shall be 150 mSv in a year, and the limit shall apply to the dose averaged over any area of 1 cm<sup>2</sup>, regardless of the area exposed.
- (c) the limit on equivalent dose for the hands, forearms, feet and ankles shall be 150 mSv in a year.

(3) The dose limits for apprentices and students who are not subject to the provisions of paragraphs 1 and 2 shall be the same as the dose limits for members of the public specified in Part C of this Schedule for the public.

#### PART C: Dose limits for members of the public

- 1. The limit on effective dose for members of the public shall be 1 mSv in a year, however in special circumstances, a higher effective dose may be authorized in a single year, provided that the average over five consecutive years does not exceed 1 mSv per year.
- 2. Without prejudice to paragraph 1 for members of the public:
  - (a) the limit on equivalent dose for the lens of the eye shall be 15 mSv in a year, and
  - (b) the limit on equivalent dose for the skin shall be 50 mSv in a year averaged over any 1 cm<sup>2</sup> area of skin, regardless of the area exposed.

#### SECOND SCHEDULE Regulation 12(2)(a))

## Estimation of equivalent and effective dose

PART A: Values of radiation weighting factor, wR

<u>PART B:</u> Relationship between the quality factor (Q(L)) and the unrestricted linear energy transfer (L).

PART C: Values of the tissue weighting factor, w<sub>T</sub>

PART D: Operational quantities for external radiation

(ANNEX II of Directive 96/29/Euratom)

#### THIRD SCHEDULE (Regulation 12(2)(b))

# Intakes – Estimation of effective doses

PART A:

PART B:

PART C:

PART D: Tables used for the estimation of various coefficients

Forth Schedule	Ingestion dose coefficients for members of the public
Fifth Schedule	Inhalation dose coefficients for members of the public
Sixth Schedule	Inhalation and ingestion dose coefficients for workers
Seventh Schedule	Values for f <sub>1</sub> for the calculation of ingestion dose coefficient
Eighth Schedule	Lung absorption types and f <sub>1</sub> values for chemical forms of the
	elements for the calculation of inhalation dose coefficients.

(ANNEX III of Directive 96/29/Euratom)

## FORTH SCHEDULE

# Ingestion dose coefficients for members of the public

(Table A of Directive 96/29/Euratom)

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# FIFTH SCHEDULE

# Inhalation dose coefficients for members of the public

(Table B of Directive 96/29/Euratom)

## SIXTH SCHEDULE

# Inhalation and ingestion dose coefficients for workers

(Table C of Directive 96/29/Euratom)

## SEVENTH SCHEDULE

# Values for f1 for the calculation of ingestion dose coefficient

(Table D of Directive 96/29/Euratom)

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#### EIGHTH SCHEDULE

## Lung absorption types and f<sub>1</sub> values for chemical forms of the elements for the calculation of inhalation dose coefficients.

(Table E of Directive 96/29/Euratom)

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#### NINTH SCHEDULE (Regulations 35, 36, and 37)

#### PART A: Information included in the Radiation Passbook

- 1. A Radiation Passbook of an outside worker shall include information on:
  - (a) particulars on worker's identity.
  - (b) particulars to be supplied before the start of any activity.
  - (c) particulars to be supplied after the end of any activity.
- 2. Data on outside worker's identity shall also include the worker's sex and date of birth.

# <u>PART B: Information recorded in the Radiation Passbook before the commencement of any activity</u>

Every employer, who is employing outside workers, shall supply to the employer or licensee who has control of a workplace where the outside workers carry out activities or to the approved medical practitioner or to the approved occupational health service with which the employer or the licensee is cooperating, the following information:

- 1. Name and address of the employer who is employing outside workers.
- 2. Medical classification of the outside worker.
- 3. Date of the last periodical medical examination.
- 4. The records for the individual monitoring of the outside worker.

# PART C: Information recorded in the Radiation Passbook at the end of any activity

Every employer of licensee who has control of a workplace where outside workers are carrying out activities, shall record or make arrangements to be recorded in the Radiation Passbook of an outside worker, and shall submit or make arrangements to be submitted to the Inspection Service, the following information:

- 1. The period covered by the activity.
- 2. Estimate of the effective dose received by the outside worker.
- 3. In the event of non-uniform exposure, an estimate of the dose-equivalent in the different parts of the body.
- 4. In the event of internal contamination, an estimate of the activity taken in or the committed dose.