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RADIATION PROTECTION ACT 2007

RADIATION PROTECTION (IONISING RADIATION) REGULATIONS 2023

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RADIATION ACCIDENTS

In exercise of the powers conferred by section 57(1) of the Radiation Protection Act 2007, the National Environment Agency, with the approval of the Minister for Sustainability and the Environment, makes the following Regulations:

PART 1

PRELIMINARY

Citation and commencement

1. These Regulations are the Radiation Protection (Ionising Radiation) Regulations 2023 and come into operation on 20 February 2023.

Definitions

2. In these Regulations —

"absorbed dose" means the amount of energy, expressed in gray, imparted to matter by ionising radiation per unit mass of the irradiated material at the place of interest;

"accident" means any unintended event, including operating errors, equipment failures and other mishaps, the

consequences of potential consequences of which are not negligible from the point of view of protection and safety;

"allied health professional" has the meaning given by section 2 of the Allied Health Professions Act 2011;

"applicant" means a person who is applying for an approval, a licence or registration, as the case may be;

"approved" means approved in writing by the Director-General;

"approved person" means a person who has been granted approval by the Director-General under section 12, 13 or 15 of the Act;

"becquerel" means the unit of radioactivity defined as one disintegration per second, and may be designated by the symbol "Bq";

"bulk", in relation to amounts of radioactive substances, means an amount of more than one tonne;

"caregiver" or "comforter" means a person who willingly and voluntarily helps (other than in their occupation) in the care, support or comfort of patients undergoing radiological procedures for medical diagnosis or medical treatment;

"committed effective dose" means the time integral of the effective dose rate following an intake of radioactive material into the body based on —

(*a*) the time period that has elapsed after the intake; and

(*b*) if the time that has elapsed after the intake is not known, the time period is —

(i) in the case of an intake by an individual of 18 years of age or older, presumed to be 50 years; and

(ii) in the case of an intake by an individual below 18 years of age, presumed to be a period ending on the individual's attainment of 70 years of age;

"consumer product" means a device or manufactured product into which radionuclides have deliberately been incorporated or produced by activation, or which generates ionising radiation, and which may be sold, supplied or otherwise made available to members of the public without a licence or an approval under the Act or any of its regulations after sale;

"effective dose" means the sum of the weighted equivalent doses in all tissues and organs of the human body, and is expressed in sievert;

"emergency" means a non-routine situation that necessitates prompt action, primarily to mitigate a hazard or adverse consequences for human health and safety, quality of life, property or the environment, and includes but is not limited to —

(*a*) nuclear or radiological emergencies and conventional emergencies such as fires, release of hazardous chemicals or storms; and

(*b*) situations for which prompt action is warranted to mitigate the effects of a perceived hazard;

"emergency worker" means any individual who is engaged in or is employed for part or whole of the individual's working time to perform duties in response to an emergency and —

(*a*) includes an individual employed by the licensees and personnel of response organisations, such as police officers, firefighters, medical personnel, and drivers and crews of evacuation vehicles; and

(*b*) the individual may or may not be designated in advance of an emergency and is not necessarily a radiation worker prior to the emergency;

"employee", in relation to a licensee, has the meaning given to it by section 10(5) of the Act;

"equivalent dose" means the sum of the product of the absorbed dose in gray and the radiation weighting factor for all the

different types of radiation incident on a tissue or an organ, and is expressed in sievert;

"full blood examination" means —

(*a*) an estimation of the haemoglobin in grams per 100 millilitres of whole blood;

(*b*) an estimation of the number of red blood cells present per cubic millimetre of whole blood;

(*c*) an estimation of the number of white blood cells present per cubic millimetre of whole blood;

(*d*) a differential white cell count;

(*e*) a platelet count;

(*f*) a search for abnormal cells and description of any seen; and

(*g*) any other blood examination as the Director-General may from time to time require;

"gigabecquerel" means one thousand million becquerels and may be designated by the symbol "GBq";

"gray" means the unit of absorbed dose and is equal to one joule per kilogramme of irradiated material and may be designated by the symbol "Gy";

"healthcare professional" includes a medical practitioner, a dentist, a nurse, a pharmacist, an allied health professional and any other individual who is licensed to provide any other healthcare service in Singapore;

"incident" means any unintended event, including —

(*a*) any operating error, equipment failure, initiating event, accident precursor, near miss or other mishap; or

(*b*) any unauthorised act, malicious or non-malicious,

the consequences or potential consequences of which are not negligible from the point of view of protection and safety;

"installation" means the area of radiation hazard under the administrative control of the person possessing the source of radiation;

"institutional review board" means a board or committee appointed to conduct an ethics review of proposed human biomedical research or a clinical trial for human subjects;

"ionisation chamber smoke detector" means a detector, using radioactive materials, sensitive to combustion products capable of affecting ionisation currents within the detector;

"IR1 licence" means a licence to manufacture, possess for sale or deal in irradiating apparatus or radioactive materials;

"IR2 licence" means a licence to keep, possess for use (other than sale) or use irradiating apparatus or radioactive materials;

"IR3 licence" means a licence to handle and transport radioactive materials;

"IR4A licence" means a licence to import a consignment of irradiating apparatus;

"IR4B licence" means a licence to export a consignment of irradiating apparatus;

"IR5A licence" means a licence to import a consignment of radioactive materials;

"IR5B licence" means a licence to export a consignment of radioactive materials;

"IR5C licence" means a licence to transit or tranship a consignment of nuclear material as defined in section 28(1) of the Act;

"irradiating apparatus" means —

(*a*) any apparatus that is capable of producing ionising radiation; or

(*b*) any component of or accessory to an apparatus described in paragraph (*a*);

"kilobecquerel" means one thousand becquerels and may be designated by the symbol "kBq";

"licensee" means a person who holds a licence under the Act;

"medical exposure" means any exposure incurred by —

(*a*) a patient for the purposes of medical or dental diagnosis or treatment;

(*b*) a caregiver or comforter; and

(*c*) a volunteer as part of human biomedical research;

"medical physicist" means a healthcare worker with educational qualifications and training in the concepts and techniques of applying physics in medicine;

"medical radiation technologist" means a healthcare professional, with a specialist education and training in medical radiation technology, competent to carry out radiological procedures, on delegation from the radiological medical practitioner, in one or more of the specialities of medical radiation technology;

"megabecquerel" means one million becquerels and may be designated by the symbol "MBq";

"microsievert" means one millionth part of a sievert and may be designated by the symbol "μSv";

"millisievert" means one thousandth part of a sievert and may be designated by the symbol "mSv";

"moderate", in relation to amounts of radioactive substances, means an amount not more than one tonne;

"non-single station ionisation chamber smoke detector" means an ionisation chamber smoke detector which is intended for, and capable of, connection to one or more other smoke detector units as part of a fire detection system with a centrally located alarm and power supply unit;

"occupational exposure" means any exposure of workers incurred in the course of their work;

"optimisation", in relation to protection and safety —

(*a*) for medical exposures of patients, means the management of the radiation dose commensurate with the medical purpose; and

(*b*) for purposes not mentioned in paragraph (*a*), means the process of determining the level of protection and safety that would result in the magnitude of individual doses, the number of individuals (workers and members of the public) subject to exposure and the likelihood of exposure being as low as reasonably achievable, economic and social factors being taken into account;

"pre-disposal management of radioactive waste" means any waste management steps carried out prior to disposal, such as pre-treatment, treatment, conditioning, storage or transport activities;

"primary radiation" means radiation coming directly from any radioactive substances or irradiating apparatus;

"public exposure" means exposure incurred by members of the public due to any radiation source, excluding occupational exposure or medical exposure;

"public sector agency" means any of the following:

(*a*) a ministry or department of the Government;

(*b*) a body corporate established by a public Act for the purposes of a public function;

(*c*) an organ of state, excluding a court;

"radiation" or "ionising radiation" means energy that is propagated in the form of X-rays, gamma-rays, alpha and beta particles, high speed electrons, neutrons, protons and other nuclear particles, but does not include energy in the form of sound and radiowaves, or visible, infra-red, or ultra-violet light;

"radiation dose" means an effective dose or equivalent dose received by an individual;

"radiation hazard" means the danger to the health of an individual arising from exposure to ionising radiation, whether due to external radiation or to radiation from radioactive substances within the body;

"radiation level" means the corresponding equivalent dose rate;

"radiation source" or "source" means anything that may cause radiation exposure, such as by emitting ionising radiation or releasing radioactive substances or materials;

"radiation weighting factor" means a dimensionless factor, selected for the type and energy of radiation incident on the body or from sources within the body, by which the absorbed dose in a tissue or an organ is weighted to give the equivalent dose;

"radiation work" means work which —

(*a*) involves the handling of any radioactive substance; or

(*b*) involves the operation of any irradiating apparatus;

"radiation worker" means any individual who is engaged in or is employed for part or whole of the individual's working time to do radiation work;

"radiological medical practitioner" means a healthcare professional with specialist educational qualifications and training in the medical uses of radiation, who is competent to perform independently or to oversee procedures involving medical exposure in a given specialty;

"sealed source" means any radioactive material that is firmly bonded within material or sealed in a capsule of adequate mechanical strength so as to prevent the escape of any part of the radioactive material under foreseeable conditions of use and wear but so designed as to allow the emission of ionising radiation for use as required;

"sievert" means the unit of equivalent dose or effective dose and may be designated by the symbol "Sv";

"single station ionisation chamber smoke detector" means a self-contained ionisation chamber smoke detector in which the alarm is incorporated in the ionisation chamber smoke detector itself and which does not need to be linked to any other external fire detection or alarm system in order to function;

"stochastic effects" means those effects for which the probability of an effect occurring, regarded as a function of dose, is without threshold;

"tissue weighting factor" means the proportion of the risk arising from stochastic effects resulting from tissue to the total risk, when the whole body is irradiated uniformly;

"unsealed source" means any radioactive material which is not a sealed source;

"worker" includes a radiation worker.

PART 2

EXEMPTIONS AND CLEARANCE

Exemptions

3.—(1) Subject to paragraph (2), the provisions of the Act do not apply to any import, export, possession, manufacture, transport, use, disposal, sale of or other dealing in the following radioactive substances:

(*a*) a radioactive substance where the activity concentration —

(i) of any radionuclide in the uranium decay chain or the thorium decay chain does not exceed 1 Bq/g; and

(ii) of any potassium-40 does not exceed 10 Bq/g;

(*b*) a radioactive substance in a moderate amount for which the total activity of a given radionuclide or its activity concentration does not exceed the level prescribed in Part 1 of the First Schedule;

(*c*) a radioactive substance of solid material in bulk amount for which the activity concentration of a given radionuclide of

artificial origin does not exceed the level prescribed in Part 2 of the First Schedule;

(*d*) a radioactive substance of solid material in bulk amount for which the activity concentration of a given radionuclide of artificial origin exceeds the level prescribed in Part 2 of the First Schedule, but does not exceed the level prescribed in Part 1 of the First Schedule, provided that under all reasonably foreseeable circumstances the radioactive substance is not reasonably expected to result in any individual incurring an effective dose of the order of 10 μSv or more in a year, or in the case of low probability scenarios, an effective dose of not more than 1 mSv in a year;

(*e*) a radioactive substance of solid material in bulk amount for which the activity concentration of a given radionuclide of natural origin does not exceed specific values derived so as to meet a dose criterion of the order of 1 mSv in a year.

(2) The exemptions in paragraph (1)(*b*) to (*e*) do not apply to radioactive substances —

(*a*) to be used in practices which are mentioned in regulations 5, 6 and 7 as practices which are not justified; or

(*b*) to be disposed of as radioactive waste.

(3) An educational institution which has in its possession or under its control any radioactive substance, being a sealed source, not exceeding 100 times the activity or activity concentration prescribed in the First Schedule with respect to that particular radioactive substance is exempted from section 6(1)(*b*) and (*d*) of the Act only in relation to that radioactive substance if —

(*a*) the radioactive substance is used or to be used solely for demonstration, teaching or research purposes in the educational institution;

(*b*) the radioactive substance is under the control of a competent employee or staff designated by the principal in the case of a primary or secondary school, or by the head

of the relevant department, in the case of any other educational institution, to take full responsibility for the safe and secure storage and use of such radioactive substance and for the compliance with the relevant provisions of these Regulations relating to a sealed source; and

(*c*) the complete details of the radioactive substance have been submitted to the Director-General.

(4) Any person who has in the person's possession or under the person's control not more than 3 sealed sources for the sole purpose of checking or calibrating a particular radiation survey or monitoring instrument, and each of which contains any radioactive substance not exceeding 175 kBq, is exempted from section 6(1)(*b*) and (*d*) of the Act only in relation to that radioactive substance and subject to all the following conditions:

(*a*) the complete details of the radioactive substance have been submitted to the Director-General;

(*b*) that person must ensure compliance with the provisions of these Regulations relating to a sealed source;

(*c*) that person must ensure the safe and secure storage and use of the radioactive substance.

(5) The Act and all regulations made under the Act (except Parts 8 and 15 of these Regulations) do not apply to any radioactive substance which is implanted in or has been internally administered to an individual for medical purposes.

(6) Any person having the control or management of a single station or non-single station ionisation chamber smoke detector that —

(*a*) contains a sealed source; and

(*b*) complies with the recommendations of the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development or any other equivalent international standards or recommendations,

is exempted from section 6(1)(*b*) and (*d*) of the Act, and from regulations 26 and 29 only in relation to that smoke detector.

(7) The provisions of the Act do not apply to the import, export, possession, use or sale of or other dealing as specified in the Third Schedule in relation to the articles or irradiating apparatus specified in that Schedule.

(8) Any person having the control or management of any thoriated tungsten welding electrode for the purpose of use in welding is exempted from section 6(1)(*b*) and (*d*) of the Act only in relation to that welding electrode.

Clearance

4.—(1) Radioactive substances, including waste, arising from the use of irradiating apparatus or radioactive material authorised by a licence issued under sections 6 and 7 of the Act, can be released from further compliance with the requirements of the Act provided that —

(*a*) for radioactive substance of solid material, the activity concentration of a given radionuclide of artificial origin does not exceed the level prescribed in Part 2 of the First Schedule;

(*b*) the activity concentration of any radionuclide in the uranium decay chain or the thorium decay chain does not exceed 1 Bq/g or the activity concentration of potassium-40 does not exceed 10 Bq/g;

(*c*) the radioactive substance when released is not reasonably expected to result in any individual incurring an effective dose of the order of 10 μSv or more in a year, or in the case of low probability scenarios, an effective dose of not more than 1 mSv in a year; and

(*d*) for radionuclides of natural origin in residues that might be recycled into construction materials, or the disposal of

which is liable to cause the contamination of drinking water supplies, the activity concentration in the residues does not exceed specific values derived so as to meet a dose criterion of the order of 1 mSv in a year.

(2) Every licensee and approved person must take all reasonable steps to ensure that —

(*a*) the clearance of radioactive waste complies with paragraph (1);

(*b*) a formal mechanism is in place to demonstrate compliance with the regulatory requirements in respect of clearance;

(*c*) deliberate dilution of material, other than the dilution that takes place in normal operations, must not be carried out without the written approval of the Director-General; and

(*d*) any radiation markings will be removed from any material of which the requirements of these Regulations no longer apply.

(3) Every licensee and approved person must take all reasonable steps to ensure that information on material which has been removed from regulatory control must be recorded, retained within a management system and submitted to the Director-General in any form and manner that the Director-General may require.

PART 3

PRACTICES NOT JUSTIFIED

Practices not justified

5. The following practices are not justified:

(*a*) practices, except for justified practices involving medical exposure, that result in an increase in activity, by the deliberate addition of radioactive substances or by activation, in food, feed, beverages, cosmetics or any other commodity or product intended for ingestion, inhalation or percutaneous intake by, or application to, a person;

(*b*) practices involving frivolous use of radiation or radioactive substances in commodities or in products such as household beddings, toys, personal jewellery or adornments, which result in an increase in activity, by the deliberate addition of radioactive substances or by activation;

(*c*) human imaging using radiation that is performed as a form of art or for publicity purposes;

(*d*) human imaging using radiation for theft detection purposes.

Human imaging for detecting concealed objects not justified

6.—(1) Human imaging using radiation for the detection of concealed objects for anti-smuggling purposes is not justified unless it is carried out with the written approval of the Director-General.

(2) Human imaging using radiation for the detection of concealed objects that can be used for criminal acts or acts that pose a threat to public order or the national security of Singapore is not justified unless it is carried out —

(*a*) by the Government;

(*b*) by any public sector agency; or

(*c*) with the approval of the Director-General.

Exposure of human in biomedical research or clinical trials not justified

7. The exposure of human research subjects as part of any human biomedical research or clinical trial is not justified unless —

(*a*) the biomedical research or clinical trial has been approved by an institutional review board; and

(*b*) the exposure of the research subjects complies with such dose constraints as may be specified in the licence conditions.

PART 4

LICENCES

Purposes of licence

8.—(1) The Director-General may grant licences for medical diagnostic, medical therapeutic, dental diagnostic, veterinary diagnostic and for industrial, experimental, testing, demonstration or research purposes or such other purpose as may be specified in the licence by the Director-General.

(2) The Director-General may grant a licence —

(*a*) to use irradiating apparatus or radioactive materials for medical purposes only if he or she is satisfied that the applicant is a healthcare service provider;

(*b*) to use irradiating apparatus for dental diagnostic purposes only if he or she is satisfied that the applicant is a dental service provider;

(*c*) to use irradiating apparatus or radioactive materials for veterinary diagnostic purposes only if he or she is satisfied that the applicant is a veterinary service provider; or

(*d*) to use irradiating apparatus or radioactive materials for industrial, experimental, testing, demonstration, research or other specific purpose only if he or she is satisfied that the applicant is able to ensure the safe use of such irradiating apparatus or radioactive materials.

(3) A person must not use any irradiating apparatus or radioactive material for any purpose other than that specified in the person's licence in respect of that apparatus or material.

Single licence for multiple apparatus or materials under charge of same licensee

9. A single licence may be granted in respect of —

(*a*) 2 or more irradiating apparatus under the charge of the same person;

(*b*) 2 or more radioactive materials under the charge of the same person;

(*c*) 2 or more of the purposes mentioned in regulation 8(1) in respect of any apparatus or material mentioned in paragraph (*a*) or (*b*); or

(*d*) any combination of any irradiating apparatus, any radioactive material or the purpose mentioned in paragraph (*c*), so long as the apparatus or materials are all under the charge of the same person.

Application for licence

10.—(1) Every application, to alter any information specified in a licence (including but not limited to details of the irradiating apparatus or radioactive materials specified in a licence or the purpose specified in respect of such apparatus or material), must be made to the Director-General in such form as the Director-General may require.

(2) For the purposes of and without limiting section 8(2) of the Act, every applicant must submit to the Director-General relevant information and documents necessary to support the application as required by the Director-General, including but not limited to —

(*a*) evaluation of the nature, likelihood and magnitude of the exposures attributed to the practice or purpose for which the irradiating apparatus or radioactive material is to be used and sources within the practice or purpose;

(*b*) safety assessment;

(*c*) security assessment;

(*d*) assessment of radiological environment impact;

(*e*) arrangements for the safe and secure management of the sources such as a radiation protection plan or security plan for both storage and transport;

(*f*) an emergency plan;

(*g*) final disposal plan for generated radioactive waste and disused sealed sources; and

(*h*) information and evidence on the benefits and harm to support the justification of the practice.

(3) Without limiting section 8(3) of the Act, the Director-General may, in his or her discretion, refuse the application for the grant of a licence if he or she is satisfied that —

(*a*) if the applicant is an individual, the person is not a fit or proper person to hold the licence;

(*b*) if the applicant is not an individual, an officer or a key employee of the applicant is not a fit or proper person;

(*c*) it is not in the public interest to grant the licence; or

(*d*) the grant of the licence may pose a threat to public order or the national security of Singapore.

(4) For the purposes of paragraph (3), in determining whether —

(*a*) an applicant, if an individual, is or is not a fit or proper person to hold the licence, the Director-General may, if he or she thinks it is necessary, take into consideration that the applicant has been convicted of an offence under the Act or any of its regulations, or any other offence involving fraud, dishonesty or moral turpitude; or

(*b*) an officer or a key employee of the applicant, if the applicant is not an individual, is or is not a fit or proper person, the Director-General may, if he or she thinks it is necessary, take into consideration that the officer or key employee has been convicted of an offence under the Act or any of its regulations, or any other offence involving fraud, dishonesty or moral turpitude.

(5) Paragraph (4) does not limit the matters which the Director-General may take into consideration in determining for the purposes of paragraph (3) whether an applicant, if an individual or an officer or a key employee of the applicant, is or is not a fit or proper person.

Licence fees

11.—(1) The fees specified in the Fifth Schedule are payable in respect of the matters set out in that Schedule.

(2) Any fee specified in the Fifth Schedule that is payable in respect of a matter —

(*a*) cannot be refunded; and

(*b*) cannot be used to offset any fee (specified in that Schedule) that is payable in respect of another matter.

(3) The fee for an application for the grant of a licence must be paid when the application is submitted to the Director-General.

(4) The fee for an application to alter any of the irradiating apparatus or radioactive materials specified in a licence or the purpose specified in respect of such apparatus or material must be paid when the application is submitted to the Director-General.

(5) The annual fee for a licence must be paid on or before each anniversary of —

(*a*) the date on which the licence was granted; or

(*b*) any other date that the Director-General may specify in a particular case.

(6) The Director-General may, in any particular case or class of cases, waive the whole or any part of any fee payable under paragraph (1).

Licence conditions

12. Without limiting section 8(3) of the Act, a licence may be granted subject to any of the following conditions:

(*a*) any licence under section 6 of the Act may be restricted to radioactive materials of a specific kind or may be restricted to specific purposes (limited in their type and nature);

(*b*) any licence under section 7 of the Act for the use of irradiating apparatus may be restricted —

(i) to a specific apparatus or to apparatus of a specific kind;

(ii) to specific uses (limited in their type and nature); or

(iii) to the use of apparatus at a specific place.

Cancellation, suspension or variation of licence

13.—(1) Without limiting section 8(3) of the Act, the Director-General may, in his or her discretion, cancel or suspend for any period that he or she may determine or vary any condition, limitation or exception attached to the licence if the licensee —

(*a*) has obtained the licence by means of a false or misleading statement or an omission which makes the statement false or misleading;

(*b*) commits an offence under the Act or any of its regulations;

(*c*) commits a breach of or fails to comply with or observe any of the conditions or limitations of the licence; or

(*d*) is unable to act by reason of illness, disability or any other reason.

(2) Without limiting section 8(3) of the Act, the Director-General may, in his or her discretion, cancel or suspend for any period that he or she may determine or vary any condition, limitation or exception attached to the licence if he or she is satisfied that —

(*a*) where the licensee is an individual, the licensee is not a fit or proper person to continue to hold the licence;

(*b*) where the licensee is not an individual, an officer or a key employee of the applicant is not a fit or proper person;

(*c*) it is in the public interest to do so; or

(*d*) it is in the interests of the maintenance of public order or the national security of Singapore to do so.

(3) For the purposes of paragraph (2), in determining whether —

(*a*) a licensee, if an individual, is or is not a fit or proper person to continue to hold the licence, the Director-General may, if he or she thinks it is necessary, take into consideration that the licensee has been convicted of an offence under the

Act or any of its regulations, or any other offence involving fraud, dishonesty or moral turpitude; or

(*b*) an officer or a key employee of the licensee, if the licensee is not an individual, is or is not a fit or proper person, the Director-General may, if he or she thinks it is necessary, take into consideration that the officer or key employee has been convicted of an offence under the Act or any of its regulations, or any other offence involving fraud, dishonesty or moral turpitude.

(4) Paragraph (3) does not limit the matters which the Director-General may take into consideration in determining for the purposes of paragraph (3) whether a licensee, if an individual or an officer or a key employee of the licensee, is or is not a fit or proper person.

(5) Every licensee must, as soon as practicable, notify the Director-General in writing when the licensee —

(*a*) if an individual, has been convicted of an offence under the Act or any of its regulations, or any other offence involving fraud, dishonesty or moral turpitude; or

(*b*) if not an individual, has reasonable grounds for believing that an officer or a key employee of the licensee has been convicted of an offence under the Act or any of its regulations, or any other offence involving fraud, dishonesty or moral turpitude.

(6) Without limiting section 8(3) of the Act, the Director-General may, in his or her discretion, cancel or suspend for such period as he or she may determine any licence if the licensee fails to pay the annual fee or any part of the fee for that licence on or before the last day prescribed in regulation 11 for the payment of that fee.

(7) The Director-General may for the purpose of granting a licensee an IR1, IR2 or IR3 licence in place of one or more licences that were granted to the licensee, cancel each such licence.

(8) Every licence that is in force immediately before 20 February 2023 continues to be in force, and to have effect, until the earlier of —

(*a*) the date of its expiry; or

(*b*) the date it is cancelled.

(9) Without limiting section 8(3) of the Act, the Director-General may vary or remove any irradiating apparatus or radioactive material (including the specifications of the apparatus or material) specified in a licence or cancel the licence if the licence is no longer required under these Regulations.

Register of licences

14. For the purposes of section 9 of the Act, the Director-General must keep and maintain a register of licences in which must be entered —

(*a*) the names of all persons issued licences under the Act;

(*b*) if applicable, the premises at which the person issued a licence may carry out the activity authorised by the person's licence; and

(*c*) any other particulars relating to the licence or licensee that the Director-General may determine.

PART 5

RADIATION WORKER REGISTRATION

Age requirement

15. An individual below 18 years of age must not engage or participate in any radiation work.

Requirements for engaging in radiation work

16.—(1) An individual must not engage or participate in any radiation work unless the individual —

(*a*) is registered as a radiation worker in accordance with these Regulations; or

(*b*) is a registered or enrolled student of an educational institution who, in the course of the individual's studies, conducts any activity involving the handling or use of

irradiating apparatus or radioactive materials under the direct supervision of a registered radiation worker authorised to conduct such activity.

(2) An individual must not be registered as a radiation worker unless the individual —

(*a*) has, within 12 months prior to the individual's application for registration as a radiation worker, undergone a medical examination, which must include any examination that may be required by the Director-General (such as a full blood examination), and been certified fit to be engaged in radiation work by an approved registered medical practitioner; and

(*b*) has been adequately trained to do such work or fully instructed to do such work in all the working procedures and rules and the emergency procedures appropriate to the individual's duty and been adequately informed of the hazards associated with such work.

(3) Every application for registration as a radiation worker must be made to the Director-General in such form as the Director-General may require.

(4) The fee specified in the Fifth Schedule is payable for every application under paragraph (3).

(5) Every individual registered as a radiation worker is entitled to receive a certificate of registration that must specify the type of radiation work that the individual is authorised to engage in and for the period stated in the certificate.

(6) An individual must not engage in radiation work other than that specified in the individual's registration certificate.

(7) Every registered radiation worker must pay the annual fee specified in the Fifth Schedule on or before each anniversary of —

(*a*) the date on which the certificate was granted; or

(*b*) any other date that the Director-General may specify in a particular case.

(8) The Director-General may, if he or she thinks fit, refuse to register any applicant as a radiation worker if the Director-General is satisfied that —

(*a*) the applicant is not a fit or proper person to be registered as a radiation worker;

(*b*) it is not in the public interest to register the applicant; or

(*c*) the registration of the applicant may pose a threat to public order or the national security of Singapore.

(9) The Director-General may register an individual as a radiation worker, subject to any condition that the Director-General thinks fit to impose and these conditions may be varied, added to or revoked by the Director-General.

(10) The Director-General may, in his or her discretion, cancel or suspend, for any period that he or she may determine, the registration of any radiation worker or vary any condition, limitation or exception imposed on the registration if he or she is satisfied that —

(*a*) the radiation worker is not a fit or proper person to continue to be registered;

(*b*) it is in the public interest to do so; or

(*c*) it is in the interests of the maintenance of public order or the national security of Singapore to do so.

(11) For the purposes of paragraphs (8) and (10), in determining whether an applicant or a radiation worker (as the case may be) is or is not a fit or proper person to be or continue to be registered, the Director-General may, if he or she thinks it is necessary, take into consideration that the applicant or radiation worker has been convicted of an offence under the Act or any of its regulations, or any other offence involving fraud, dishonesty or moral turpitude.

(12) Paragraph (11) does not limit the matters which the Director-General may take into consideration in determining for the purposes of paragraphs (8) and (10) whether an applicant or a radiation worker (as the case may be) is or is not a fit or proper person to be or continue to be registered.

(13) The Director-General may, in his or her discretion, cancel or suspend, for any period that he or she may determine or vary any condition, limitation or exception attached to the registration of any radiation worker if the radiation worker —

(*a*) has obtained the registration by means of a false or misleading statement or an omission which makes the statement false or misleading;

(*b*) commits an offence under the Act or any of its regulations;

(*c*) commits a breach of or fails to comply with or observe any of the conditions or limitations of the registration; or

(*d*) is unable to act by reason of illness, disability or any other reason.

(14) The Director-General may, in his or her discretion, cancel or suspend, for any period that he or she may determine, the registration of any radiation worker if the radiation worker fails to pay the annual fee or any part of the fee for that registration on or before the last day prescribed in paragraph (7) for the payment of that fee.

(15) The Director-General may, in any particular case or class of cases, exempt from registration radiation workers engaged in radiation work, provided that the work is not liable to result in any individual receiving a radiation dose exceeding one-tenth of the appropriate dose limit for radiation workers as specified in Part 1 of the Second Schedule.

PART 6

RESPONSIBILITIES OF LICENSEES

Responsibility of licensee

17.—(1) Every licensee must ensure that the licensee and every employee and worker employed by the licensee or under the licensee's supervision comply with these Regulations.

(2) Every licensee has the prime responsibility for —

(*a*) establishing and implementing the technical and organisational measures that are necessary for ensuring

protection and safety and for compliance with all applicable requirements of these Regulations; and

(*b*) designating suitably qualified persons to carry out actions and tasks related to these responsibilities.

(3) Every licensee must document the names and responsibilities of persons designated under paragraph (2)(*b*) and such documentation must be —

(*a*) kept up to date; and

(*b*) made available for inspection at any time by the Director-General or any authorised officer.

(4) Without limiting regulation 65(3), every licensee must ensure that any radioactive material is managed as radioactive waste where —

(*a*) no further use of the radioactive material is foreseen; and

(*b*) the radioactive material is unsuitable for authorised discharge, authorised use or clearance from regulatory control.

(5) Every licensee who receives any irradiating apparatus or radioactive material must make arrangements with the supplier of the irradiating apparatus or radioactive material (as the case may be) for the purpose of —

(*a*) obtaining information on conditions of use and operating experience that may be important for protection and safety; and

(*b*) providing feedback and information that may have implications for protection and safety for other users, or that may have implications for the possibility for improvements in protection and safety for the irradiating apparatus or radioactive material.

(6) Every licensee who supplies any irradiating apparatus or radioactive material must make information available on the proper installation, safe management and use of the irradiating apparatus or radioactive material (as the case may be) and its associated risks, including but not limited to performance specifications, instructions

for operation and maintenance, and instructions for protection and safety.

(7) Where a licensee is aware that a fault or defect exists or is suspected to exist in any irradiating apparatus or apparatus containing a sealed radioactive source, the licensee must —

(*a*) immediately cease the operation of the apparatus;

(*b*) immediately investigate the apparent fault or defect and, if necessary, cause the apparatus to be shut down, removed from service, repaired or replaced; and

(*c*) inform all individuals who may have been exposed to radiation from the apparatus that they may have been so exposed in amounts exceeding those they would normally receive from the apparatus when in faultless condition.

(8) Where a licensee is aware that a fault or defect exists or is suspected to exist in any engineering control equipment (such as extract ventilation, a fume cupboard or a glove box) used to ensure safe working conditions in the use of unsealed radioactive materials, the licensee must —

(*a*) immediately investigate the apparent fault or defect and, if necessary, cause the equipment to be shut down, removed from service, replaced or repaired;

(*b*) inform all individuals who may have been exposed to radioactive materials as a result of the fault or defect; and

(*c*) cause appropriate biological monitoring to be carried out for all individuals so exposed.

Submission of reports or documents

18. Every licensee must if required to do so by the Director-General submit a report (with accompanying documents) containing any information, relating to radiation safety and security, that the Director-General may require including the following information:

(*a*) evaluation of the dose exposures attributed to the practice and sources within the practice;

(*b*) safety assessment;

(*c*) security assessment;

(*d*) arrangements for the safe and secure management of the sources such as a radiation protection plan or security plan;

(*e*) an emergency plan;

(*f*) logs of incidents;

(*g*) notification of conduct of certain specified activities;

(*h*) any other information that may be necessary to verify the licensee's compliance with these Regulations.

Appointment of radiation safety officer

19.—(1) A licensee must appoint an individual as a radiation safety officer if required by the Director-General, and that individual must for the purpose of the work that the licensee is licensed to carry out, have —

(*a*) the level of academic knowledge or professional experience compatible with the levels of risks associated with the use or custody of any irradiating apparatus or radioactive substance used or to be used for that work; and

(*b*) the technical competency in radiation protection matters relevant to the use or custody of any irradiating apparatus or radioactive substance used or to be used for that work.

(2) Any licensee who intends to appoint a radiation safety officer or deputy radiation safety officer must submit a proposal of such appointment in writing to the Director-General together with the particulars, qualifications and experience of the individual whom the licensee proposes to appoint as such radiation safety officer.

(3) The Director-General may, if he or she thinks fit, approve the appointment of any individual as a radiation safety officer or deputy radiation safety officer either generally or in respect of —

(*a*) any particular place or premises or part of any premises; or

(*b*) any particular work.

(4) An individual must not act as a radiation safety officer or deputy radiation safety officer unless the Director-General has approved his

or her appointment as a radiation safety officer or deputy radiation safety officer.

(5) The Director-General may, at any time, in the Director-General's discretion, revoke his or her approval of the appointment of any individual as a radiation safety officer or deputy radiation safety officer.

(6) In the absence of the licensee, the radiation safety officer or deputy radiation safety officer is also responsible for the radiation safety in any work performed under the officer's supervision.

PART 7

LABELLING OF IRRADIATING APPARATUS AND RADIOACTIVE MATERIALS

Labelling of irradiating apparatus

20.—(1) Except as provided in paragraph (2), every licensee and every person who possesses or has under his or her control any irradiating apparatus must —

(*a*) to each such irradiating apparatus possessed by him or her or under his or her control, other than an irradiating apparatus containing a radioactive substance, securely attach and keep attached a label containing the standard radiation hazard symbol specified in the Fourth Schedule together with the words "DANGER — RADIATION. This apparatus produces radiation when energised" immediately adjacent to the symbol; and

(*b*) to each such irradiating apparatus possessed by him or her or under his or her control that contains a radioactive material, securely attach and keep attached a label containing —

(i) the standard radiation hazard symbol specified in the Fourth Schedule together with the words "DANGER — RADIOACTIVE" immediately adjacent to the symbol; and

(ii) the kind and activity of the radioactive material in the irradiating apparatus and the date of measurement of such activity.

(2) The words "DANGER — RADIATION. This apparatus produces radiation when energised" and "DANGER RADIOACTIVE" appearing in the labels specified in paragraph (1) may be omitted for apparatus used for medical or dental purposes if access to the area where the irradiating apparatus is located is strictly controlled.

Labelling of radioactive materials

21. Every licensee and every individual who possesses or has under his or her control any radioactive material must —

(*a*) to each container of each such radioactive material possessed by him or her or under his or her control securely attach and keep attached a label containing the standard radiation hazard symbol specified in the Fourth Schedule together with the words "DANGER — RADIOACTIVE" immediately adjacent to the symbol; and

(*b*) to each container used by him or her to store such radioactive material securely attach or keep attached a label showing clearly the kind and activity of the radioactive material and the date of measurement of such activity in addition to the label required by paragraph (*a*).

Labelling of radiation areas

22.—(1) Except as provided in paragraph (2), every licensee, every individual who possesses or has under his or her control any irradiating apparatus or radioactive material and every individual in charge of any place where a radiation hazard may exist, must, in addition to any other labels required by these Regulations, display a notice containing the standard radiation hazard symbol specified in the Fourth Schedule —

(*a*) near to each place where any irradiating apparatus or radioactive material is used;

(*b*) at each entrance to any place where any radioactive material is used or stored; and

(*c*) at each entrance to any place where any irradiating apparatus is used.

(2) Paragraph (1) does not apply to a sealed source which gives a radiation level not exceeding 0.1 μSv per hour at one metre away from the centre of the source.

(3) Any premises where the total amount of radioactive materials kept or stored on the premises exceeds 35 GBq must have a notice stating that radioactive materials are kept or stored on those premises and the notice must be displayed at all main entrances to those premises in such a manner that it can be clearly seen by any individual entering those premises.

Requirements for labels

23.—(1) Each label and notice required to be used or displayed by these Regulations must be as large as practicable in each particular circumstance.

(2) A person must not use any label or notice described in these Regulations except for the purposes of these Regulations or to denote a radiation hazard.

(3) When any radiation hazard ceases to exist, all labels and notices used or displayed in connection with such hazard must be immediately removed by the person who was required by this Part to use or display the labels or notices.

PART 8

SUPPLY OF IRRADIATING APPARATUS AND RADIOACTIVE MATERIALS AND STORAGE OF RADIOACTIVE MATERIALS

Sale and supply of irradiating apparatus and radioactive materials

24.—(1) A person must ensure that any irradiating apparatus or radioactive material is only sold or supplied to —

(*a*) a person who is authorised to possess that irradiating apparatus or radioactive material, as the case may be; or

(*b*) a person who has applied for a licence to possess that irradiating apparatus or radioactive material (as the case may be) prior to receipt of the irradiating apparatus or radioactive material.

(2) Where any irradiating apparatus or radioactive material (as the case may be) was sold or supplied to a person under paragraph (1)(*b*), the seller or supplier must make reasonable efforts to ensure that the person subsequently obtains a licence authorising the possession of that irradiating apparatus or radioactive material after receipt of the irradiating apparatus or radioactive material.

(3) Where the seller or supplier has reasonable grounds to believe that the licence mentioned in paragraph (2) is not obtained by the recipient, the seller or supplier must promptly notify the Director-General.

(4) Paragraphs (1), (2) and (3) do not apply to the export of irradiating apparatus or radioactive materials from Singapore.

(5) Any person who sells or supplies irradiating apparatus or radioactive materials must —

(*a*) ensure that any irradiating apparatus or radioactive material that is sold or supplied has been tested by a laboratory mentioned in paragraph (6) to demonstrate compliance with the relevant specifications of the irradiating apparatus or radioactive material;

(*b*) keep a record of all sales and supplies of irradiating apparatus and radioactive materials (as the case may be) in any form and manner that may be determined by the Director-General; and

(*c*) make the records available for inspection when required by the Director-General.

(6) For the purposes of paragraph (5)(*a*), the test must be performed by —

(*a*) an in-house testing laboratory operated by the manufacturer of the irradiating apparatus or radioactive material, as the case may be; or

(*b*) a testing laboratory accredited by the Singapore Accreditation Council or an equivalent accreditation body as being able to perform the relevant test.

(7) In paragraph (6), "Singapore Accreditation Council" means the national authority for accreditation of conformity assessment bodies in Singapore.

Precautions for safe storage and keeping of radioactive materials

25.—(1) Where there is any possibility that any chemical, radiation, or other action might weaken or rupture the container of a radioactive material sufficiently to cause leakage from the container, the container must be provided with a suitable secondary tray, or catchment, adequate to retain the entire amount of such radioactive material in that container.

(2) Storage containers for radioactive materials exceeding 35 GBq must be designed to be —

(*a*) resistant to fire and any severe shock or stress;

(*b*) able to withstand any temperature that may be reasonably anticipated; and

(*c*) structurally sound having regard to corrosion, radiation, temperature effects and chemical or other action that may develop over the period of intended storage or use.

(3) Suitable provisions must be made to minimise the radiation hazard to any individual who may be doing emergency work in or about the place where the radioactive material is stored or kept in the event of fire, flood or any other catastrophe or emergency.

PART 9

ACCOUNTING FOR AND INTERNAL TRANSPORT OF RADIOACTIVE MATERIALS AND CHECKING OF SEALED SOURCES

Accounting for radioactive materials

26.—(1) Subject to paragraph (2), any person who has in the person's possession any radioactive material must keep, or cause to be kept, a record of the following particulars in respect of the radioactive material:

(*a*) the date of receipt of the radioactive material;

(*b*) the quantity of radioactive material received by that person;

(*c*) the nature and form of the radioactive material at the date mentioned in sub-paragraph (*a*);

(*d*) the activity of the radioactive material at the date specified by the manufacturer;

(*e*) the location of the radioactive material kept up to date on each working day;

(*f*) where the radioactive material is a sealed source —

(i) the distinguishing number or other identifying mark;

(ii) the source use history, including all movements into and out of the storage location; and

(iii) the date and the manner of disposal of the sealed source;

(*g*) where the radioactive material is an unsealed source —

(i) the quantity of radioactive material used each time and the date and purpose of use;

(ii) the remaining quantity of radioactive material; and

(iii) the date and the manner of disposal of the radioactive material or any portion of it.

(2) Paragraph (1) does not apply to any radioactive material —

(*a*) in the course of the manufacture of the material; or

(*b*) while stored, without having been used, on the premises in which they were manufactured or in which their manufacture was completed.

(3) Where a licensee is in possession of radioactive material, any individual who is employed by the licensee and who has reasonable grounds for believing that any radioactive material is lost or missing, must immediately notify the licensee of the individual's belief and the grounds for the belief.

(4) Where a licensee has reasonable grounds for believing that any radioactive material has been lost or mislaid, the licensee must immediately notify the Director-General and take immediate steps with a view to finding the radioactive material.

Internal transport of sealed sources

27. A sealed source must not be transported within the premises under the control of a licensee unless it is transported —

(*a*) in a suitable container or by other appropriate methods;

(*b*) by a radiation worker authorised by the licensee; and

(*c*) in such a way that the individual receiving it is made aware that what he or she is receiving is a sealed source.

Internal transport of unsealed sources

28. An unsealed source must not be transported within the premises under the control of a licensee unless it is —

(*a*) enclosed within a suitable container adequately shielded;

(*b*) transported by a radiation worker authorised by the licensee; and

(*c*) transported with a tag attached to each container giving the following information:

(i) name of isotope;

(ii) nature, physical and chemical form;

(iii) activity with date.

Checking of leakage or breakage of sealed source

29.—(1) Every person who possesses or has under the person's control any sealed source must, except where the Director-General directs otherwise —

(*a*) ensure that a wipe test for leakage of radioactive substance is made by a qualified individual at least in every period of 12 months of —

(i) the bonding of a sealed source which does not have an immediate container; and

(ii) every container in which such a sealed source is permanently installed but which does not form part of the sealed source;

(*b*) maintain a register containing the required particulars of every wipe test carried out pursuant to sub-paragraph (*a*); and

(*c*) inform the Director-General immediately if the result of any wipe test carried out pursuant to sub-paragraph (*a*) is positive.

(2) Where any radioactive substance is leaking, or is likely to leak, from the immediate container or the bonding which forms part of a sealed source or if the immediate container or the bonding which forms part of a sealed source is broken —

(*a*) the Director-General must be informed immediately;

(*b*) all practicable measures must be taken immediately to safeguard every individual present in the vicinity of the sealed source including, where necessary, the immediate vacation of all appropriate areas;

(*c*) the immediate container or bonding must be placed in a leak proof container immediately and must not be brought into use until all necessary repairs have been effected;

(*d*) effective steps to decontaminate the areas affected by the radioactive substance must be taken as soon as practicable

by or under the supervision of the licensee or by or under the supervision of other individuals who are approved as qualified to do so by the Director-General; and

(*e*) any individual taking part in any work mentioned in sub-paragraph (*c*) or (*d*) must be properly equipped for the purpose.

(3) The Director-General may require a source to be subject to any additional leakage test as he may specify.

PART 10

OCCUPATIONAL EXPOSURE

General responsibilities of employers and licensees

30.—(1) Every employer and licensee must ensure, for every employee and worker engaged in activities in which the employee or worker is or could be subject to occupational exposure, that —

(*a*) the occupational exposure is so controlled such that the relevant dose limits for occupational exposure specified in Part 1 of the Second Schedule are not exceeded;

(*b*) the protection and safety of the employees or workers are optimised;

(*c*) decisions with regard to measures for the protection and safety of the employees or workers are recorded and made available for inspection when requested by the Director-General;

(*d*) policies, procedures and organisational arrangements for occupational protection and safety are established for the purpose of implementing the requirements of these Regulations; and

(*e*) suitable and adequate facilities, equipment and services for protection and safety are provided.

(2) Despite paragraph (1)(*a*), every employer and licensee must ensure that every employee and worker has the same level of protection against exposure to radiation from sources as a member of

the public mentioned in Part 12 if that exposure is not required by or directly related to the work of that employee or worker.

(3) Every employer and licensee must do all that is reasonably practicable to ensure that every employee and worker is informed that —

(*a*) ensuring protection and safety is an integral part of a general occupational health and safety programme; and

(*b*) they have in such programme specific obligations and responsibilities for their own protection and the protection of others against radiation exposure, and for the safety of sources.

(4) Where an employee or a worker has reasonable cause to believe that an occurrence that could affect safety conditions or compliance with the requirements of these Regulations has taken place, he or she must report the occurrence to the licensee or employer (as the case may be) and the licensee or employer must immediately record the report and conduct an investigation or arrange for an investigation to be conducted.

(5) An employer or a licensee must immediately notify the Director-General and take appropriate remedial actions where —

(*a*) an investigation under paragraph (4) confirms the report of the employee or worker, as the case may be; or

(*b*) the employer or licensee has any other reason to believe that a failure to comply with any requirement under these Regulations has occurred.

(6) Where an investigation mentioned in paragraph (4) confirms the report of the employee or worker, or the employer or licensee has any other reason to believe that any employee or worker has received a radiation dose exceeding that permitted under the appropriate dose limit specified in the Second Schedule, the employer or licensee (as the case may be) must immediately —

(*a*) suspend the employee or worker from work in which he or she will be exposed to ionising radiation;

(*b*) arrange for an appropriate medical examination of the employee or worker and any other examination as may be required by the Director-General;

(*c*) notify the Director-General; and

(*d*) keep a record of the circumstances as respects the employee or worker.

(7) Whenever it appears from the radiation dose record that any employee or worker has received a radiation dose exceeding that permitted under the appropriate dose limit specified in the Second Schedule, the licensee must immediately —

(*a*) suspend the employee or worker from any work in which he or she will be exposed to ionising radiation;

(*b*) conduct an investigation or arrange for an investigation to be conducted;

(*c*) arrange for an appropriate medical examination of the employee or worker and any other examination as may be required by the Director-General; and

(*d*) notify the Director-General.

(8) Every employer and every licensee must facilitate and ensure compliance, by every employee and worker engaged in activities in which the employee or worker is or could be subject to occupational exposure, with the provisions of these Regulations.

Cooperation between employers and licensees

31.—(1) Every employer and licensee must cooperate to the extent necessary for compliance by all responsible parties with the provisions of these Regulations.

(2) Cooperation between the employer and licensee must include, where appropriate, a clear allocation and documentation of the responsibilities of the employer and those of the licensee for protection and safety.

Classification of areas

32.—(1) Every licensee must designate as a controlled area any area in which specific measures for protection and safety are or could be required for —

(*a*) controlling exposures or preventing the spread of contamination in normal operations; and

(*b*) preventing or limiting the likelihood and magnitude of exposures in anticipated operational occurrences and accident conditions.

(2) Every licensee must —

(*a*) determine the boundaries of any controlled area on the basis of the likelihood and magnitude of expected exposures and the type and extent of the procedures required for protection and safety;

(*b*) delineate controlled areas by physical means or, where this is not reasonably practicable, by some other suitable means;

(*c*) where a source is only intermittently brought into operation or energised or is moved from place to place, delineate an appropriate controlled area by means that are appropriate to the prevailing circumstances and specify exposure times;

(*d*) establish measures reasonably necessary for occupational protection and safety, including physical measures to control the spread of contamination and the internal or corporate rules and procedures for controlled areas;

(*e*) restrict access to controlled areas by means of administrative procedures and by physical barriers, which could include locks or interlocks, the degree of restriction being commensurate with the likelihood and magnitude of exposures;

(*f*) provide, as appropriate, at entrances to controlled areas —

(i) personal protective equipment;

(ii) equipment for individual monitoring and workplace monitoring; and

(iii) suitable storage for personal clothing;

(*g*) provide, as appropriate, at exits from controlled areas —

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

(ii) equipment for monitoring for contamination of any objects or material being removed from the area;

(iii) washing or showering facilities and other personal decontamination facilities; and

(iv) suitable storage for contaminated personal protective equipment;

(*h*) periodically review conditions to assess whether there is any need to modify the measures for protection and safety or the boundaries of controlled areas; and

(*i*) provide appropriate information, instruction and training for persons working in controlled areas.

(3) Every licensee must designate as a supervised area any area not already designated as a controlled area, but where occupational exposure conditions need to be kept under review even though specific protection measures and safety provisions are not normally needed.

(4) Every licensee must take all the following measures which are appropriate to the nature, likelihood and magnitude of exposures or contamination in the supervised areas:

(*a*) delineate the supervised areas;

(*b*) display approved signs at access points to supervised areas;

(*c*) periodically review the conditions to assess whether there is any need for further measures for protection and safety or any need for changes to the boundaries of supervised areas.

Internal or corporate rules and procedures and personal protective equipment

33.—(1) Every employer and licensee must minimise the need to rely on administrative controls and personal protective equipment for protection and safety by providing well-engineered controls and satisfactory working conditions.

(2) Every employer and licensee must —

(*a*) establish in writing internal or corporate rules and procedures that are necessary for the protection and safety of employees, workers and other persons;

(*b*) include in the internal or corporate rules and procedures any relevant investigation level or authorised level, and the procedures to be followed if any such level is exceeded;

(*c*) make the internal or corporate rules and procedures and the measures for protection and safety known to those employees and workers to whom they apply and to other persons who may be affected by them;

(*d*) ensure that any work in which employees and workers are or could be subject to occupational exposure is adequately supervised and take all reasonable steps to ensure that the rules, procedures, measures for protection and safety provisions are observed; and

(*e*) if required by the Director-General, appoint an individual to be a radiation safety officer in accordance with regulation 19.

(3) Every employer and licensee must ensure that —

(*a*) if necessary, employees and workers are provided with suitable and adequate personal protective equipment including as appropriate —

(i) protective clothing;

(ii) respiratory protective equipment the characteristics of which are known to the users; and

(iii) protective aprons, protective gloves and organ shields;

(*b*) where respiratory protective equipment is provided, employees and workers receive adequate instruction in the proper use of respiratory protective equipment, including testing for good fit;

(*c*) tasks requiring the use of certain personal protective equipment are assigned only to employees or workers who, on the basis of medical advice, are capable of safely sustaining the extra effort necessary;

(*d*) all personal protective equipment, including equipment for use in an emergency, is maintained in proper condition such as by testing at regular intervals; and

(*e*) if the use of personal protective equipment is considered for any given task, account is taken of any additional exposure that could result owing to the additional time taken or the inconvenience, and of any non-radiological risks that might be associated with using personal protective equipment while performing the task.

Monitoring of workplaces

34.—(1) Every licensee, in cooperation with employers, must determine if a programme for monitoring at the workplace is necessary, and if so, must establish, maintain and keep under review a programme for monitoring at the workplace that is appropriate for the facility and activities to be carried out at that workplace.

(2) The type and frequency of monitoring of workplaces must be sufficient to enable —

(*a*) evaluation of the radiological conditions in all workplaces;

(*b*) assessment of the exposure of employees and workers in controlled areas and supervised areas; and

(*c*) review of the classification of controlled areas and supervised areas.

(3) Where a workplace monitoring programme is established, every licensee, in cooperation with employers (if any) must maintain records of the findings of the workplace monitoring programme.

(4) The records of the findings of the workplace monitoring programme must be made available to the employees and workers.

(5) The programme for monitoring of the workplace must specify —

(*a*) the dose quantities to be measured;

(*b*) where and when the measurements are to be made and at what frequency;

(*c*) the measurement methods and procedures; and

(*d*) the investigation levels and the actions to be taken if they are exceeded.

Occupational exposure assessment

35.—(1) Every employer and licensee must make arrangements approved by the Director-General for the assessment of the occupational exposure of employees and workers.

(2) In complying with paragraph (1), every employer and licensee must determine if monitoring of the individual radiation dose is required for the assessment, and if so, must ensure that arrangements are made with approved dosimetry service providers.

(3) It is the duty of every employee and worker to comply with the arrangements mentioned in paragraph (1).

(4) For any employee or worker who usually works in a controlled area, or who occasionally works in a controlled area and may receive a significant dose from occupational exposure, monitoring of the individual radiation dose must be undertaken where feasible.

(5) In cases where monitoring of the individual radiation dose is not feasible, the occupational exposure must be assessed on the basis of the results of workplace monitoring and information on the locations and duration of exposure of the employee or worker.

(6) For any employee or worker who regularly works in a supervised area or who enters a controlled area only occasionally, the occupational exposure must be assessed on the basis of the results of workplace monitoring or of monitoring of the individual radiation dose, as appropriate.

(7) Every employer must ensure that employees or workers who may be subject to exposure due to contamination are identified, including employees or workers who use respiratory protective equipment, and must arrange for monitoring to the extent that is necessary —

(*a*) to demonstrate the effectiveness of the measures for protection and safety; and

(*b*) to assess intakes of radionuclides and the committed effective doses.

(8) Without limiting the other requirements of these Regulations, where the Director-General has reasonable cause to believe an employee or a worker may have received, or is likely to receive, in any calendar year, a sum of radiation doses greater than three-tenths of the appropriate dose limit specified in Part 1 of the Second Schedule, the Director-General may issue to the licensee concerned or the employer concerned a written notice for the purposes set out in paragraph (9).

(9) The written notice issued under paragraph (8) may require the licensee or employer to make arrangements approved by the Director-General with respect to all or any of the following matters:

(*a*) for the monitoring of any part of the installation, and for the keeping and preserving of records of measurements obtained by such monitoring;

(*b*) for the suspension of any employee or worker from work in which he or she will be exposed to ionising radiations or for imposing special conditions on the employee's or worker's continued employment in any such work;

(*c*) for the medical examination of any employee or worker.

(10) Without limiting the other requirements of these Regulations, where the Director-General has reasonable cause to believe that the ingestion of an excessive amount of a radionuclide by any employee or worker has taken place, or could potentially take place, the Director-General may issue to the licensee concerned or the employer concerned a written notice for the purposes set out in paragraph (11).

(11) The written notice issued under paragraph (10) may require the licensee or employer to make arrangements approved by the Director-General with respect to all or any of the following matters:

(*a*) for the monitoring of airborne radionuclides in any part of the installation, and for the keeping and preserving of records of measurements obtained by such monitoring;

(*b*) for measurements to be made on the amount of radionuclides present in the body of any employee or worker, and for the keeping and preserving of the records of such measurements;

(*c*) for the suspension of any radiation worker from work in which he or she will be exposed to ionising radiations, or for imposing special conditions on the radiation worker's continued employment in any such work;

(*d*) for the medical examination of any employee or worker.

Records of worker exposure

36.—(1) Every employer and licensee must maintain records of occupational exposure for every employee and worker for whom assessment of occupational exposure is required.

(2) The records of occupational exposure for every employee and worker must be maintained during and after the employee's or worker's working life, at least until the employee or worker attains or would have attained 75 years of age, and for at least 30 years after cessation of the work in which the employee or worker was subject to occupational exposure.

(3) Every employer and licensee must —

(*a*) provide every employee and worker with access to records of their own occupational exposure;

(*b*) provide access to employees' and workers' records of occupational exposure to —

(i) the Director-General;

(ii) any authorised officer; and

(iii) any person who requires access to these records for the purposes of compliance with these Regulations;

(*c*) facilitate the provision of copies of employees' and workers' exposure records to new employers when their employees and workers change employment;

(*d*) make arrangements for the retention of exposure records for former employees and workers by the employer or licensee, as appropriate;

(*e*) if required to do so by the Director-General, make arrangements for the provision of the dose records to the Director-General; and

(*f*) in complying with sub-paragraphs (*a*) to (*e*), give due care and attention to maintaining the confidentiality of records.

(4) If any employer or licensee ceases to conduct activities in which employees and workers are subject to occupational exposure, the employer or licensee must make arrangements approved by the Director-General for the retention of records of occupational exposure of employees and workers by an approved organisation.

Workers' health surveillance

37.—(1) Every employer and licensee must make arrangements for the health surveillance of all occupationally exposed employees and workers.

(2) The arrangements mentioned in paragraph (1) must be arrangements that are —

(*a*) reasonably necessary and appropriate in the circumstances;

(*b*) based on the general principles of occupational health; and

(*c*) designed to assess the initial fitness and continuing fitness of these workers for their intended tasks.

Information, instruction and training

38. Every employer, in cooperation with a licensee, must —

(*a*) before commencement of work and on a periodic basis, provide all employees and workers with adequate information —

(i) on health risks due to their occupational exposure in normal operation, anticipated operational occurrences and accident conditions; and

(ii) on the significance of the employee's and worker's actions for protection and safety;

(*b*) provide all employees and workers with adequate instruction and training and periodic retraining in protection and safety;

(*c*) provide those employees and workers who may be involved in or affected by the response to an emergency —

(i) with appropriate information and adequate instruction; and

(ii) with training and periodic retraining, for protection and safety; and

(*d*) maintain records of the training provided to individual employees and workers for the duration of the individual's employment or work.

Special arrangements for female employees and workers and for persons below 18 years of age undergoing training

39.—(1) Every employer, in cooperation with a licensee, must provide every female employee and worker, who is likely or required to enter any controlled area or supervised area or who may undertake emergency duties, with appropriate information on —

(*a*) the risk to the embryo or foetus due to exposure of a pregnant woman;

(*b*) the importance for a female employee and worker of notifying her employer as soon as possible if she suspects that she is pregnant or if she is breastfeeding; and

(*c*) the risk of health effects for a breastfed infant due to ingestion of radioactive substances.

(2) Every employer and licensee must ensure that every person below 16 years of age must not be and must not be likely to be subject to occupational exposure.

(3) Every employer and licensee must ensure that every person below 18 years of age must not be allowed access to a controlled area unless under supervision and unless for either of the following purposes:

(*a*) training for employment in which the person is or is likely to be subject to occupational exposure;

(*b*) studies in which sources are used.

PART 11

MEDICAL EXPOSURE

General responsibilities of licensees

40.—(1) Every licensee must ensure, prior to providing care and comfort to an individual undergoing a radiological procedure, that a caregiver or comforter must not incur a medical exposure unless he or she has received, and has indicated an understanding of, relevant information on radiation protection and information on the radiation risks.

(2) Every licensee must ensure that —

(*a*) the radiological medical practitioner performing or overseeing the radiological procedure has assumed responsibility for ensuring overall protection and safety for patients in the planning and delivery of the medical exposure and the optimisation of protection and safety, in cooperation with the medical physicist and the medical radiation technologist, as appropriate;

(*b*) radiological medical practitioners, medical physicists, medical radiation technologists and other healthcare workers with specific duties in relation to the protection and safety of patients in a radiological procedure have specialised or relevant training in the appropriate area; and

(*c*) any designation of responsibilities by a principal party is documented.

Optimisation of protection for medical exposures

41. Every licensee and radiological medical practitioner performing or overseeing the radiological procedure must ensure that protection and safety is optimised for each medical exposure.

Dose constraints

42.—(1) Every licensee must establish relevant dose constraints and ensure that they are used in the optimisation of protection and safety in any radiological procedure in which an individual acts as a caregiver or comforter.

(2) Every licensee must ensure that the dose constraints specified or approved by an institutional review board are used in the optimisation of protection and safety for persons subject to exposure as part of biomedical research.

Pregnant or breastfeeding patients

43.—(1) Every licensee must ensure that there are arrangements established for appropriate radiation protection in cases where a patient is or is likely to be pregnant or is breastfeeding.

(2) Every licensee must ensure that —

(*a*) signs conveying the information in paragraph (3) in appropriate languages are placed in public places, waiting rooms for patients, cubicles or other appropriate places; and

(*b*) other means of communication are also used to convey the information.

(3) The signs and other means of communication must request any female patient who is to undergo a radiological procedure to notify the radiological medical practitioner, medical radiation technologist or other personnel if she —

(*a*) is or is likely to be pregnant; or

(*b*) is breastfeeding and the scheduled radiological procedure includes the administration of a radiopharmaceutical.

(4) Every licensee must ensure that there are procedures in place for establishing the pregnancy status of a female patient of reproductive capacity before the performance of any radiological procedure that could result in a significant dose to an embryo or a foetus that may be in the patient.

(5) Every licensee must ensure that there are procedures in place for establishing that a female patient is not currently breastfeeding before the performance of any radiological procedure involving the administration of a radiopharmaceutical that could result in a significant dose to a breastfed infant.

Release of patients after radiological procedures involving radionuclides

44.—(1) Every licensee must ensure that there are arrangements established to ensure appropriate radiation protection for members of the public and for family members before a patient is released following radiological procedures where radionuclides are administered into the patient.

(2) The radiological medical practitioner must ensure that every patient under his or her responsibility who has undergone a radiological procedure with sealed sources or unsealed sources must not be discharged from a medical radiation facility until it has been established that —

(*a*) the activity of radionuclides in the patient is such that doses that could be received by members of the public and family members would be in compliance with the requirements specified by the Director-General; and

(*b*) the patient or the legal guardian of the patient is provided with —

(i) written instructions for keeping doses to persons in contact with or in the vicinity of the patient as low as reasonably achievable and for avoiding the spread of contamination; and

(ii) information on the radiation risks.

Unintended and accidental medical exposure

45. Every licensee must ensure that all practicable measures are taken to minimise the likelihood of unintended or accidental medical exposure arising from —

(*a*) flaws in design of or operational failure of medical radiological equipment;

(*b*) failures of or errors in software; or

(*c*) human error.

Records related to medical exposures

46.—(1) Every licensee must maintain the following personnel records:

(*a*) records of any designation of responsibilities by principal parties;

(*b*) records of training of personnel in radiation protection.

(2) Every licensee must maintain the following records:

(*a*) records of the results of the calibrations and periodic checks of the relevant physical and clinical parameters selected during treatment of patients;

(*b*) records of dosimetry of patients;

(*c*) records associated with the quality assurance programme.

(3) Every licensee must make available for inspection the records mentioned in paragraph (1) or (2) when required by the Director-General.

PART 12

PUBLIC EXPOSURE

General responsibilities of licensees

47.—(1) Every licensee must verify and demonstrate compliance with these Regulations and the licence conditions, in any manner that may be required by the Director-General, in relation to any public exposure delivered by a source for which the licensee has responsibility.

(2) Every licensee in cooperation with a supplier must apply the principle of optimisation of protection and safety in the design, planning, operation and decommissioning of a source (or for closure and the post-closure period for waste disposal facilities) and in doing so, must take into account —

(*a*) possible changes in any conditions that could affect exposure to members of the public, such as changes in the characteristics and use of the source, changes in environmental dispersion conditions, changes in exposure pathways or changes in values of parameters used for the determination of the representative person;

(*b*) good practice in the operation of similar sources or the conduct of similar practices;

(*c*) possible build up and accumulation in the environment of radioactive substances from discharges during the lifetime of the source; and

(*d*) uncertainties in the assessment of doses, especially uncertainties in contributions to doses if the source and the representative person are separated in space or in time.

(3) Every licensee, for sources under the licensee's responsibility, must establish, implement and maintain —

(*a*) policies, procedures and organisational arrangements for protection and safety in relation to public exposure, in accordance with these Regulations;

(*b*) measures for ensuring optimisation of protection and safety, and limitation of exposure to members of the

public from such sources, in order that the total exposure is not higher than the dose limits for members of the public as specified in Part 2 of the Second Schedule;

(*c*) measures for ensuring the safety of such sources;

(*d*) provision for suitable and adequate resources (including facilities, equipment and services) for the protection and safety of members of the public, commensurate with the likelihood and magnitude of the exposure;

(*e*) programmes for appropriate training of personnel having functions relevant to the protection and safety of the public, as well as periodic retraining as required, to ensure the necessary level of competence;

(*f*) provision for appropriate monitoring equipment, monitoring programmes and methods for assessing public exposure;

(*g*) emergency plans, emergency procedures and emergency response arrangements, in accordance with the nature and magnitude of the radiation risks associated with the sources; and

(*h*) adequate records of monitoring programmes.

(4) In paragraph (2), "representative person" means an individual who receives a dose that is representative of the doses to the more highly exposed individuals in the population publicly exposed to the source mentioned in that paragraph.

Control of visitors

48. Every licensee, in cooperation with an employer where appropriate, must —

(*a*) ensure that the requirements under these Regulations that relate to public exposure are also complied with in relation to visitors to a controlled area or a supervised area;

(*b*) ensure that visitors are accompanied in any controlled area by a person who knows the measures for protection and safety for the controlled area;

(*c*) provide adequate information and instructions to visitors before they enter a controlled area or a supervised area so as to provide protection and safety for visitors and other individuals who could be affected by their actions; and

(*d*) ensure that adequate control is maintained over the entry of visitors to a controlled area or a supervised area, including the use of signs for such areas.

Sources of external irradiation

49. Every licensee must ensure that if a source can give rise to external exposure to members of the public —

(*a*) the floor plans and arrangements of equipment for all significant modifications to existing installations are subject to review and approval by the Director-General or any authorised officer, prior to commissioning; and

(*b*) shielding and other measures for protection and safety, including access controls, are provided for restricting public exposure, in particular at open sites such as for some applications of industrial radiography.

Contamination in areas accessible to members of public

50. Every licensee must ensure that —

(*a*) specific provisions for confinement of radioactive substances are established for the design and operation of a source that could cause the spread of contamination in areas that are accessible to members of the public; and

(*b*) measures for protection and safety are implemented for restricting public exposure due to contamination in areas within a facility that are accessible to members of the public.

Monitoring of public exposure

51. Every licensee must —

(*a*) establish and implement monitoring programmes to ensure that public exposure due to sources under the responsibility of the licensee is adequately assessed and that the assessment is sufficient to verify and demonstrate compliance with these Regulations or the licence conditions;

(*b*) maintain appropriate records of the results of the monitoring programmes and estimated doses to members of the public;

(*c*) report or make available to and when required by the Director-General or any authorised officer the results of the monitoring programme;

(*d*) report promptly to the Director-General any level of public exposure exceeding the limits in Part 2 of the Second Schedule or in licence conditions relating to public exposure;

(*e*) establish and maintain a capability to carry out monitoring in an emergency, in the event of any unexpected increase in radiation level or concentration of radionuclides in the environment due to any accident or other unusual event attributed to the source or facility;

(*f*) verify the adequacy of the assumptions made for the assessment of public exposure and radiological environmental impacts; and

(*g*) publish or make available, on request by the Director-General, results from source monitoring and environmental monitoring programmes and assessments made of doses from public exposure.

Consumer products

52.—(1) Every provider of any consumer product, who imports the consumer product for sale and distribution as an exempt product must ensure that —

(*a*) where practicable, a legible label is firmly affixed to a visible surface of each consumer product that —

(i) states that the product contains radioactive substances and identifies the radionuclides and their activities;

(ii) states that the provision of the product to the public has been authorised;

(iii) states that the product has been exempted from licensing under the Act; and

(iv) provides information about required or recommended options for recycling or disposal, if relevant; and

(*b*) the information specified in sub-paragraph (*a*) is printed legibly on the retail packaging of the consumer product.

(2) Every provider of any consumer product must provide clear and appropriate information and instructions with every consumer product on —

(*a*) the correct installation, use and maintenance of the product;

(*b*) the servicing and repair of the product;

(*c*) the radionuclides and their activities;

(*d*) the dose rates in normal operation and during servicing and repair; and

(*e*) required or recommended options for recycling or disposal, if relevant.

(3) Every provider of any consumer product must provide all the retailers of the consumer product with relevant information on safety and instructions on transport and storage.

PART 13

RADIOACTIVE WASTE MANAGEMENT

Application for approval to accumulate or transport radioactive waste

53.—(1) Every application for approval to accumulate or transport radioactive waste under section 13 or 15 of the Act must be made to the Director-General in such form as the Director-General may require.

(2) Any condition, limitation or exception specified by the Director-General, for an approval granted under section 13 or 15 of the Act, must not be altered except with the approval of the Director-General on an application made in such form as the Director-General may require.

(3) The fees specified in the Fifth Schedule are payable for every application under paragraph (1) or (2).

(4) Any fee specified in the Fifth Schedule that is payable in respect of a matter —

(*a*) cannot be refunded; and

(*b*) cannot be used to offset any fee (specified in that Schedule) that is payable in respect of another matter.

(5) The fee for an application under paragraph (1) or (2) must be paid when the application is submitted to the Director-General.

(6) Every person applying for approval must submit to the Director-General the relevant information and documents that are necessary to support the application as required to do so, including —

(*a*) information on waste generation, pre-disposal, pre-treatment, characterisation, treatment, conditioning, storage, control of discharges, clearance, packaging strategies, transport, design and manufacture of containers, handling of waste packages, site evaluation, design, construction, operation, closure and post-closure stage of a waste management facility;

(*b*) supporting safety assessment;

(*c*) supporting environmental assessment;

(*d*) security assessment; and

(*e*) an emergency plan.

(7) The safety assessment must be prepared by the applicant in the development of a radioactive waste management facility as a basis for the process of regulatory decision-making and approval and must be progressively developed and refined as the project proceeds.

Amendment of condition, limitation or exception of approval

54. The Director-General may, if he or she thinks fit, amend any condition, limitation or exception of an approval granted under section 13 or 15 of the Act.

Responsibilities associated with management of radioactive waste

55.—(1) Every approved person is responsible for the safe management of radioactive waste under the person's responsibility.

(2) Every approved person must take all necessary measures to ensure an adequate level of protection and safety by various means, including —

(*a*) when requested by the Director-General, demonstration of safety by means of a safety assessment and by means of periodic safety reviews for an existing facility or activity;

(*b*) preparation and implementation of appropriate operating procedures, including monitoring;

(*c*) application of good engineering practice;

(*d*) establishment and implementation of a suitable management system commensurate with the hazard of the waste management activities;

(*e*) ensuring that staff are trained, qualified and competent;

(*f*) establishment and maintenance of a mechanism to provide and ensure adequate financial resources to discharge its responsibilities;

(*g*) derivation of operational limits, conditions and controls to assist with ensuring that the radioactive waste management facility is operated in accordance with the safety assessment;

(*h*) ensuring that there are no avoidable delays in processing waste and transferring to the next step as soon as practicable;

(*i*) using relevant international experience to ensure operations are as safe as practicable;

(*j*) ensuring radioactive waste is managed by appropriate classification, segregation, treatment, conditioning, storage and disposal, and maintaining records of such activities; and

(*k*) ensuring disposal of radioactive waste is not unnecessarily delayed.

(3) Every approved person must promote and maintain a strong safety culture.

(4) Every approved person must appoint, when required by and subject to the approval of the Director-General, a technically competent person with the appropriate independence and authority to be a Radioactive Waste Management Officer in order to assist the approved person in the safe and efficient on-site management of radioactive waste.

(5) Every approved person approved to accumulate or dispose of radioactive waste must develop a suitable and comprehensive recording system for radioactive waste management activities under the person's responsibility, which must include discharges and must allow for traceability of radioactive waste from the point of its collection through to its long term storage and its disposal.

(6) Every approved person approved to accumulate or dispose of radioactive waste must ensure that all records related to radioactive waste inventory and radioactive waste management activities must be —

(*a*) kept up to date; and

(*b*) retained in such a way as to ensure that relevant information is accessible in the future.

(7) When any radioactive waste is being transferred, associated records must be provided to the approved person of the subsequent step.

(8) Every approved person must submit records and provide written reports on the person's radioactive waste management activities that are required to be submitted and provided under these Regulations to the Director-General in the form and manner required by the Director-General.

Security of radioactive waste

56. Part 16 applies to the security of storage and transport of radioactive waste as it applies to the security of radioactive materials.

Control of radioactive waste generation

57.—(1) Every licensee and approved person generating radioactive waste must ensure that appropriate measures are taken to keep generation of radioactive waste to the minimum practicable.

(2) Every licensee and approved person must accomplish minimisation of waste generation required under paragraph (1) by —

(*a*) applying careful and appropriate planning to the design, construction, administration, operation and decommissioning planning of facilities so that the generation of radioactive waste is kept to the minimum practicable;

(*b*) applying to the extent possible the reuse and recycling of materials;

(*c*) the authorised discharge of effluent and clearance of materials from regulatory control, after some appropriate processing or a sufficiently long period of storage, to reduce the amount of radioactive waste that needs further processing or storage;

(*d*) minimising the activity and volume of waste by using the minimum quantity of radioactive material needed;

(*e*) wherever possible, when purchasing sealed sources, establishing contractual arrangements for the return of sources to the manufacturer or pre-determined waste manager following use; and

(*f*) implementing a comprehensive management system for all activities potentially generating radioactive waste.

Radioactive waste characterisation and classification

58.—(1) Every approved person must characterise radioactive waste under the person's responsibility in terms of its physical, mechanical, chemical, radiological and biological properties, and the relevant characteristics of the waste must be recorded to facilitate its further management.

(2) Every approved person must classify radioactive waste under the person's responsibility in accordance with the radioactive waste classification scheme established by the Director-General.

Acceptance criteria for radioactive waste

59.—(1) Every approved person must establish the person's own waste acceptance criteria (called in this regulation the waste acceptance criteria), which must be submitted to the Director-General for review, assessment and approval as part of the safety assessment.

(2) The waste acceptance criteria defined for each step of the waste management process must specify the characteristics of waste packages and unpackaged waste, under normal and abnormal conditions, to be processed, stored or disposed of in that step.

(3) Every approved person must ensure that an appropriate control system is established to provide confidence that the waste under the person's responsibility meets the waste acceptance criteria that is applicable to that waste.

(4) Every approved person must ensure that radioactive waste to be transferred to other installations or waste management steps meets the waste acceptance criteria with respect to the subsequent step.

(5) The procedures for the reception of waste must contain provisions for safely managing radioactive waste that fails to meet the waste acceptance criteria, including but not limited to taking remedial actions or returning the waste.

Processing of radioactive waste from collection up to treatment

60.—(1) Every approved person must ensure that radioactive waste is collected, characterised and segregated, at the point of origin in accordance with —

(*a*) established criteria;

(*b*) a defined waste management strategy; and

(*c*) the waste acceptance criteria defined for the next step in the waste management process.

(2) Every approved person must ensure that radioactive waste is, as soon as possible, rendered into a safe and passive form for storage or disposal.

(3) Every approved person must ensure that radioactive waste is processed in such a way that safety of the operations is appropriately ensured during normal operations, that measures are taken to prevent the occurrence of incidents or accidents, and that provisions are made to mitigate the consequences if accidents occur.

(4) Every approved person must ensure that the processing of radioactive waste is consistent with the type of waste, the possible need for its storage, the anticipated disposal option, and the limits, conditions and controls established in the safety assessment and in the assessment of environmental impacts.

(5) Every approved person must ensure that radioactive waste is processed in such a way that the resulting waste form can be safely stored and retrieved from the storage facility until its disposal.

(6) Every approved person must establish provisions for identifying, assessing and dealing with radioactive waste and radioactive waste packages that do not meet process specifications and requirements for safe handling, transport, storage and disposal.

Conditioning of radioactive waste

61.—(1) In selecting a conditioning process, every licensee must consider the following aspects:

(*a*) whether safety would be improved from the use of a matrix material;

(*b*) compatibility of the radioactive waste with the selected materials and processes;

(*c*) the minimisation of the generation of secondary radioactive waste.

(2) Every approved person must ensure that the radioactive waste packages are designed and produced so that radionuclides are confined under both normal conditions and accident conditions that may occur during handling, storage, and disposal.

(3) Every approved person must ensure that each package of conditioned radioactive waste is provided with a durable label bearing the identification number and relevant information, and that a proper record of each package is kept under the management system.

Storage of radioactive waste

62.—(1) Prior to generating radioactive waste that may require subsequent management, every licensee and approved person must ensure the availability of an appropriate storage facility.

(2) Every approved person must ensure that arrangements are in place to verify that the radioactive waste, collected or received in the storage facility under its responsibility, meets the acceptance criteria approved by the Director-General for that facility.

(3) If the radioactive waste or sources to be stored do not meet the waste acceptance criteria, every approved person must establish provisions which compensate for the non-compliance or refuse the transfer.

(4) Every approved person must adopt provisions to ensure that radioactive waste and disused sealed sources will be stored in such containers, packages and facilities that meet the requirements approved by the Director-General.

(5) Radioactive waste must be stored in a manner that ensures proper segregation, and protection of the employees, workers, the public and the environment, and enables its subsequent inspection, monitoring, retrieval and reservation in a condition suitable for movement, handling, transport or disposal.

(6) Every approved person must ensure that the integrity of every waste package in storage is maintained until it is retrieved for further treatment, conditioning or disposal.

(7) Every approved person must ensure that every waste package container provides integrity throughout the storage period and permits —

(*a*) retrieval at the end of the storage period;

(*b*) enclosure in an overpack, if necessary;

(*c*) transport to and handling at a disposal facility; and

(*d*) compliance with relevant waste acceptance criteria.

(8) Every approved person must periodically review the adequacy of the storage capacity and the review must take into account the following:

(*a*) the predicted waste arising both from normal operation and from possible incidents;

(*b*) the expected lifetime of the storage facility;

(*c*) the availability of disposal options.

Discharge of radioactive materials to environment

63.—(1) Before seeking approval to discharge any radioactive material to the environment, an applicant must —

(*a*) determine the characteristics and activity of the material to be discharged, and the possible points and methods of discharge;

(*b*) determine by an appropriate pre-operational study all significant exposure pathways by which discharged radionuclides could give rise to exposure of members of the public;

(*c*) assess doses to the representative person due to the planned discharges;

(*d*) consider the radiological environmental impacts in an integrated manner with features of the system of protection and safety, as required by the Director-General; and

(*e*) submit to the Director-General the findings from sub-paragraphs (*a*) to (*d*) as an input to the establishment by the Director-General of authorised limits on discharges and conditions on their implementation.

(2) Every approved person, in addition to the requirements of paragraph (1), must —

(*a*) keep all radioactive discharges as far below the authorised limits as is reasonably achievable;

(*b*) monitor and record the discharges of radionuclides with sufficient detail and accuracy to demonstrate compliance with the authorised discharge limits and to permit estimation of the exposure of the representative person;

(*c*) maintain an appropriate management system for the activities related to effluent or environmental monitoring;

(*d*) report discharges to the regulatory body at intervals as may be specified by the Director-General; and

(*e*) promptly report to the Director-General any discharges that will exceed the authorised limits.

(3) In paragraph (1), "representative person" means an individual who receives a dose that is representative of the doses to the more highly exposed individuals in the population exposed to the radiation from the material mentioned in that paragraph.

Requirements for radioactive waste management facilities

64.—(1) Every pre-disposal radioactive waste management facility (called in this regulation the facility) must be constructed in accordance with the design as described in the safety assessment and approved by the Director-General.

(2) Where the commissioning of the facility is carried out in several stages, the commissioning of every stage is subject to the review and approval of the Director-General.

(3) Upon the completion of commissioning of the facility, the approved person must submit a final commissioning report to the Director-General and ensure that the safety assessment is updated, as necessary, to reflect the as-built status of the facility and the conclusions of the commissioning report.

(4) A modification of an existing facility with significant safety implications that requires a revision of the safety assessment is subject to the same requirements and approvals under these Regulations as are applicable for a new facility.

(5) Every facility must be operated in accordance with every condition, limitation or exception that is imposed by the Director-General.

(6) All operations and activities related to the facility and important to safety are subject to documented limits, conditions and controls, and must be carried out by trained, qualified and competent personnel.

(7) Every facility must be regularly maintained so as to ensure its safe performance.

PART 14

MANAGEMENT OF DISUSED SEALED SOURCES

Management of disused sealed sources

65.—(1) Every licensee must review their sealed source inventory at least annually to identify any sources that have become disused.

(2) Every licensee must, if required to do so by the Director-General, notify the Director-General of any disused source identified under paragraph (1).

(3) Before declaring any disused sealed source as radioactive waste, the licensee must first attempt to return the sealed source to its supplier and consider possible reuse or recycling of the source.

(4) Without limiting paragraph (3) and unless otherwise authorised by the Director-General, every licensee must make arrangements for the prompt transfer of any disused sealed sources to a facility authorised to receive disused sealed sources.

PART 15

EMERGENCY PREPAREDNESS AND RESPONSE

Responsibilities of licensees and approved persons

66.—(1) Where there is any risk of an emergency affecting either employees, workers or members of the public, the licensee or approved person must prepare an emergency plan for the protection of people and the environment (called in this Part the emergency plan), which must include arrangements for the prompt identification of an emergency, and for determining the appropriate level of emergency response.

(2) In relation to the arrangements for the emergency response at the scene by the licensee or approved person, the emergency plan must include —

(*a*) provision for individual monitoring and area monitoring;

(*b*) arrangements for medical treatment; and

(*c*) arrangements for assessing and mitigating any consequences of an emergency.

(3) Every licensee and approved person must be responsible for the implementation of their emergency plans and must be prepared to take any necessary action for effective response.

(4) To prevent the occurrence of conditions that could lead to a loss of control over a source or to the escalation of such conditions, every licensee and approved person must —

(*a*) develop, maintain and implement procedures to provide the means for preventing loss of control over the source and for regaining control over the source as necessary;

(*b*) make available equipment, instrumentation and diagnostic aids that may be needed; and

(*c*) train and periodically retrain personnel in the procedures to be followed and conduct exercises on the procedures.

(5) Every licensee in possession of sources and persons authorised to store radioactive waste, for which prompt intervention may be required, must ensure that the emergency plan defines with respect to each scenario the respective responsibilities of response organisations in the implementation of the emergency plan.

(6) Every emergency plan must —

(*a*) characterise the content, feature and extent of a risk of an emergency taking into account the results of any hazard assessment and any lessons learnt from operational experience and from accidents that have occurred with sources of a similar type;

(*b*) identify the various operating conditions and other conditions of the source which could lead to the need for intervention;

(*c*) describe the methods and instruments for assessing an accident and its consequences on and off the site;

(*d*) provide for protective actions and mitigation actions, and assignment of responsibilities for initiating and discharging such actions;

(*e*) provide for rapid and continuous assessment of the accident as it proceeds and determining the need for protective actions;

(*f*) allocate responsibilities for notifying the relevant authorities and for initiating intervention;

(*g*) provide procedures, including communication arrangements for contacting any relevant response organisation and for obtaining assistance from firefighting, medical, police and other relevant organisations;

(*h*) provide for training of personnel involved in implementing emergency plans;

(*i*) be rehearsed at suitable intervals; and

(*j*) provide for periodic review and updating of the plan.

Implementation of intervention

67.—(1) Every licensee and every approved person must ensure that the protective actions or remedial actions aimed at reducing or averting accidental exposure are only undertaken when they are justified, taking into account health, social and economic factors.

(2) The form, scale and duration of any justified intervention must be optimised so as to produce the maximum net benefit under the prevailing social and economic circumstances.

(3) Without limiting the requirements of regulation 72, every licensee and approved person must promptly notify the Director-General when an accidental situation requiring intervention has arisen or is expected to arise and must keep the Director-General informed of —

(*a*) the current situation and its expected evolution;

(*b*) the measures taken to terminate the accident and to protect employees, workers and members of the public; and

(*c*) the exposures that have been incurred and that are expected to be incurred.

Protection of emergency workers

68.—(1) The response organisation and employers responsible for ensuring compliance with the requirements in paragraphs (2) to (10) must be specified in the emergency plan.

(2) In an emergency exposure situation, the requirements for occupational exposure in Part 10 must be applied for emergency workers, where applicable, except as provided in paragraph (3).

(3) Every response organisation and every employer must ensure that no emergency worker is subject to exposure exceeding 50 mSv other than —

(*a*) for the purpose of saving life or preventing serious injury;

(*b*) when undertaking actions to avert a large collective dose; or

(*c*) when undertaking actions to prevent severe deterministic effects and actions to prevent the development of catastrophic conditions that could significantly affect people and the environment.

(4) In the exceptional circumstances of paragraph (3), every response organisation and every employer must make all reasonable efforts to keep doses to emergency workers below the appropriate guidance values for restricting exposure of emergency workers specified in Part 4 of the Second Schedule.

(5) Emergency workers undertaking actions due to which their doses could approach or exceed the appropriate guidance values for restricting exposure of emergency workers specified in Part 4 of the Second Schedule must do so only when the expected benefits to other persons would clearly outweigh the risks to emergency workers.

(6) Every response organisation and every employer must ensure that every emergency worker who undertakes any action in which any dose received is likely to exceed 50 mSv —

(*a*) does so voluntarily;

(*b*) has been clearly and comprehensively informed in advance of the associated health risks, as well as of available measures for protection and safety; and

(*c*) is, to the extent possible, trained in the action that the worker is required to take.

(7) Every worker undertaking work such as repairs to plants and buildings or activities for radioactive waste management or remedial work for the decontamination of the site and surrounding areas, is subject to the requirements relating to occupational exposure in Part 10.

(8) Every response organisation and every employer must take all reasonable steps to assess and record the doses received in an emergency by every emergency worker.

(9) The information on the doses received mentioned in paragraph (8) and information concerning the associated health

risks must be communicated to the individual worker concerned by the response organisation or employer, as the case may be.

(10) A worker who has received a dose in an emergency exposure situation must normally be precluded from incurring any further occupational exposure, and medical advice from a medical practitioner must be obtained before further occupational exposure if the worker has received a dose exceeding 200 mSv or at the request of the worker.

PART 16

SECURITY OF RADIOACTIVE MATERIALS

Security measures

69.—(1) Where any radioactive material is in use, being stored at a facility or site, or being transported, the licensee must establish, implement and maintain, at a minimum, security measures capable of preventing unauthorised access to the radioactive material.

(2) Where, in the opinion of the Director-General, the security measures at the facility or site are insufficient to prevent unauthorised access to the radioactive material, the Director-General may, by written notice, require the licensee to establish, implement or improve the security measures at the facility or site, or in transport, within a reasonable time determined by the Director-General.

Duty to report breach of security measures

70.—(1) The licensee must inform the Director-General of any incident involving a breach of security measures (in relation to the radioactive material), by means of a preliminary oral report within 24 hours after the incident, which is to be confirmed in writing within 48 hours and a final full written report within 10 days after the incident.

(2) The preliminary written report must contain details of the circumstances of the breach and the steps taken to rectify the breach to the extent possible and the final full written report must contain all such details in full.

(3) Without limiting the requirements of paragraphs (1) and (2), a licensee must inform the Director-General immediately when the licensee becomes aware that, as a result of a breach in security measures —

(*a*) any radioactive material has been lost; or

(*b*) an actual or attempted theft of radioactive material has occurred.

PART 17

RADIATION ACCIDENTS

Definition of "radiation accident"

71.—(1) For the purposes of this Part, a radiation accident in a non-medical application of ionising radiation or radioactive material is treated as having taken place if —

(*a*) an unplanned or unexpected uncontrolled high level of ionising radiation occurs;

(*b*) an individual enters a high radiation field by accident;

(*c*) there is loss of control of unsealed radioactive material causing a spillage or leakage of the radioactive material;

(*d*) the skin or clothing of an individual becomes contaminated; or

(*e*) radioactive material is accidentally released into the environment exceeding the discharge level permitted by the Director-General,

such that any individual has, or could have, received an effective or committed effective dose which is equal to or exceeding one-fifth of the appropriate dose limit specified in the Second Schedule.

(2) For the purposes of this Part, a radiation accident in a medical application of ionising radiation or radioactive materials is treated as having taken place if there is an occurrence that involves the misuse of irradiating apparatus or maladministration of a radioactive material for medical purposes including —

(*a*) any therapeutic treatment delivered —

(i) to the wrong patient or to the wrong tissue of a patient;

(ii) using the wrong radiopharmaceutical; or

(iii) with a dose or dose fractionation which differs by more than 10% from the value prescribed by the medical practitioner or which may lead to acute effects;

(*b*) any diagnostic exposure greater than 50% of the intended dose or resulting in doses repeatedly or substantially exceeding the established normal doses for diagnostic radiological examinations; or

(*c*) any equipment failure, error, mishap or other unusual occurrence which has the potential to cause a patient to receive a dose significantly different from that intended.

Radiation accident in non-medical application

72.—(1) When any radiation accident occurs in a non-medical application of ionising radiation or radioactive materials, the licensee, the radiation safety officer or the individual in charge of the area at the time must —

(*a*) evacuate all individuals from the affected area;

(*b*) block off the affected area and post warning signs at all its entrances;

(*c*) take immediate action to reduce the hazards caused by the radiation accident;

(*d*) make arrangements to provide temporary shielding, monitor and decontaminate any affected individual and the area and take all other actions necessary to return the situation to normal;

(*e*) ensure that any personal clothing or other private property which is contaminated by radioactive materials is not taken from the premises or released to a public laundry without the approval of the Director-General; and

(*f*) refer affected individuals for medical observation and treatment.

(2) The licensee or radiation safety officer must inform the Director-General of the occurrence of any radiation accident by means of a preliminary oral report within 24 hours after the accident, which is to be confirmed in writing within 48 hours and a final full written report within 10 days after the accident.

(3) The preliminary written report must contain the following details to the extent possible and the final full written report must contain all the following details:

(*a*) the time, place and nature of the accident, the number of individuals affected and the manner in which they were affected and the period during which there was loss of control of ionising radiation or of radioactive material;

(*b*) the area over which any radioactive substance may have been dispersed and the degree of contamination;

(*c*) the actions taken to rectify the accident situation and to minimise the possibility of any future recurrence;

(*d*) any individual who may have suffered radiation exposure and the assessment of the effective or committed effective radiation doses received by the individual;

(*e*) the results of medical examinations carried out on affected individuals and, in the case of any internal exposure of individuals, the results of biological monitoring.

Radiation accident in medical application

73.—(1) When any radiation accident occurs in a medical application of ionising radiation or radioactive material, the licensee or radiation safety officer must inform the Director-General of the occurrence of the accident by means of a preliminary oral report within 24 hours after the accident, which is to be confirmed in writing within 48 hours and a final full written report within 10 days after the accident.

(2) The preliminary written report must contain the following details to the extent possible and the final full written report must contain all the following details:

(*a*) the time, place and nature of the accident and the details of the patient involved;

(*b*) the calculated or estimated doses received and their distribution within the patient;

(*c*) the corrective measures taken to prevent recurrence of a similar accident.

PART 18

MISCELLANEOUS

Prohibition of use of premises and irradiating apparatus or radioactive materials

74.—(1) The Director-General may prohibit the use of any premises or part of any premises if, in the Director-General's opinion, the use of such premises or part of such premises is likely to result in any individual receiving an excessive radiation dose unnecessarily.

(2) The Director-General may prohibit the use of any irradiating apparatus or radioactive material if, in the Director-General's opinion, the use of such apparatus or material is likely to result in any individual receiving an excessive radiation dose unnecessarily.

Post-mortem examination, cremation and embalming of corpses containing radioactive material

75. Without affecting the Coroners Act 2010, a post-mortem examination, cremation or embalming process must not be carried out on a human body or part of a human body known to contain radioactive material without the prior approval in writing of the Director-General.

Calibration of monitors and dosimeters

76.—(1) This regulation applies to any radiation area monitor used for any purpose in connection with these Regulations and any direct reading personal dosimeter used for the measurement of the dose received by an individual.

(2) The monitor and dosimeter mentioned in paragraph (1) must, not more than 12 months prior to use, have been calibrated by a person approved by the Director-General as a qualified person for this purpose.

(3) The licensee must make available for inspection by the Director-General or any authorised officer a valid certificate issued by the qualified person mentioned in paragraph (2) certifying that the accuracy of the monitor or dosimeter is within acceptable limits.

Offences

77.—(1) A person who contravenes any of the provisions of these Regulations shall be guilty of an offence and shall be liable on conviction to a fine not exceeding $2,000 or to imprisonment for a term not exceeding 6 months or to both.

(2) A person who fails to comply with any written notice issued under regulation 35 or 69 shall be guilty of an offence and shall be liable on conviction to a fine not exceeding $2,000 or to imprisonment for a term not exceeding 6 months or to both.

Revocation, saving and transitional provisions

78.—(1) The Radiation Protection (Ionising Radiation) Regulations (Rg 2) (called in this regulation the revoked Regulations) are revoked.

(2) Every individual who immediately before 20 February 2023 is registered as a radiation worker under the revoked Regulations is deemed to be registered as a radiation worker under these Regulations.

(3) Every certificate of registration of a radiation worker that was issued under the revoked Regulations and is in force immediately before 20 February 2023 continues in force as if the certificate of

registration were issued under these Regulations until it expires or is sooner cancelled.

(4) Any application made under the revoked Regulations before 20 February 2023 for the registration or renewal of registration of an individual as a radiation worker that is still pending on or after that date, is to be treated as if that application were made under the corresponding provision of these Regulations.

(5) Any approval granted or given by the Director-General under any provision of the revoked Regulations is deemed to be an approval granted or given by the Director-General under the corresponding provision of these Regulations.

(6) Every licence that was issued under the revoked Regulations and is in force immediately before 20 February 2023 continues in force as if the licence were issued under these Regulations until it expires or is sooner cancelled.

(7) Any application made under the revoked Regulations before 20 February 2023 for an approval or licence that is still pending on or after that date, is to be treated as if that application were made under the corresponding provision of these Regulations.

FIRST SCHEDULE

Regulations 3(1) and (3) and 4(1)

PART 1

LEVELS FOR EXEMPTION OF MODERATE AMOUNTS OF MATERIAL: EXEMPT ACTIVITY CONCENTRATIONS AND ACTIVITIES OF RADIONUCLIDES

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
H-3	1×10^6	1×10^9
Be-7	1×10^3	1×10^7
Be-10	1×10^4	1×10^6
C-11	1×10^1	1×10^6
C-14	1×10^4	1×10^7
N-13	1×10^2	1×10^9
Ne-19	1×10^2	1×10^9
O-15	1×10^2	1×10^9
F-18	1×10^1	1×10^6
Na-22	1×10^1	1×10^6
Na-24	1×10^1	1×10^5
Mg-28	1×10^1	1×10^5
Al-26	1×10^1	1×10^5
Si-31	1×10^3	1×10^6
Si-32	1×10^3	1×10^6
P-32	1×10^3	1×10^5
P-33	1×10^5	1×10^8
S-35	1×10^5	1×10^8
Cl-36	1×10^4	1×10^6
Cl-38	1×10^1	1×10^5
Cl-39	1×10^1	1×10^5
Ar-37	1×10^6	1×10^8
Ar-39	1×10^7	1×10^4
Ar-41	1×10^2	1×10^9

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
K-40	1×10^2	1×10^6
K-42	1×10^2	1×10^6
K-43	1×10^1	1×10^6
K-44	1×10^1	1×10^5
K-45	1×10^1	1×10^5
Ca-41	1×10^5	1×10^7
Ca-45	1×10^4	1×10^7
Ca-47	1×10^1	1×10^6
Sc-43	1×10^1	1×10^6
Sc-44	1×10^1	1×10^5
Sc-45	1×10^2	1×10^7
Sc-46	1×10^1	1×10^6
Sc-47	1×10^2	1×10^6
Sc-48	1×10^1	1×10^5
Sc-49	1×10^3	1×10^5
Ti-44	1×10^1	1×10^5
Ti-45	1×10^1	1×10^6
V-47	1×10^1	1×10^5
V-48	1×10^1	1×10^5
V-49	1×10^4	1×10^7
Cr-48	1×10^2	1×10^6
Cr-49	1×10^1	1×10^6
Cr-51	1×10^3	1×10^7
Mn-51	1×10^1	1×10^5
Mn-52	1×10^1	1×10^5
Mn-52m	1×10^1	1×10^5
Mn-53	1×10^4	1×10^9
Mn-54	1×10^1	1×10^6
Mn-56	1×10^1	1×10^5

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Fe-52	1×10^1	1×10^6
Fe-55	1×10^4	1×10^6
Fe-59	1×10^1	1×10^6
Fe-60	1×10^2	1×10^5
Co-55	1×10^1	1×10^6
Co-56	1×10^1	1×10^5
Co-57	1×10^2	1×10^6
Co-58	1×10^1	1×10^6
Co-58m	1×10^4	1×10^7
Co-60	1×10^1	1×10^5
Co-60m	1×10^3	1×10^6
Co-61	1×10^2	1×10^6
Co-62m	1×10^1	1×10^5
Ni-56	1×10^1	1×10^6
Ni-57	1×10^1	1×10^6
Ni-59	1×10^4	1×10^8
Ni-63	1×10^5	1×10^8
Ni-65	1×10^1	1×10^6
Ni-66	1×10^4	1×10^7
Cu-60	1×10^1	1×10^5
Cu-61	1×10^1	1×10^6
Cu-64	1×10^2	1×10^6
Cu-67	1×10^2	1×10^6
Zn-62	1×10^2	1×10^6
Zn-63	1×10^1	1×10^5
Zn-65	1×10^1	1×10^6
Zn-69	1×10^4	1×10^6
Zn-69m	1×10^2	1×10^6
Zn-71m	1×10^1	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Zn-72	1×10^2	1×10^6
Ga-65	1×10^1	1×10^5
Ga-66	1×10^1	1×10^5
Ga-67	1×10^2	1×10^6
Ga-68	1×10^1	1×10^5
Ga-70	1×10^2	1×10^6
Ga-72	1×10^1	1×10^5
Ga-73	1×10^2	1×10^6
Ge-66	1×10^1	1×10^6
Ge-67	1×10^1	1×10^5
Ge-68[b]	1×10^1	1×10^5
Ge-69	1×10^1	1×10^6
Ge-71	1×10^4	1×10^8
Ge-75	1×10^3	1×10^6
Ge-77	1×10^1	1×10^5
Ge-78	1×10^2	1×10^6
As-69	1×10^1	1×10^5
As-70	1×10^1	1×10^5
As-71	1×10^1	1×10^6
As-72	1×10^1	1×10^5
As-73	1×10^3	1×10^7
As-74	1×10^1	1×10^6
As-76	1×10^2	1×10^5
As-77	1×10^3	1×10^6
As-78	1×10^1	1×10^5
Se-70	1×10^1	1×10^6
Se-73	1×10^1	1×10^6
Se-73m	1×10^2	1×10^6
Se-75	1×10^2	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Se-79	1×10^4	1×10^7
Se-81	1×10^3	1×10^6
Se-81m	1×10^3	1×10^7
Se-83	1×10^1	1×10^5
Br-74	1×10^1	1×10^5
Br-74m	1×10^1	1×10^5
Br-75	1×10^1	1×10^6
Br-76	1×10^1	1×10^5
Br-77	1×10^2	1×10^6
Br-80	1×10^2	1×10^5
Br-80m	1×10^3	1×10^7
Br-82	1×10^1	1×10^6
Br-83	1×10^3	1×10^6
Br-84	1×10^1	1×10^5
Kr-74	1×10^2	1×10^9
Kr-76	1×10^2	1×10^9
Kr-77	1×10^2	1×10^9
Kr-79	1×10^3	1×10^5
Kr-81	1×10^4	1×10^7
Kr-81m	1×10^3	1×10^{10}
Kr-83m	1×10^5	1×10^{12}
Kr-85	1×10^5	1×10^4
Kr-85m	1×10^3	1×10^{10}
Kr-87	1×10^2	1×10^9
Kr-88	1×10^2	1×10^9
Rb-79	1×10^1	1×10^5
Rb-81	1×10^1	1×10^6
Rb-81m	1×10^3	1×10^7
Rb-82m	1×10^1	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Rb-83[b]	1×10^2	1×10^6
Rb-84	1×10^1	1×10^6
Rb-86	1×10^2	1×10^5
Rb-87	1×10^3	1×10^7
Rb-88	1×10^2	1×10^5
Rb-89	1×10^2	1×10^5
Sr-80	1×10^3	1×10^7
Sr-81	1×10^1	1×10^5
Sr-82[b]	1×10^1	1×10^5
Sr-83	1×10^1	1×10^6
Sr-85	1×10^2	1×10^6
Sr-85m	1×10^2	1×10^7
Sr-87m	1×10^2	1×10^6
Sr-89	1×10^3	1×10^6
Sr-90[b]	1×10^2	1×10^4
Sr-91	1×10^1	1×10^5
Sr-92	1×10^1	1×10^6
Y-86	1×10^1	1×10^5
Y-86m	1×10^2	1×10^7
Y-87[b]	1×10^1	1×10^6
Y-88	1×10^1	1×10^6
Y-90	1×10^3	1×10^5
Y-90m	1×10^1	1×10^6
Y-91	1×10^3	1×10^6
Y-91m	1×10^2	1×10^6
Y-92	1×10^2	1×10^5
Y-93	1×10^2	1×10^5
Y-94	1×10^1	1×10^5
Y-95	1×10^1	1×10^5

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Zr-86	1×10^2	1×10^7
Zr-88	1×10^2	1×10^6
Zr-89	1×10^1	1×10^6
Zr-93[b]	1×10^3	1×10^7
Zr-95	1×10^1	1×10^6
Zr-97[b]	1×10^1	1×10^5
Nb-88	1×10^1	1×10^5
Nb-89	1×10^1	1×10^5
Nb-89m	1×10^1	1×10^5
Nb-90	1×10^1	1×10^5
Nb-93m	1×10^4	1×10^7
Nb-94	1×10^1	1×10^6
Nb-95	1×10^1	1×10^6
Nb-95m	1×10^2	1×10^7
Nb-96	1×10^1	1×10^5
Nb-97	1×10^1	1×10^6
Nb-98	1×10^1	1×10^5
Mo-90	1×10^1	1×10^6
Mo-93	1×10^3	1×10^8
Mo-93m	1×10^1	1×10^6
Mo-99	1×10^2	1×10^6
Mo-101	1×10^1	1×10^6
Tc-93	1×10^1	1×10^6
Tc-93m	1×10^1	1×10^6
Tc-94	1×10^1	1×10^6
Tc-94m	1×10^1	1×10^5
Tc-95	1×10^1	1×10^6
Tc-95m	1×10^1	1×10^6
Tc-96	1×10^1	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Tc-96m	1×10^3	1×10^7
Tc-97	1×10^3	1×10^8
Tc-97m	1×10^3	1×10^7
Tc-98	1×10^1	1×10^6
Tc-99	1×10^4	1×10^7
Tc-99m	1×10^2	1×10^7
Tc-101	1×10^2	1×10^6
Tc-104	1×10^1	1×10^5
Ru-94	1×10^2	1×10^6
Ru-97	1×10^2	1×10^7
Ru-103	1×10^2	1×10^6
Ru-105	1×10^1	1×10^6
Ru-106[b]	1×10^2	1×10^5
Rh-99	1×10^1	1×10^6
Rh-99m	1×10^1	1×10^6
Rh-100	1×10^1	1×10^6
Rh-101	1×10^2	1×10^7
Rh-101m	1×10^2	1×10^7
Rh-102	1×10^1	1×10^6
Rh-102m	1×10^2	1×10^6
Rh-103m	1×10^4	1×10^8
Rh-105	1×10^2	1×10^7
Rh-106m	1×10^1	1×10^5
Rh-107	1×10^2	1×10^6
Pd-100	1×10^2	1×10^7
Pd-101	1×10^2	1×10^6
Pd-103	1×10^3	1×10^8
Pd-107	1×10^5	1×10^8
Pd-109	1×10^3	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Ag-102	1×10^1	1×10^5
Ag-103	1×10^1	1×10^6
Ag-104	1×10^1	1×10^6
Ag-104m	1×10^1	1×10^6
Ag-105	1×10^2	1×10^6
Ag-106	1×10^1	1×10^6
Ag-106m	1×10^1	1×10^6
Ag-108m[b]	1×10^1	1×10^6
Ag-110m	1×10^1	1×10^6
Ag-111	1×10^3	1×10^6
Ag-112	1×10^1	1×10^5
Ag-115	1×10^1	1×10^5
Cd-104	1×10^2	1×10^7
Cd-107	1×10^3	1×10^7
Cd-109	1×10^4	1×10^6
Cd-113	1×10^3	1×10^6
Cd-113m	1×10^3	1×10^6
Cd-115	1×10^2	1×10^6
Cd-115m	1×10^3	1×10^6
Cd-117	1×10^1	1×10^6
Cd-117m	1×10^1	1×10^6
In-109	1×10^1	1×10^6
In-110	1×10^1	1×10^6
In-110m	1×10^1	1×10^5
In-111	1×10^2	1×10^6
In-112	1×10^2	1×10^6
In-113m	1×10^2	1×10^6
In-114	1×10^3	1×10^5
In-114m	1×10^2	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
In-115	1×10^3	1×10^5
In-115m	1×10^2	1×10^6
In-116m	1×10^1	1×10^5
In-117	1×10^1	1×10^6
In-117m	1×10^2	1×10^6
In-119m	1×10^2	1×10^5
Sn-110	1×10^2	1×10^7
Sn-111	1×10^2	1×10^6
Sn-113	1×10^3	1×10^7
Sn-117m	1×10^2	1×10^6
Sn-119m	1×10^3	1×10^7
Sn-121	1×10^5	1×10^7
Sn-121m[b]	1×10^3	1×10^7
Sn-123	1×10^3	1×10^6
Sn-123m	1×10^2	1×10^6
Sn-125	1×10^2	1×10^5
Sn-126[b]	1×10^1	1×10^5
Sn-127	1×10^1	1×10^6
Sn-128	1×10^1	1×10^6
Sb-115	1×10^1	1×10^6
Sb-116	1×10^1	1×10^6
Sb-116m	1×10^1	1×10^5
Sb-117	1×10^2	1×10^7
Sb-118m	1×10^1	1×10^6
Sb-119	1×10^3	1×10^7
Sb-120	1×10^2	1×10^6
Sb-120m	1×10^1	1×10^6
Sb-122	1×10^2	1×10^4
Sb-124	1×10^1	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Sb-124m	1×10^2	1×10^6
Sb-125	1×10^2	1×10^6
Sb-126	1×10^1	1×10^5
Sb-126m	1×10^1	1×10^5
Sb-127	1×10^1	1×10^6
Sb-128	1×10^1	1×10^5
Sb-128m	1×10^1	1×10^5
Sb-129	1×10^1	1×10^6
Sb-130	1×10^1	1×10^5
Sb-131	1×10^1	1×10^6
Te-116	1×10^2	1×10^7
Te-121	1×10^1	1×10^6
Te-121m	1×10^2	1×10^6
Te-123	1×10^3	1×10^6
Te-123m	1×10^2	1×10^7
Te-125m	1×10^3	1×10^7
Te-127	1×10^3	1×10^6
Te-127m	1×10^3	1×10^7
Te-129	1×10^2	1×10^6
Te-129m	1×10^3	1×10^6
Te-131	1×10^2	1×10^5
Te-131m	1×10^1	1×10^6
Te-132	1×10^2	1×10^7
Te-133	1×10^1	1×10^5
Te-133m	1×10^1	1×10^5
Te-134	1×10^1	1×10^6
I-120	1×10^1	1×10^5
I-120m	1×10^1	1×10^5
I-121	1×10^2	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
I-123	1×10^2	1×10^7
I-124	1×10^1	1×10^6
I-125	1×10^3	1×10^6
I-126	1×10^2	1×10^6
I-128	1×10^2	1×10^5
I-129	1×10^2	1×10^5
I-130	1×10^1	1×10^6
I-131	1×10^2	1×10^6
I-132	1×10^1	1×10^5
I-132m	1×10^2	1×10^6
I-133	1×10^1	1×10^6
I-134	1×10^1	1×10^5
I-135	1×10^1	1×10^6
Xe-120	1×10^2	1×10^9
Xe-121	1×10^2	1×10^9
Xe-122[b]	1×10^2	1×10^9
Xe-123	1×10^2	1×10^9
Xe-125	1×10^3	1×10^9
Xe-127	1×10^3	1×10^5
Xe-129m	1×10^3	1×10^4
Xe-131m	1×10^4	1×10^4
Xe-133	1×10^3	1×10^4
Xe-133m	1×10^3	1×10^4
Xe-135	1×10^3	1×10^{10}
Xe-135m	1×10^2	1×10^9
Xe-138	1×10^2	1×10^9
Cs-125	1×10^1	1×10^4
Cs-127	1×10^2	1×10^5
Cs-129	1×10^2	1×10^5

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Cs-130	1×10^2	1×10^6
Cs-131	1×10^3	1×10^6
Cs-132	1×10^1	1×10^5
Cs-134	1×10^1	1×10^4
Cs-134m	1×10^3	1×10^5
Cs-135	1×10^4	1×10^7
Cs-135m	1×10^1	1×10^6
Cs-136	1×10^1	1×10^5
Cs-137[b]	1×10^1	1×10^4
Cs-138	1×10^1	1×10^4
Ba-126	1×10^2	1×10^7
Ba-128	1×10^2	1×10^7
Ba-131	1×10^2	1×10^6
Ba-131m	1×10^2	1×10^7
Ba-133	1×10^2	1×10^6
Ba-133m	1×10^2	1×10^6
Ba-135m	1×10^2	1×10^6
Ba-137m	1×10^1	1×10^6
Ba-139	1×10^2	1×10^5
Ba-140[b]	1×10^1	1×10^5
Ba-141	1×10^2	1×10^5
Ba-142	1×10^2	1×10^6
La-131	1×10^1	1×10^6
La-132	1×10^1	1×10^6
La-135	1×10^3	1×10^7
La-137	1×10^3	1×10^7
La-138	1×10^1	1×10^6
La-140	1×10^1	1×10^5
La-141	1×10^2	1×10^5

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
La-142	1×10^1	1×10^5
La-143	1×10^2	1×10^5
Ce-134[b]	1×10^3	1×10^7
Ce-135	1×10^1	1×10^6
Ce-137	1×10^3	1×10^7
Ce-137m	1×10^3	1×10^6
Ce-139	1×10^2	1×10^6
Ce-141	1×10^2	1×10^7
Ce-143	1×10^2	1×10^6
Ce-144[b]	1×10^2	1×10^5
Pr-136	1×10^1	1×10^5
Pr-137	1×10^2	1×10^6
Pr-138m	1×10^1	1×10^6
Pr-139	1×10^2	1×10^7
Pr-142	1×10^2	1×10^5
Pr-142m	1×10^7	1×10^9
Pr-143	1×10^4	1×10^6
Pr-144	1×10^2	1×10^5
Pr-145	1×10^3	1×10^5
Pr-147	1×10^1	1×10^5
Nd-136	1×10^2	1×10^6
Nd-138	1×10^3	1×10^7
Nd-139	1×10^2	1×10^6
Nd-139m	1×10^1	1×10^6
Nd-141	1×10^2	1×10^7
Nd-147	1×10^2	1×10^6
Nd-149	1×10^2	1×10^6
Nd-151	1×10^1	1×10^5
Pm-141	1×10^1	1×10^5

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Pm-143	1×10^2	1×10^6
Pm-144	1×10^1	1×10^6
Pm-145	1×10^3	1×10^7
Pm-146	1×10^1	1×10^6
Pm-147	1×10^4	1×10^7
Pm-148	1×10^1	1×10^5
Pm-148m	1×10^1	1×10^6
Pm-149	1×10^3	1×10^6
Pm-150	1×10^1	1×10^5
Pm-151	1×10^2	1×10^6
Sm-141	1×10^1	1×10^5
Sm-141m	1×10^1	1×10^6
Sm-142	1×10^2	1×10^7
Sm-145	1×10^2	1×10^7
Sm-146	1×10^1	1×10^5
Sm-147	1×10^1	1×10^4
Sm-151	1×10^4	1×10^8
Sm-153	1×10^2	1×10^6
Sm-155	1×10^2	1×10^6
Sm-156	1×10^2	1×10^6
Eu-145	1×10^1	1×10^6
Eu-146	1×10^1	1×10^6
Eu-147	1×10^2	1×10^6
Eu-148	1×10^1	1×10^6
Eu-149	1×10^2	1×10^7
Eu-150	1×10^1	1×10^6
Eu-150m	1×10^3	1×10^6
Eu-152	1×10^1	1×10^6
Eu-152m	1×10^2	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Eu-154	1×10^1	1×10^6
Eu-155	1×10^2	1×10^7
Eu-156	1×10^1	1×10^6
Eu-157	1×10^2	1×10^6
Eu-158	1×10^1	1×10^5
Gd-145	1×10^1	1×10^5
Gd-146[b]	1×10^1	1×10^6
Gd-147	1×10^1	1×10^6
Gd-148	1×10^1	1×10^4
Gd-149	1×10^2	1×10^6
Gd-151	1×10^2	1×10^7
Gd-152	1×10^1	1×10^4
Gd-153	1×10^2	1×10^7
Gd-159	1×10^3	1×10^6
Tb-147	1×10^1	1×10^6
Tb-149	1×10^1	1×10^6
Tb-150	1×10^1	1×10^6
Tb-151	1×10^1	1×10^6
Tb-153	1×10^2	1×10^7
Tb-154	1×10^1	1×10^6
Tb-155	1×10^2	1×10^7
Tb-156	1×10^1	1×10^6
Tb-156m (24.4 h)	1×10^3	1×10^7
Tb-156m′ (5 h)	1×10^4	1×10^7
Tb-157	1×10^4	1×10^7
Tb-158	1×10^1	1×10^6
Tb-160	1×10^1	1×10^6
Tb-161	1×10^3	1×10^6
Dy-155	1×10^1	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Dy-157	1×10^2	1×10^6
Dy-159	1×10^3	1×10^7
Dy-165	1×10^3	1×10^6
Dy-166	1×10^3	1×10^6
Ho-155	1×10^2	1×10^6
Ho-157	1×10^2	1×10^6
Ho-159	1×10^2	1×10^6
Ho-161	1×10^2	1×10^7
Ho-162	1×10^2	1×10^7
Ho-162m	1×10^1	1×10^6
Ho-164	1×10^3	1×10^6
Ho-164m	1×10^3	1×10^7
Ho-166	1×10^3	1×10^5
Ho-166m	1×10^1	1×10^6
Ho-167	1×10^2	1×10^6
Er-161	1×10^1	1×10^6
Er-165	1×10^3	1×10^7
Er-169	1×10^4	1×10^7
Er-171	1×10^2	1×10^6
Er-172	1×10^2	1×10^6
Tm-162	1×10^1	1×10^6
Tm-166	1×10^1	1×10^6
Tm-167	1×10^2	1×10^6
Tm-170	1×10^3	1×10^6
Tm-171	1×10^4	1×10^8
Tm-172	1×10^2	1×10^6
Tm-173	1×10^2	1×10^6
Tm-175	1×10^1	1×10^6
Yb-162	1×10^2	1×10^7

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Yb-166	1×10^2	1×10^7
Yb-167	1×10^2	1×10^6
Yb-169	1×10^2	1×10^7
Yb-175	1×10^3	1×10^7
Yb-177	1×10^2	1×10^6
Yb-178	1×10^3	1×10^6
Lu-169	1×10^1	1×10^6
Lu-170	1×10^1	1×10^6
Lu-171	1×10^1	1×10^6
Lu-172	1×10^1	1×10^6
Lu-173	1×10^2	1×10^7
Lu-174	1×10^2	1×10^7
Lu-174m	1×10^2	1×10^7
Lu-176	1×10^2	1×10^6
Lu-176m	1×10^3	1×10^6
Lu-177	1×10^3	1×10^7
Lu-177m	1×10^1	1×10^6
Lu-178	1×10^2	1×10^5
Lu-178m	1×10^1	1×10^5
Lu-179	1×10^3	1×10^6
Hf-170	1×10^2	1×10^6
Hf-172[b]	1×10^1	1×10^6
Hf-173	1×10^2	1×10^6
Hf-175	1×10^2	1×10^6
Hf-177m	1×10^1	1×10^5
Hf-178m	1×10^1	1×10^6
Hf-179m	1×10^1	1×10^6
Hf-180m	1×10^1	1×10^6
Hf-181	1×10^1	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Hf-182	1×10^2	1×10^6
Hf-182m	1×10^1	1×10^6
Hf-183	1×10^1	1×10^6
Hf-184	1×10^2	1×10^6
Ta-172	1×10^1	1×10^6
Ta-173	1×10^1	1×10^6
Ta-174	1×10^1	1×10^6
Ta-175	1×10^1	1×10^6
Ta-176	1×10^1	1×10^6
Ta-177	1×10^2	1×10^7
Ta-178	1×10^1	1×10^6
Ta-179	1×10^3	1×10^7
Ta-180	1×10^1	1×10^6
Ta-180m	1×10^3	1×10^7
Ta-182	1×10^1	1×10^4
Ta-182m	1×10^2	1×10^6
Ta-183	1×10^2	1×10^6
Ta-184	1×10^1	1×10^6
Ta-185	1×10^2	1×10^5
Ta-186	1×10^1	1×10^5
W-176	1×10^2	1×10^6
W-177	1×10^1	1×10^6
W-178[b]	1×10^1	1×10^6
W-179	1×10^2	1×10^7
W-181	1×10^3	1×10^7
W-185	1×10^4	1×10^7
W-187	1×10^2	1×10^6
W-188[b]	1×10^2	1×10^5
Re-177	1×10^1	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Re-178	1×10^1	1×10^6
Re-181	1×10^1	1×10^6
Re-182	1×10^1	1×10^6
Re-182m	1×10^1	1×10^6
Re-184	1×10^1	1×10^6
Re-184m	1×10^2	1×10^6
Re-186	1×10^3	1×10^6
Re-186m	1×10^3	1×10^7
Re-187	1×10^6	1×10^9
Re-188	1×10^2	1×10^5
Re-188m	1×10^2	1×10^7
Re-189[b]	1×10^2	1×10^6
Os-180	1×10^2	1×10^7
Os-181	1×10^1	1×10^6
Os-182	1×10^2	1×10^6
Os-185	1×10^1	1×10^6
Os-189m	1×10^4	1×10^7
Os-191	1×10^2	1×10^7
Os-191m	1×10^3	1×10^7
Os-193	1×10^2	1×10^6
Os-194	1×10^2	1×10^5
Ir-182	1×10^1	1×10^5
Ir-184	1×10^1	1×10^6
Ir-185	1×10^1	1×10^6
Ir-186	1×10^1	1×10^6
Ir-186m	1×10^1	1×10^6
Ir-187	1×10^2	1×10^6
Ir-188	1×10^1	1×10^6
Ir-189[b]	1×10^2	1×10^7

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Ir-190	1×10^1	1×10^6
Ir-190m (3.1 h)	1×10^1	1×10^6
Ir-190m′ (1.2 h)	1×10^4	1×10^7
Ir-192	1×10^1	1×10^4
Ir-192m	1×10^2	1×10^7
Ir-193m	1×10^4	1×10^7
Ir-194	1×10^2	1×10^5
Ir-194m	1×10^1	1×10^6
Ir-195	1×10^2	1×10^6
Ir-195m	1×10^2	1×10^6
Pt-186	1×10^1	1×10^6
Pt-188[b]	1×10^1	1×10^6
Pt-189	1×10^2	1×10^6
Pt-191	1×10^2	1×10^6
Pt-193	1×10^4	1×10^7
Pt-193m	1×10^3	1×10^7
Pt-195m	1×10^2	1×10^6
Pt-197	1×10^3	1×10^6
Pt-197m	1×10^2	1×10^6
Pt-199	1×10^2	1×10^6
Pt-200	1×10^2	1×10^6
Au-193	1×10^2	1×10^7
Au-194	1×10^1	1×10^6
Au-195	1×10^2	1×10^7
Au-198	1×10^2	1×10^6
Au-198m	1×10^1	1×10^6
Au-199	1×10^2	1×10^6
Au-200	1×10^2	1×10^5
Au-200m	1×10^1	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Au-201	1×10^2	1×10^6
Hg-193	1×10^2	1×10^6
Hg-193m	1×10^1	1×10^6
Hg-194[b]	1×10^1	1×10^6
Hg-195	1×10^2	1×10^6
Hg-195m[b]	1×10^2	1×10^6
Hg-197	1×10^2	1×10^7
Hg-197m	1×10^2	1×10^6
Hg-199m	1×10^2	1×10^6
Hg-203	1×10^2	1×10^5
Tl-194	1×10^1	1×10^6
Tl-194m	1×10^1	1×10^6
Tl-195	1×10^1	1×10^6
Tl-197	1×10^2	1×10^6
Tl-198	1×10^1	1×10^6
Tl-198m	1×10^1	1×10^6
Tl-199	1×10^2	1×10^6
Tl-200	1×10^1	1×10^6
Tl-201	1×10^2	1×10^6
Tl-202	1×10^2	1×10^6
Tl-204	1×10^4	1×10^4
Pb-195m	1×10^1	1×10^6
Pb-198	1×10^2	1×10^6
Pb-199	1×10^1	1×10^6
Pb-200	1×10^2	1×10^6
Pb-201	1×10^1	1×10^6
Pb-202	1×10^3	1×10^6
Pb-202m	1×10^1	1×10^6
Pb-203	1×10^2	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Pb-205	1×10^4	1×10^7
Pb-209	1×10^5	1×10^6
Pb-210[b]	1×10^1	1×10^4
Pb-211	1×10^2	1×10^6
Pb-212[b]	1×10^1	1×10^5
Pb-214	1×10^2	1×10^6
Bi-200	1×10^1	1×10^6
Bi-201	1×10^1	1×10^6
Bi-202	1×10^1	1×10^6
Bi-203	1×10^1	1×10^6
Bi-205	1×10^1	1×10^6
Bi-206	1×10^1	1×10^5
Bi-207	1×10^1	1×10^6
Bi-210	1×10^3	1×10^6
Bi-210m[b]	1×10^1	1×10^5
Bi-212[b]	1×10^1	1×10^5
Bi-213	1×10^2	1×10^6
Bi-214	1×10^1	1×10^5
Po-203	1×10^1	1×10^6
Po-205	1×10^1	1×10^6
Po-206	1×10^1	1×10^6
Po-207	1×10^1	1×10^6
Po-208	1×10^1	1×10^4
Po-209	1×10^1	1×10^4
Po-210	1×10^1	1×10^4
At-207	1×10^1	1×10^6
At-211	1×10^3	1×10^7
Fr-222	1×10^3	1×10^5
Fr-223	1×10^2	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Rn-220[b]	1×10^4	1×10^7
Rn-222[b]	1×10^1	1×10^8
Ra-223[b]	1×10^2	1×10^5
Ra-224[b]	1×10^1	1×10^5
Ra-225	1×10^2	1×10^5
Ra-226[b]	1×10^1	1×10^4
Ra-227	1×10^2	1×10^6
Ra-228[b]	1×10^1	1×10^5
Ac-224	1×10^2	1×10^6
Ac-225[b]	1×10^1	1×10^4
Ac-226	1×10^2	1×10^5
Ac-227[b]	1×10^{-1}	1×10^3
Ac-228	1×10^1	1×10^6
Th-226[b]	1×10^3	1×10^7
Th-227	1×10^1	1×10^4
Th-228[b]	1×10^0	1×10^4
Th-229[b]	1×10^0	1×10^3
Th-230	1×10^0	1×10^4
Th-231	1×10^3	1×10^7
Th-232	1×10^1	1×10^4
Th-234[b]	1×10^3	1×10^5
Pa-227	1×10^1	1×10^6
Pa-228	1×10^1	1×10^6
Pa-230	1×10^1	1×10^6
Pa-231	1×10^0	1×10^3
Pa-232	1×10^1	1×10^6
Pa-233	1×10^2	1×10^7
Pa-234	1×10^1	1×10^6
U-230[b]	1×10^1	1×10^5

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
U-231	1×10^2	1×10^7
U-232[b]	1×10^0	1×10^3
U-233	1×10^1	1×10^4
U-234	1×10^1	1×10^4
U-235[b]	1×10^1	1×10^4
U-236	1×10^1	1×10^4
U-237	1×10^2	1×10^6
U-238[b]	1×10^1	1×10^4
U-239	1×10^2	1×10^6
U-240	1×10^3	1×10^7
U-240[b]	1×10^1	1×10^6
Np-232	1×10^1	1×10^6
Np-233	1×10^2	1×10^7
Np-234	1×10^1	1×10^6
Np-235	1×10^3	1×10^7
Np-236	1×10^2	1×10^5
Np-236m	1×10^3	1×10^7
Np-237[b]	1×10^0	1×10^3
Np-238	1×10^2	1×10^6
Np-239	1×10^2	1×10^7
Np-240	1×10^1	1×10^6
Pu-234	1×10^2	1×10^7
Pu-235	1×10^2	1×10^7
Pu-236	1×10^1	1×10^4
Pu-237	1×10^3	1×10^7
Pu-238	1×10^0	1×10^4
Pu-239	1×10^0	1×10^4
Pu-240	1×10^0	1×10^3
Pu-241	1×10^2	1×10^5

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Pu-242	1×10^0	1×10^4
Pu-243	1×10^3	1×10^7
Pu-244	1×10^0	1×10^4
Pu-245	1×10^2	1×10^6
Pu-246	1×10^2	1×10^6
Am-237	1×10^2	1×10^6
Am-238	1×10^1	1×10^6
Am-239	1×10^2	1×10^6
Am-240	1×10^1	1×10^6
Am-241	1×10^0	1×10^4
Am-242	1×10^3	1×10^6
Am-242m[b]	1×10^0	1×10^4
Am-243[b]	1×10^0	1×10^3
Am-244	1×10^1	1×10^6
Am-244m	1×10^4	1×10^7
Am-245	1×10^3	1×10^6
Am-246	1×10^1	1×10^5
Am-246m	1×10^1	1×10^6
Cm-238	1×10^2	1×10^7
Cm-240	1×10^2	1×10^5
Cm-241	1×10^2	1×10^6
Cm-242	1×10^2	1×10^5
Cm-243	1×10^0	1×10^4
Cm-244	1×10^1	1×10^4
Cm-245	1×10^0	1×10^3
Cm-246	1×10^0	1×10^3
Cm-247	1×10^0	1×10^4
Cm-248	1×10^0	1×10^3
Cm-249	1×10^3	1×10^6

FIRST SCHEDULE — *continued*

Radionuclide[a]	Activity concentration (Bq/g)	Activity (Bq)
Cm-250	1×10^{-1}	1×10^{3}
Bk-245	1×10^{2}	1×10^{6}
Bk-246	1×10^{1}	1×10^{6}
Bk-247	1×10^{0}	1×10^{4}
Bk-249	1×10^{3}	1×10^{6}
Bk-250	1×10^{1}	1×10^{6}
Cf-244	1×10^{4}	1×10^{7}
Cf-246	1×10^{3}	1×10^{6}
Cf-248	1×10^{1}	1×10^{4}
Cf-249	1×10^{0}	1×10^{3}
Cf-250	1×10^{1}	1×10^{4}
Cf-251	1×10^{0}	1×10^{3}
Cf-252	1×10^{1}	1×10^{4}
Cf-253	1×10^{2}	1×10^{5}
Cf-254	1×10^{0}	1×10^{3}
Es-250	1×10^{2}	1×10^{6}
Es-251	1×10^{2}	1×10^{7}
Es-253	1×10^{2}	1×10^{5}
Es-254	1×10^{1}	1×10^{4}
Es-254m	1×10^{2}	1×10^{6}
Fm-252	1×10^{3}	1×10^{6}
Fm-253	1×10^{2}	1×10^{6}
Fm-254	1×10^{4}	1×10^{7}
Fm-255	1×10^{3}	1×10^{6}
Fm-257	1×10^{1}	1×10^{5}
Md-257	1×10^{2}	1×10^{7}
Md-258	1×10^{2}	1×10^{5}

[a] m and m′ denote metastable states of the radionuclide. The metastable state m′ is of higher energy than the metastable state m.

FIRST SCHEDULE — *continued*

[b] Parent radionuclides and their progeny whose dose contributions are taken into account in the dose calculations (thus requiring only the exemption level of the parent radionuclide to be considered) are listed here:

Parent radionuclide	Progeny
Ge-68	Ga-68
Rb-83	Kr-83m
Sr-82	Rb-82
Sr-90	Y-90
Y-87	Sr-87m
Zr-93	Nb-93m
Zr-97	Nb-97
Ru-106	Rh-106
Ag-108m	Ag-108
Sn-121m	Sn-121 (0.776)
Sn-126	Sb-126m
Xe-122	I-122
Cs-137	Ba-137m
Ba-140	La-140
Ce-134	La-134
Ce-144	Pr-144
Gd-146	Eu-146
Hf-172	Lu-172
W-178	Ta-178
W-188	Re-188
Re-189	Os-189m (0.241)
Ir-189	Os-189m
Pt-188	Ir-188
Hg-194	Au-194
Hg-195m	Hg-195 (0.542)
Pb-210	Bi-210, Po-210
Pb-212	Bi-212, Tl-208 (0.36), Po-212 (0.64)

FIRST SCHEDULE — *continued*

Parent radionuclide	Progeny
Bi-210m	Tl-206
Bi-212	Tl-208 (0.36), Po-212 (0.64)
Rn-220	Po-216
Rn-222	Po-218, Pb-214, Bi-214, Po-214
Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Tl-207
Ra-224	Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Ra-226	Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
Ra-228	Ac-228
Ac-225	Fr-221, At-217, Bi-213, Po-213 (0.978), Tl-209 (0.0216), Pb-209 (0.978)
Ac-227	Fr-223 (0.0138)
Th-226	Ra-222, Rn-218, Po-214
Th-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Th-229	Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209
Th-234	Pa-234m
U-230	Th-226, Ra-222, Rn-218, Po-214
U-232	Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
U-235	Th-231
U-238	Th-234, Pa-234m
U-240	Np-240m
Np-237	Pa-233
Am-242m	Am-242
Am-243	Np-239

1) Exemption is given for radioactive substances in moderate amounts for which either the total activity or the activity concentration of the radionuclide does not exceed the levels given in the above table.

2) In the case of more than one radionuclide, the appropriate sum of the ratios of the activity or activity concentration of each radionuclide and the corresponding exempt activity or activity concentration must be taken into account.

FIRST SCHEDULE — *continued*

PART 2

LEVELS FOR EXEMPTION OF BULK AMOUNTS OF SOLID MATERIAL AND FOR CLEARANCE OF SOLID MATERIAL: ACTIVITY CONCENTRATIONS OF RADIONUCLIDES OF ARTIFICIAL ORIGIN

Radionuclide	Activity concentration (Bq/g)
H-3	100
Be-7	10
C-14	1
F-18	10
Na-22	0.1
Na-24	1
Si-31	1000
P-32	1000
P-33	1000
S-35	100
Cl-36	1
Cl-38	10
K-42	100
K-43	10
Ca-45	100
Ca-47	10
Sc-46	0.1
Sc-47	100
Sc-48	1
V-48	1
Cr-51	100
Mn-51	10
Mn-52	1
Mn-52m	10

FIRST SCHEDULE — *continued*

Radionuclide	Activity concentration (Bq/g)
Mn-53	100
Mn-54	0.1
Mn-56	10
Fe-52[a]	10
Fe-55	1000
Fe-59	1
Co-55	10
Co-56	0.1
Co-57	1
Co-58	1
Co-58m	10000
Co-60	0.1
Co-60m	1000
Co-61	100
Co-62m	10
Ni-59	100
Ni-63	100
Ni-65	10
Cu-64	100
Zn-65	0.1
Zn-69	1000
Zn-69m[a]	10
Ga-72	10
Ge-71	10000
As-73	1000
As-74	10
As-76	10
As-77	1000
Se-75	1

FIRST SCHEDULE — *continued*

Radionuclide	Activity concentration (Bq/g)
Br-82	1
Rb-86	100
Sr-85	1
Sr-85m	100
Sr-87m	100
Sr-89	1000
Sr-90[a]	1
Sr-91[a]	10
Sr-92	10
Y-90	1000
Y-91	100
Y-91m	100
Y-92	100
Y-93	100
Zr-93	10
Zr-95[a]	1
Zr-97[a]	10
Nb-93m	10
Nb-94	0.1
Nb-95	1
Nb-97[a]	10
Nb-98	10
Mo-90	10
Mo-93	10
Mo-99[a]	10
Mo-101[a]	10
Tc-96	1
Tc-96m	1000
Tc-97	10

FIRST SCHEDULE — *continued*

Radionuclide	Activity concentration (Bq/g)
Tc-97m	100
Tc-99	1
Tc-99m	100
Ru-97	10
Ru-103[a]	1
Ru-105[a]	10
Ru-106[a]	0.1
Rh-103m	10000
Rh-105	100
Pd-103[a]	1000
Pd-109[a]	100
Ag-105	1
Ag-110m[a]	0.1
Ag-111	100
Cd-109[a]	1
Cd-115[a]	10
Cd-115m[a]	100
In-111	10
In-113m	100
In-114m[a]	10
In-115m	100
Sn-113[a]	1
Sn-125	10
Sb-122	10
Sb-124	1
Sb-125[a]	0.1
Te-123m	1
Te-125m	1000
Te-127	1000

FIRST SCHEDULE — *continued*

Radionuclide	Activity concentration (Bq/g)
Te-127m[a]	10
Te-129	100
Te-129m[a]	10
Te-131	100
Te-131m[a]	10
Te-132[a]	1
Te-133	10
Te-133m	10
Te-134	10
I-123	100
I-125	100
I-126	10
I-129	0.01
I-130	10
I-131	10
I-132	10
I-133	10
I-134	10
I-135	10
Cs-129	10
Cs-131	1000
Cs-132	10
Cs-134	0.1
Cs-134m	1000
Cs-135	100
Cs-136	1
Cs-137[a]	0.1
Cs-138	10
Ba-131	10

FIRST SCHEDULE — *continued*

Radionuclide	Activity concentration (Bq/g)
Ba-140	1
La-140	1
Ce-139	1
Ce-141	100
Ce-143	10
Ce-144[a]	10
Pr-142	100
Pr-143	1000
Nd-147	100
Nd-149	100
Pm-147	1000
Pm-149	1000
Sm-151	1000
Sm-153	100
Eu-152	0.1
Eu-152m	100
Eu-154	0.1
Eu-155	1
Gd-153	10
Gd-159	100
Tb-160	1
Dy-165	1000
Dy-166	100
Ho-166	100
Er-169	1000
Er-171	100
Tm-170	100
Tm-171	1000
Yb-175	100

FIRST SCHEDULE — *continued*

Radionuclide	Activity concentration (Bq/g)
Lu-177	100
Hf-181	1
Ta-182	0.1
W-181	10
W-185	1000
W-187	10
Re-186	1000
Re-188	100
Os-185	1
Os-191	100
Os-191m	1000
Os-193	100
Ir-190	1
Ir-192	1
Ir-194	100
Pt-191	10
Pt-193m	1000
Pt-197	1000
Pt-197m	100
Au-198	10
Au-199	100
Hg-197	100
Hg-197m	100
Hg-203	10
Tl-200	10
Tl-201	100
Tl-202	10
Tl-204	1
Pb-203	10

FIRST SCHEDULE — *continued*

Radionuclide	Activity concentration (Bq/g)
Bi-206	1
Bi-207	0.1
Po-203	10
Po-205	10
Po-207	10
At-211	1000
Ra-225	10
Ra-227	100
Th-226	1000
Th-229	0.1
Pa-230	10
Pa-233	10
U-230	10
U-231	100
U-232[a]	0.1
U-233	1
U-236	10
U-237	100
U-239	100
U-240[a]	100
Np-237[a]	1
Np-239	100
Np-240	10
Pu-234	100
Pu-235	100
Pu-236	1
Pu-237	100
Pu-238	0.1
Pu-239	0.1

FIRST SCHEDULE — *continued*

Radionuclide	Activity concentration (Bq/g)
Pu-240	0.1
Pu-241	10
Pu-242	0.1
Pu-243	1000
Pu-244[a]	0.1
Am-241	0.1
Am-242	1000
Am-242m[a]	0.1
Am-243[a]	0.1
Cm-242	10
Cm-243	1
Cm-244	1
Cm-245	0.1
Cm-246	0.1
Cm-247[a]	0.1
Cm-248	0.1
Bk-249	100
Cf-246	1000
Cf-248	1
Cf-249	0.1
Cf-250	1
Cf-251	0.1
Cf-252	1
Cf-253	100
Cf-254	1
Es-253	100

FIRST SCHEDULE — *continued*

Radionuclide	Activity concentration (Bq/g)
Es-254[a]	0.1
Es-254m[a]	10
Fm-254	10000
Fm-255	100

[a] Parent radionuclides and their progeny whose dose contributions are taken into account in the dose calculations (thus requiring only the exemption level of the parent radionuclide to be considered) are listed here:

Parent radionuclide	Progeny
Fe-52	Mn-52m
Zn-69m	Zn-69
Sr-90	Y-90
Sr-91	Y-91m
Zr-95	Nb-95
Zr-97	Nb-97, Nb-97m
Nb-97	Nb-97m
Mo-99	Tc-99m
Mo-101	Tc-101
Ru-103	Rh-103m
Ru-105	Rh-105m
Ru-106	Rh-106
Pd-103	Rh-103m
Pd-109	Ag-109m
Ag-110m	Ag-110
Cd-109	Ag-109m
Cd-115	In-115m
Cd-115m	In-115m
In-114m	In-114
Sn-113	In-113m

FIRST SCHEDULE — *continued*

Parent radionuclide	Progeny
Sb-125	Te-125m
Te-127m	Te-127
Te-129m	Te-129
Te-131m	Te-131
Te-132	I-132
Cs-137	Ba-137m
Ce-144	Pr-144, Pr-144m
U-232	Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208
U-240	Np-240, Np-240m
Np-237	Pa-233
Pu-244	U-240, Np-240, Np-240m
Am-242m	Np-238
Am-243	Np-239
Cm-247	Pu-243
Es-254	Bk-250
Es-254m	Fm-254

1) Exemption is given for radioactive substances in bulk amounts for which the activity concentration of the radionuclide does not exceed the levels given in the above table.

2) In the case of more than one radionuclide, the appropriate sum of the ratios of the activity concentration of each radionuclide and the corresponding exempt activity concentration must be taken into account.

SECOND SCHEDULE

Regulations 16(15), 30(1), (6) and (7), 35(8), 47(3), 51, 68(4) and (5) and 71(1)

PART 1

DOSE LIMITS FOR OCCUPATIONAL EXPOSURE

1. Except as provided in paragraph 6, the dose limits for occupational exposure of workers above 18 years of age are those specified in the following table:

Application	Dose limit per year (mSv)
Effective dose (whole body)	20
Equivalent dose to	
the lens of the eye	20
the skin	500
the hands and feet	500

Notes:

1. The limit on effective dose (whole body) is 20 mSv per year, averaged over 5 consecutive years and with the further provision that the effective dose does not exceed 50 mSv in any single year. The limit applies to the sum of the relevant doses from external exposure in the specified period and the committed effective dose.
2. The limit on equivalent dose to the lens of the eye is 20 mSv per year, averaged over 5 consecutive years and with the further provision that the equivalent dose does not exceed 50 mSv in any single year.
3. The equivalent dose limit for the skin applies to the average dose over 1 cm^2 of the most highly irradiated area of the skin.

SECOND SCHEDULE — *continued*

2. Except as provided in paragraph 6, the dose limits for apprentices of 16 to 18 years of age who are being trained for employment involving radiation and for exposure of students of 16 to 18 years of age who use sources in the course of their studies are those specified in the following table:

Application	Dose limit per year (mSv)
Effective dose (whole body)	6
Equivalent dose to	
the lens of the eye	20
the skin	150
the hands and feet	150

Note:

1. The equivalent dose limit for the skin applies to the average dose over 1 cm^2 of the most highly irradiated area of the skin.

3. For the purposes of this Part, the dose from any medical or dental exposure as a patient, from the exposure to natural background radiation or from other exposures received by the worker as a member of the public are not to be taken into account.

4. Where only a part or parts of a human body are irradiated by external radiation, the effective dose received from external radiation is determined by calculating the sum of $w_T H_T$ over all the organs and tissues irradiated, where —

(*a*) H_T is the equivalent dose received by any particular tissue or organ T; and

(*b*) w_T is the weighting factor for that tissue or organ.

SECOND SCHEDULE — *continued*

5. The values of the tissue weighting factors to be used for determining the weighted equivalent dose $w_T H_T$, are those specified in the following table:

Tissue or organ	Tissue weighting factor w_T
Bone marrow (*red*)	0.12
Colon	0.12
Lung	0.12
Stomach	0.12
Breast	0.12
Gonads	0.08
Bladder	0.04
Liver	0.04
Oesophagus	0.04
Thyroid	0.04
Skin	0.01
Bone surface	0.01
Brain	0.01
Salivary gland	0.01
Remainder	0.12

Note:

1. The w_T for remainder tissues (0.12) applies to the arithmetic mean dose to these 13 tissues and organs for each sex: adrenals, extrathoracic region, gall bladder, heart, kidneys, lymphatic nodes, muscle, oral mucosa, pancreas, prostate (male), small intestines, spleen, thymus, uterus/cervix (female).

6. Upon notification by a female worker of her suspected pregnancy or that she is breastfeeding, the employer of the female worker must adapt her working conditions in respect of occupational exposure so as to ensure that the embryo or foetus or the breastfed infant is afforded the same broad level of protection as is required for members of the public.

SECOND SCHEDULE — *continued*

PART 2

DOSE LIMITS FOR INDIVIDUAL MEMBERS OF THE PUBLIC

1. The annual dose limits for individual members of the public are those specified in the following table:

Application	Dose limit per year (mSv)
Effective dose (whole body)	1
Equivalent dose to	
the lens of the eye	15
the skin	50

Notes:

1. In special circumstances, a higher value of effective dose for the whole body could be allowed in a single year, provided that the average effective dose over 5 consecutive years does not exceed 1 mSv per year. The limit applies to the sum of the relevant doses from external exposure in the specified period and the committed effective dose.
2. The equivalent dose limit for the skin applies to the average dose over 1 cm^2 of the most highly irradiated area of the skin.

2. For the purposes of this Part, the dose from any medical or dental exposure as a patient or from the exposure to natural background radiation are not to be taken into account.

PART 3

VALUES OF RADIATION WEIGHTING FACTOR FOR DIFFERENT TYPES OF IONISING RADIATION

1. The values of radiation weighting factor to be used in determining the equivalent dose in a tissue or organ are those specified in the following table:

Type of ionising radiation and energy range	Radiation weighting factor
Photons, all energies	1
Electrons and muons, all energies	1
Neutrons, energy < 10 keV	5
10 keV to 100 keV	10
> 100 keV to 2 MeV	20
> 2 MeV to 20 MeV	10

SECOND SCHEDULE — *continued*

Type of ionising radiation and energy range	Radiation weighting factor
> 20 MeV	5
Protons, other than recoil protons, energy > 2 MeV	5
Alpha particles, fission fragments, heavy nuclei	20

2. For the purposes of this Part, all the specified values relate to the radiation incident on the body or, for internal sources, emitted from the source.

SECOND SCHEDULE — *continued*

PART 4

GUIDANCE VALUES FOR RESTRICTING EXPOSURE OF EMERGENCY WORKERS

Tasks	Guidance value (mSv)
Life-saving actions	$H_p(10) < 500$
Actions to prevent severe deterministic effects and actions to prevent the development of catastrophic conditions that could significantly affect people and the environment	$H_p(10) < 500$
Actions to avert a large collective dose	$H_p(10) < 100$

Notes:

1. The guidance values in the second column apply only for the dose from external exposure to strongly penetrating radiation. Doses from external exposure to weakly penetrating radiation and from intake or skin contamination need to be prevented by all possible means. If this is not feasible, the effective dose and the equivalent dose to a tissue or organ that are received must be limited to minimise the health risk to the individual in line with the risk associated with the guidance values here.

2. The value relating to life-saving actions can be exceeded under circumstances in which the expected benefits to others clearly outweigh the emergency worker's own health risk, and the emergency worker volunteers to take the action and understand and accepts these health risks.

3. $H_p(10)$ in the second column is the personal dose equivalent $H_p(d)$ where d = 10 mm.

THIRD SCHEDULE

Regulation 3(7)

EXEMPTED ARTICLES OR IRRADIATING APPARATUS FOR IMPORT, EXPORT, POSSESSION, USE OR SALE OF OR OTHER DEALING

1. Any timepiece, instrument, or device containing self-luminous elements, except during the manufacture or repair of the self-luminous elements themselves and provided that the timepiece, instrument or device contains no more than —

   (*a*) 35 kBq of radium-226, 105 kBq of americium-241, 70 MBq of promethium-147 or 3.5 GBq of tritium, where the luminescent substance is substantially insoluble in water and is in the form of glass, vitreous enamel or similar substance or in the form of a paint or film which adheres to the timepiece, instrument or device during normal use; or

   (*b*) 70 GBq of tritium or 9 GBq of krypton-85 in the form of radioactive gas.

2. Subject to paragraph 3, the following electrical equipment, provided that they do not in normal operating conditions cause an ambient dose equivalent rate or a directional dose equivalent rate, as appropriate, exceeding 1 μSv per hour at a distance of 0.1 m from any accessible surface of the equipment, or the maximum energy of the radiation generated is no greater than 5 keV:

   (*a*) electron microscopes;

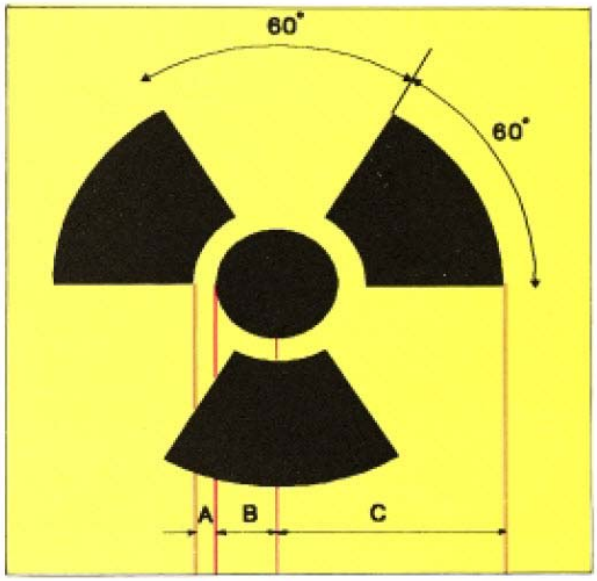
   (*b*) any electrical equipment which is not primarily intended to produce ionising radiation (such as transmitting valves, rectifying valves, image converters and cathode ray tubes used for projection purposes or closed-circuit applications).

3. The testing, in the course of production, of the equipment specified in paragraph 2 is not exempted from the Act.

FOURTH SCHEDULE

Regulations 20(1), 21 and 22(1)

STANDARD SYMBOL FOR DESIGNATING ANY IONISING RADIATION HAZARD



Notes:

1. A : B : C = 1 : 2 : 10.
2. Trefoil symbol must be black in colour and background must be yellow.

FIFTH SCHEDULE

Regulations 11(1) and (2), 16(4) and (7) and 53(3) and (4)

FEES

First column	*Second column*
1. Application for a new IR1 licence	$210 per application
2. Annual fee for an IR1 licence	$210
3. Application to amend an IR1 licence	$25 per application
4. Application for a new IR2 licence	$155 per irradiating apparatus not containing radioactive material in the application
	$155 for at least one (*a*) irradiating apparatus containing radioactive material, or (*b*) radioactive material, in the application
5. Annual fee for an IR2 licence	$155 per irradiating apparatus not containing radioactive material in the licence
	$155 for at least one (*a*) irradiating apparatus containing radioactive material, or (*b*) radioactive material, in the licence
6. Application to amend an IR2 licence	$155 per addition of irradiating apparatus not containing radioactive material to the licence
	$25 per application
7. Application for a new IR3 licence	$155 per application
8. Annual fee for an IR3 licence	$155
9. Application to amend an IR3 licence	$25 per application for any other amendment
10. Application for an IR4A licence	$40 per consignment
11. Application for an IR4B licence	
12. Application for an IR5A licence	$40 per consignment
13. Application for an IR5B licence	

FIFTH SCHEDULE — *continued*

First column	*Second column*
14. Application for an IR5C licence	
15. Application to register as a radiation worker	$105 per application
16. Annual fee for registration as a radiation worker	$50
17. Application to amend a registration certificate for radiation worker	$25 per application
18. Application for approval to accumulate radioactive waste	$600 per application
19. Application for approval to transport radioactive waste	$600 per application

Made on 31 January 2023.

LEE CHUAN SENG
Chairperson,
National Environment Agency,
Singapore.

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