2

# REQUIREMENTS FOR PRACTICES

## 2.1 BASIC OBLIGATIONS

(22) No practice shall be adopted, introduced, continued, conducted or ceased, and no source within the practice shall - as appropriate - be designed, manufactured, produced, constructed, acquired, imported, exported, sold, received, sited, located, commissioned, possessed, used, operated, transferred, decommissioned or disposed of except in accordance with the requirements of these Standards, unless such practice or source is excluded from the Standards or exempted from the relevant requirements of the Standards.

(23) The transport of any source shall be performed in accordance with the provisions of the IAEA Regulations for the Safe Transport of Radioactive Materials[10] and with any applicable international convention.

## 2.2 SOURCES

(24) For the purpose of the Standards, the term source is used to mean any physical entity within a practice that may cause radiation exposure, e.g. by emitting ionizing radiation or releasing radioactive materials.

(25) Any given requirement shall be implemented in accordance with the characteristics of the source, the potential for radiation risk and for large exposures, and the nature of the operations to which the Standards apply for the many different types of sources. Not all the requirements apply to every source: upon request, the regulatory authority will specify which of the requirements are applicable in any particular case.

---

[10] International Atomic Energy Agency, Safety Series No. 6, Regulations for the Safe Transport of Radioactive Material, IAEA, Vienna (1990)

(26) The sources to which the Standards apply include, but are not limited to, the following: consumer products; industrial gauges; radiography devices; unsealed sources; irradiation installations; nuclear installations; and radioactive waste facilities. The Standards also apply to enhanced exposure from natural sources of radiation whenever they are a part of a practice.

(27) For the purposes of these Standards:

(a) Consùmer products are items of general use that emit radiation or contain small amounts of radioactive substances, including: static electricity elimination devices; ion generating tubes; smoke detectors; devices for producing light or an ionized atmosphere, for in vitro clinical or laboratory testing, or making use of the luminizing properties of some radioactive materials, such as dials, time pieces, fishing floats, etc.; and electron tube and other devices able to generate relatively low fluxes of low energy X rays.

(b) Industrial gauges are devices designed and manufactured for the purpose of detecting, measuring, gauging or controlling thickness, density, level, interface, location, radiation, or chemical composition and also calibration or reference sources, and ice detection devices.

(c) Radiography devices are X ray apparatus and other radiography sources used in medical diagnosis (including lixiscopes), dentistry, research, or veterinary and industrial radiography.

(d) Unsealed sources are radioactive substances used in radiochemical laboratories, brachytherapy, diagnostic nuclear medicine and in biological and human metabolic research; and, other sealed sources for which any conceivable potential scenario or sequence of potential exposures cannot lead to individual exposures able to cause lethal deterministic radiation effects or serious contamination with radioactive substances.

(e) Irradiation installations are particle accelerators and other large irradiators, such as enclosures with X ray apparatus for therapeutical uses or high activity sealed sources (i.e. large amounts of radioactive material encased in a capsule designed to prevent leakage or escape of the radioactive material) used for teletherapy, radiosterilization

and other commercial product irradiatiors; facilities for therapeutical nuclear medicine, including therapeutical unsealed sources, brachytherapy sources such as $^{137}Cs$ and $^{226}Ra$, and afterloaders; facilities for stereotactic surgery, including gamma knives; mobile irradiators; and, other sources for which conceivable scenarios or could lead to individual exposures able to cause lethal deterministic radiation effects or serious contamination with radioactive substances.

(f) Nuclear installations are mines, and mills and other processing installations for uranium and thorium, nuclear fuel fabrication plants, nuclear reactors (critical and subcritical facilities, research reactors and nuclear power plants), spent fuel storage and processing facilities.

(g) Radioactive waste facilities are waste management (including disposal) facilities which handle radioactive materials that will eventually be disposed in the biosphere and for which future institutional controls are not foreseen.

(28) For the purposes of this Chapter, Enhanced Natural Sources are natural sources of radiation that increase the background exposure which the exposed people inevitably receive whenever they are elements of a practice, the continuation of which is not a matter of choice. Examples of such sources are cosmic radiation affecting occupationally exposed persons in high altitude flights, and terrestrial radiation sources in some new dwellings, in mines, in spas, etc.

## 2.3 EXPOSURES

(29) The Standards apply to occupational exposures, medical exposures, and public exposure.

(30) For the purposes of these Standards:

(a) Occupational exposure is exposure incurred by workers as a result of temporary or regular employment, wherever such exposures are incurred as a result of situations that can reasonably be regarded as being the responsibility of the employer.

(b) Medical exposures are exposures incurred by: patients as part of their own medical diagnosis or treatment; persons while helping in the support and comfort of patients,

excluding occupational exposure; and, volunteers in a programme of research involving their exposure.

(c) Public exposure is exposure incurred by members of the public, excluding any occupational or medical exposure.

(31) The Standards apply to normal exposures and to potential exposures.

(32) For the purposes of these Standards:

(a) Normal exposures are exposures which are expected to be delivered with certainty;

(b) Potential exposures are exposures that may or may not be delivered and to which a probability of occurrence can be assigned.

## 2.4 PARTIES

(33) Besides the Sponsoring Organizations and the Regulatory Authority, the following Parties have responsibilities for the application of the requirements for practices:

(a) the Applicant;

(b) the Registrant or Licensee;

(c) the Operator;

(d) the Supplier;

(e) the Employer;

(f) the Worker;

(g) the Practitioner;

(h) the Qualified Expert; and

(i) the Ethical Review Committee.

(34) For the purposes of these Standards:

(a) an Applicant is any legal person or persons that intends to carry out any of the actions described in the Basic Obligations of this Chapter;

(b) a Registrant is an Applicant who is granted registration and a Licensee is a Registrant who is granted a general or specific authorization or a licence for a practice or source and has recognized rights and duties for such practice or source, particularly in relation to protection and safety;

(c) an Operator is a Registrant or Licensee with recognized rights and duties for operating a source and that is under the legal or de facto possession of the source and is in complete charge of it, with full responsibility and commensurate authority for its operation in approved activities;

(d) a Supplier is any legal person to whom the Operator has delegated duties in relation to the design, manufacture, production or construction of a source (an importer of a source shall be considered a supplier of the source);

(e) an Employer generally means a person or legal entity with recognized responsibility, commitment and duties towards workers in their employment by virtue of a mutually agreed employer/employee relationship; particularly, in relation to occupational exposures, an Employer is any legal person that employs workers, either regularly or temporarily, for activities that may cause exposure to radiation, wherever such exposure can reasonably be regarded as being under the Employer's responsibility (a self-employed worker shall be regarded as having the responsibilities of an employer);

(f) a Worker is any person who works, either regularly or temporarily, for an Employer, and who has recognized rights and duties in relation to occupational radiation protection (a working Employer shall be regarded as having the duties of a Worker);

(g) a Practitioner is a Licensee for delivering medical exposure who has been legally accredited for exercising the medical practice;

(h) a Qualified Expert is any person duly recognized by the Regulatory Authority to possess the knowledge and training to properly measure ionizing radiation, evaluate safety techniques, or advise regarding protection against radiation and the safety of sources;

(i) a Qualified Expert in Radiotherapy Physics is any person who,

(i) is certified by the appropriate professional board or society; or

(ii) has a university degree in physics or engineering and at least three years full time experience in working in therapeutic radiological physics, or

(iii) has an advanced university degree (Master's or Doctor's degree) in physics, biophysics, radiological physics, health physics, or engineering and has had at least one year full time training in therapeutic radiological physics; and has had at least one year full time work experience in a radiation oncology facility, or

(iv) has demonstrated his qualifications to the satisfaction of the Regulatory Authority; and

(j) an Ethical Review Committee is a committee of independent persons to advise on conditions of exposures and dose constraints to be applied to persons exposed for research purposes when there is no direct benefit to the exposed individual.

## 2.5 REGULATORY SYSTEM FOR PRACTICES

### 2.5.1 Notification and Registration

(35) Any applicant shall:

(a) Give notification to the Regulatory Authority of its intentions to carry out any of the actions described in the Basic Obligations of this Chapter, in relation to a practice or source, and apply for the registration- and whenever applicable - a general or specific authorization or licence for such practice or source.

(b) Refrain from carrying out his intentions until a formal registration - whenever applicable - a general or specific authorization or a licence for the practice or source be granted by the Regulatory Authority, unless such practice or source is excluded from or exempted by the Standards.

(c) Supply the regulatory authority with relevant information for the registration - and whenever applicable - a general or specific authorization or a licence for such a practice or source.

### 2.5.2 Authorization and Licensing

(36) A general authorization shall be required for the manufacture, production, or sale of any Consumer Products, wherever specific protection and safety requirements are needed for such Consumer Products.

(37) A general authorization shall be required for the manufacture, production, sale, processing, and use of Industrial Gauges, Radiography Devices and Unsealed Sources.

(38) A specific authorization shall be required for the installation and the operation of any Irradiation Installation.

(39) A Licence shall be required for the Practitioner delivering medical exposures at Irradiation Installations.

(40) A Licence shall be required to site, design, manufacture, produce, construct, acquire, transport, receive, locate, commission, possess, use, operate, transfer, decommission, or dispose of any nuclear installation or any radioactive waste management facility.

(41) The safety assessments required by the Standards and any other relevant information shall be provided by the Applicant in order to evaluate the application for licensing.

### 2.5.3 **Exemptions**

(42) The practices and sources that meet the exemption criteria specified in Appendix I are exempted from the regulatory requirements of the Standards.

(43) Exemptions from the regulatory requirements shall not apply to justified practices involving the manufacture, production, import or sale of food, beverages, cosmetics, drugs or other commodity or product intended for ingestion, inhalation or percutaneous intake by, or for application to, a human being; nor to commodities or products primarily intended for trivial purposes, such as toys, personal jewellery or adornments; whenever there has been an intentional

increase, by addition or activation, of the amount of radioactive substances used in such commodities or products.

## 2.6 THE SYSTEM OF PROTECTION AND SAFETY FOR PRACTICES

(44) The protection and safety for any practice and for any source within the practice should be governed by the interrelated principles given in this part.

### 2.6.1. Justification of Practices

(45) No practice should be adopted unless it produces sufficient benefit to the exposed individuals or to society to offset the radiation detriment that it causes.

### 2.6.2 Optimization of Protection and Safety

(46) In relation to any particular source within a practice, the magnitude of individual doses, the number of people exposed and the likelihood of incurring exposures where these are not certain to occur should be kept as low as reasonably achievable, economic and social factors being taken into account.

### 2.6.3 Individual Limits

(47) The exposure of individuals resulting from the combination of all the relevant practices should be subject to dose limits, or to some control of risk in the case of potential exposure, aimed at ensuring that no individual is exposed to radiation risks that would be judged to be unacceptable from these separate practices in normal circumstances.

### 2.6.4 Constraints

(48) The procedure for optimizing protection and safety should be constrained by restrictions on the doses to individuals, and on the risks to individuals in the case of potential exposures caused by the particular source, which should not exceed the applicable dose limits.

### 2.6.5 Technical Principles

(49) The following technical principles should apply to the safety of Irradiation Installations, Nuclear Installations, Radioactive Waste Facilities and, where appropriate and to an extent commensurate with the risk involved, to other sources.

*Defence in Depth: Prevention and Mitigation of Accidents*

(50) Defence in depth procedures should be implemented to compensate for possible human and equipment failures in the achievement of protection and safety. Defence in depth procedures should be considered for all stages linking a source to persons' exposures, with the aim of establishing a multilayer system of technological and operational provisions such that a failure at one layer is compensated for or corrected by subsequent layers. The principal emphasis should be placed on preventing accidents involving the source. Nevertheless, wherever appropriate, engineered safety features and operational procedures should be established to minimize the potential consequences of accidents and to mitigate the radiological consequences should an accident occur.

*Sound Technical Criteria*

(51) Sound technical criteria should be applied to any source, in particular:

(a) The siting, design, construction, commissioning, operation, maintenance, decommissioning and waste management and disposal of the source, account being taken of its characteristics, should be based on sound engineering, proven by testing and experience and in accordance with approved codes and standards and other

appropriate instruments, and on reliable managerial and organizational features, with the aim of ensuring protection and safety throughout the life of the source;

(b) a quality assurance system of planned and systematic actions should be implemented in order to provide adequate confidence that the specified requirements are met;

(c) all personnel on whom protection and safety depend should be trained and qualified to understand their responsibilities and to perform their duties according to defined procedures;

(d) the possibility of human error, as one of the primary contributors to accidents, should be recognized and provisions should be made to reduce as far as practicable this contribution and to provide means for detecting and correcting or compensating for it;

(e) well documented and independently reviewed assessments should be conducted at the different stages in the life of the source; and

(f) due recognition should be given to future developments in technical criteria (e.g. the results of research relevant to protection and safety which should be exchanged, reviewed, analysed and applied; and lessons from experience should be taken into account).

*Protection and Safety Culture*

(52) A protection and safety culture should be inculcated and applied by Registrants and Licensees, particularly to those at the corporate and management level, which includes an all pervading safety consciousness on the part of the persons concerned, which requires an inherently questioning attitude, the discouragement of complacency, a commitment to excellence, and the fostering of both personal accountability and corporate self-regulation.

### 2.6.6 Assessment of Effectiveness

(53) Appropriate regulatory and operational mechanisms and procedures should be established for reviewing and assessing the effectiveness of implementation of the system of protection and safety for practices.

## 2.7 GENERAL REQUIREMENTS FOR PROTECTION

### 2.7.1 Practices deemed to be not justified

(54) Practices involving the intentional increase, by addition or activation, of radioactive substances in food, beverages, cosmetics, drugs, or other commodity or product designed for ingestion, inhalation or percutaneous intake by, or for application to, a human being, or in products primarily for frivolous purposes, such as toys, personal jewellery or adornments, are deemed to be not justified.

### 2.7.2 Optimization of Protection and Safety

(55) The protection and safety of any source within a justified practice shall be optimized, with account taken of:

(a) the magnitude of individual doses due to normal exposures;

(b) the number of people exposed;

(c) the likelihood of incurring potential exposures and their potential magnitudes;

(d) economic and social factors, such as the efforts for and benefits of reducing exposures, and decision aiding techniques such as multiattribute analysis - including cost-benefit analysis - for taking account of all protection and safety attributes in a systematic way;

(e) any relevant limit and constraint as prescribed;

(f) all normal and potential exposures, regardless of magnitude and probability and when and where received, to the extent that they would influence the choice between protection options;

(g) any other relevant attributes of protection and safety that may be prescribed by the Regulatory Authority;

(h) approved monetary values assigned to a unit collective dose for the purposes of optimizing protection;

(i) exposure levels achieved for well designed and well operated similar sources;

(j) available technology and techniques;

(k) sound engineering judgment; and

(l) good operating procedures.

### 2.7.3 Individual Related Limits to Dose and Risk

(56) The normal exposures of Workers and Members of the Public shall be limited so that the total dose caused by the combination of all relevant practices does not exceed the dose limits prescribed in Appendix II. These limits do not apply to medical exposure, to exposure received in intervention situations nor to background levels of exposure to natural sources of radiation. They do apply, however, to exposures resulting from intended emissions of naturally occurring radionuclides from installations such as mines, industrial and commercial facilities and waste disposal sites, and to the exposures of workers in such installations.

(57) The dose limits specified in Appendix II apply to the sum of the relevant doses from external exposure in the specified period and the committed doses from intakes in the same period. In calculating committed doses, the period of integration shall be as specified in Appendix II.

(58) The dose limits apply to Workers - specified in Appendix II - 18 years of age and older, including apprentices and students who incur exposure from the practices defined in these Standards as a result of their work. For apprentices aged 16 to 18 years who are training for employment involving exposure to radiation and for students aged 16 to 18 years who are required to use sources in the course of their studies, the annual limit shall be the value specified in Appendix II. No apprentice, student or other person under age 16 shall be occupationally exposed to radiation in a practice and the dose limits for such persons shall be those specified in Appendix II for Members of the Public.

(59) When a woman declares that she is pregnant, her working conditions shall be such that the equivalent dose to the foetus is most unlikely to exceed, during the term of her pregnancy, the value specified in Appendix II.

(60) The limits specified in Appendix II for Members of the Public may be applied either to the estimated average dose to the relevant critical groups or to individual Members of the Public, as appropriate.

(61) All measures for determining or estimating doses from external sources of radiation, for determining intakes of or exposures to radionuclides, and for determining doses from intakes and exposures, and all procedures for demonstrating compliance with dose limits, are subject to approval by the Regulatory Authority. Methods for determining the committed dose from intakes are specified in Appendix II.

(62) The risk of Workers and Members of the Public due to potential exposures shall be limited by constraining the probability of occurrence of accidental sequences as specified hereafter.

### 2.7.4 Source Related Constraints on Dose and Risk

(See Annex I for explanatory material on 'constraints'.)

(63) The individual doses delivered by any source shall be constrained as prescribed in Appendix III.

(64) Whenever a source releases long lived radioactive materials that can move through the environment and expose people distant from the source and people of future generations, the constraints on the individual doses shall be applied wherever and whenever the exposure is foreseen. In the case of continuing practices, the effective dose commitment from each year of operation shall be constrained in a manner such that the future annual effective doses to critical

groups, at [the time when they reach] their maximum value, will not exceed the dose constraint prescribed in Appendix III.

(65) The probability of occurrence of accident sequences leading to exposure shall not exceed the constraints prescribed in Appendix IV.

### 2.7.5 Operational Restrictions

(66) The Operator shall, where appropriate, set operational restrictions on quantities intended to limit the exposure of people and on the probability of occurrence of sequences of events leading to potential exposures. Restrictions set by the Operator shall not exceed those levels derived from the constraints prescribed in Appendix III and IV.

## 2.8 REQUIREMENTS FOR CONTROLLING OCCUPATIONAL EXPOSURE

### 2.8.1 Responsibilities of Employers

(67) Employers shall be responsible for the radiation protection of Workers (hereafter called occupational radiation protection) in activities involving exposure to radiation or radioactive substances and for compliance with the requirements of the Standards. The Employer may delegate these responsibilities to the Operator.

(68) The responsibility for providing adequate protection of workers against radiation rests with the employer, even if the employer is himself a subcontractor[11].

(69) Whenever an Employer is also the Operator, its responsibilities as Employer and as Operator apply jointly and equally.

[11] International Labour Organisation; ILO Code of Practice on Radiation Protection of Workers, Ionizing Radiations; ILO, Geneva (1987)

(70) Employers shall ensure, in co-operation with the relevant Operator or otherwise:

(a) the establishment of occupational radiation protection policies, procedures and organizational arrangements for implementing the requirements of these Standards;

(b) the provision of suitable and adequate radiation protection facilities, equipment and services, the nature and extent of which depend on the nature and magnitude of the radiation risks;

(c) the provision of all necessary technical, health and medical services needed;

(d) the provision of appropriate protective and monitoring equipment and to ensure its proper use;

(e) the provision of suitable and adequate manpower and of appropriate training, including radiation protection training as well as periodic retraining and updating as required in order to ensure the necessary level of competence; and

(f) the maintenance of adequate records as required by these Standards.

### 2.8.2 Special Administrative Arrangements

(71) The Standards provide for such a high level of protection that the radiological aspects of the working environment should have no influence on the administrative conditions of service of occupationally exposed persons. In particular, no preferential treatment is warranted with respect to salaries, working hours, length of vacation, additional holidays, or extra credit for retirement purposes. Such special compensatory arrangements shall not be used as substitutes for adequate protection and safety measures, cannot be justified on the basis of the requirements of these Standards and shall not be implemented at the expense of such requirements.

### 2.8.3 Classification of Areas

Requirements for Controlled Areas

(72) The Employer shall ensure that the Operator designates as a controlled area:

(a) any area where special rules are needed for the purpose of occupational radiation protection or for preventing the spread or dispersal of radioactive contamination; and

(b) any area where special rules are needed for preventing unplanned exposure of people from a radiation generator, an irradiator with a high activity sealed source, or other source from which individuals could receive exposures able to cause sèrious deterministic radiation effects.

(73) The Operator shall determine the extent of the controlled area by taking into account the magnitude of the expected normal exposure of Workers working in the area and the likelihood of potential exposures.

(74) For any designated control area, the Operator shall:

(a) control access to the area by means such as administrative procedures, the use of permits to work, and physical barriers including locks or interlocks, the degree of control being commensurate with the risk involved;

(b) delineate the area by physical means, or where this is not reasonably practicable, by some other suitable means; and where a source is exposed or energized only intermittently, or is moved from place to place, delineate an appropriate controlled area and controlled times by means that are appropriate under the prevailing circumstances;

(c) display approved radiation warning signs at appropriate access points and at appropriate locations within the controlled area;

(d) establish radiation protection measures that are appropriate for the radiation risks that could prevail in the area;

(e) provide as appropriate at the exits from the controlled area:

(i) for monitoring for contamination of skin and clothing;

(ii) for monitoring for contamination any object or materials being removed from the area;

(iii) washing or showering facilities;

(iv) suitable housing for contaminated protective clothing; and

(v) suitable housing for personal clothing.

Requirements for Supervised Areas

(74) The Employer shall ensure that the Operator:

(a) designates as a supervised area any area not already designated as a controlled area where radiobiological conditions should be kept under review even though specific radiation protection provisions are not normally needed; and

(b) provides for radiation protection measures that are commensurate with the radiological risks in the supervised area.

### 2.8.4 Local Rules and Supervision

(75) The Employer shall ensure that the Operator:

(a) establishes in writing such local rules, including special rules for controlled and supervised areas, and such procedures as are necessary to ensure an adequate level of radiation protection for Workers and other persons;

(b) includes in the local rules and procedures:
values for any constraint or operational level which may be set by the Operator and the procedure to be followed in the event that any such constraint or operational level is exceeded;

(c) makes the local rules and procedures known to those Workers to whom they apply and to other persons who may be affected by them;

(d) adequately supervises any work involving exposure to radiation or radioactive substances and takes all reasonable steps to ensure that the rules and procedures are observed.

### 2.8.5 Information, Instruction and Training

(76) The Employer shall:

(a) provide all Workers with adequate information on the radiological risks they might encounter in their work in normal and abnormal circumstances, with adequate instruction and training on measures for protecting against risk, and with adequate information on the protection and safety significance of their actions;

(b) provide female Workers who are liable to enter controlled or supervised areas with information on:
the risks to the conceptus due to exposure of a pregnant woman;
the importance of informing the employer as soon as a pregnancy is confirmed; and

(c) provide to those Workers who could be affected by an emergency plan appropriate information, instruction and training.

(77) The Operator shall:

(a) provide adequate information and instruction to visitors to ensure the restriction of their exposure and that of other persons who might be affected by their actions.

### 2.8.6 **Personal Protective Equipment**

(78) The Employer shall:

(a) provide suitable and adequate personal protective equipment including as appropriate:
- protective clothing;
- respiratory protective equipment which meets an approved standard and for which the protection factor is made known to the users; and
- lead lined aprons and gloves, and eye shields;

(b) ensure that Workers receive adequate instruction in the proper use of respiratory protective equipment including testing for good fit;

(c) ensure that tasks requiring the use of personal protective equipment are assigned only to workers who are capable of safely sustaining the extra effort necessary;

(d) maintain all personal protective equipment in proper condition and where appropriate test such equipment at regular intervals;

(e) maintain appropriate personal protective equipment for use in the event of an accident or emergency; and

(f) ensure, when the use of personal protective equipment is considered for any given task, that account is taken of any additional exposure that could result due to the additional time that might be required for performing the task while using protective equipment.

(79) The Operator shall minimize the need for using personal protective equipment during normal operations by providing good working conditions and taking safety precautions.

### 2.8.7 Duties of Workers

(80) Every Worker shall:

(a) follow any applicable occupational radiation protection procedures and rules specified by the Employer;

(b) use properly the monitoring instruments and the protective equipment, clothing and devices provided;

(c) co-operate with the Employer and with any relevant Operator, to the extent that compliance with these Standards depends on such co-operation;

(d) provide to the Employer such information on the Worker's past and current work as is relevant to ensure effective and comprehensive occupational radiation protection for the Worker and co-workers; and

(e) abstain from any wilful action that could put the Worker or co-workers in situations that violate the requirements of these Standards.

### 2.8.8 Co-operation between Employers and Operators

(81) Where a Worker is employed in the use of a practice or source which is not under the control of the Worker's Employer, the Operator conducting the practice and the Employer shall co-operate by the exchange of information and otherwise so as to facilitate proper occupational radiation protection of the Worker and to ensure compliance with these Standards. The co-operation shall include, where appropriate:

(a) the development and use of special dose constraints for such workers;

(b) special assessments of doses received by itinerant workers in practices outside the control of their employers.

### 2.8.9 Personal Monitoring and Exposure Assessment

(82) The Employer of any Worker (or the self-employed Worker) shall be responsible for arranging for personal monitoring and health surveillance for the purposes of occupational radiation protection.

(83) Employers shall make arrangements with approved dosimetry services for assessments of internal and external doses, where the frequency of dose assessment takes into account the magnitude and possible fluctuations in exposure levels, including:

(a) for any Worker regularly employed in a controlled area, individual assessments, based on individual measurements where such measurements are feasible and adequate or otherwise on the results of monitoring of the workplace;

(b) for any Worker who regularly enters a supervised area or who enters a controlled area only occasionally, assessments based either on individual measurements or on the results of monitoring of the workplace.

(84) Employers shall identify Workers who are liable to receive significant internal contamination, including Workers who use respiratory protective equipment, and shall arrange

for their monitoring, to the extent necessary to demonstrate the effectiveness of the protection provided and to assess internal doses as appropriate.

### 2.8.10 Workplace Monitoring

(85) The Employer/Operator, or the Employer in co-operation with the Operator, shall:

(a) establish a monitoring programme sufficient to determine the radiological conditions to which workers may be exposed [in normal and abnormal circumstances] in each controlled area and each supervised area, and sufficient to demonstrate compliance with the requirements of these Standards; and

(b) keep summary records of the monitoring results.

(86) The nature and frequency of monitoring shall depend on the normal radiation fields and contamination levels, on the expected fluctuations and on the potential for high levels, and the design of the monitoring programme shall take into account factors such as:

(a) the kind of measurements to be made; for example, dose rates for different types of radiation, surface contamination and concentrations of radionuclides in air;

(b) where and when the measurements should be made and at what frequency;

(c) the most appropriate measurement methods, including who should make them;

(d) reference levels and the actions to be taken if they are exceeded;

(e) when and how the monitoring results and procedures should be reviewed.

### 2.8.11 Health Surveillance

(87) The Employer shall:

(a) establish a health surveillance programme based on the general principles of occupational health, designed to assess the initial and continuing fitness of Workers for their intended tasks;

(b) arrange for an approved physician to supervise the health surveillance programme;

(c) keep appropriate records of health surveillance;

(d) arrange for the communication to the relevant Workers and Employers of the results of health surveillance for individual Workers in the form of

- "fit" or "unfit" for the intended task; and, as appropriate,
- indications of the type of job and conditions of work that are medically contra-indicated either temporarily or permanently.

### 2.8.12 Dose Records

(88) Employers shall open and maintain for each Worker assigned to work in a controlled area, or working routinely in supervised areas, dose records which include:

(a) information on the general nature of the work involving exposure to radiation or radioactive substances;

(b) an indication whenever an assessment is made that is below the recording level;

(c) the results of any individual dose assessment that is above the recording level;

(d) in the case of Workers who have not been subject to individual monitoring, an upper estimate of the dose or intake received;

(e) the summation of doses received annually, in any approved period of five years, and for the duration of employment with each Employer;

(f) when a Worker works for more than one employer, the sum of doses received in each such employment; and

(g) records of emergency and accidental doses and intakes which shall be distinguished from doses and intakes received during normal work activities