

Queensland



*Radioactive Substances Act 1958*

# **RADIOACTIVE SUBSTANCES REGULATION 1961**

**Reprinted as in force on 23 September 1994  
(includes amendments up to SL No. 213 of 1994)**

**Reprint No. 1**

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the Office of the Queensland Parliamentary Counsel  
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# Information about this reprint

This regulation is reprinted as at 23 September 1994. The reprint—

- shows the law as amended by all amendments that commenced on or before that day
- incorporates all necessary consequential amendments, whether of punctuation, numbering or another kind.

The reprint includes a reference to the law by which each amendment was made—see List of legislation and List of annotations in Endnotes.

Minor editorial changes allowed under the provisions of the Reprints Act 1992 mentioned in the following list have also been made to—

- update citations and references (Pt 4, Div 2)
- update references (Pt 4, Div 3)
- express gender specific provisions in a way consistent with current legislative drafting practice (s 24)
- use different spelling consistent with current legislative drafting practice (s 26(2))
- use standard punctuation consistent with current legislative drafting practice (s 27)
- use conjunctives and disjunctives consistent with current legislative drafting practice (s 28)
- use expressions consistent with current legislative drafting practice (s 29)
- use appropriate names for instruments and provision units (ss 31 and 32)
- insert references to the empowering Act (s 33)
- relocate marginal or cite notes (s 34)
- use aspects of format and printing style consistent with current legislative drafting practice (s 35)
- omit provisions that are no longer required (s 39)
- omit unnecessary referential words (s 41)
- omit the words of notification (s 42A)
- number and renumber certain provisions and references (s 43)
- correct minor errors (s 44).

**Also see Endnotes for information about—**

- **when provisions commenced**
- **provisions that have not commenced and are not incorporated in the reprint**
- **editorial changes made in the reprint, including—**
  - **Table of changed names and titles**
  - **Table of obsolete and redundant provisions**
  - **Table of corrected minor errors**
  - **Table of renumbered provisions.**

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# RADIOACTIVE SUBSTANCES REGULATION 1961

[as amended by all amendments that commenced on or before 23 September 19942]

## PART 1—PRELIMINARY

1. This regulation may be cited as the *Radioactive Substances Regulation 1961*<sup>3-8</sup>.

2. This regulation shall come into force as from 1 January 1962.

3. In this regulation—

“**absorbed dose**” means the amount of energy imparted to matter by corpuscular radiation per unit mass of the irradiated material at the place of interest. It shall be expressed in rads.

“**air dose**” means the quantity of X-rays or gamma rays incident upon the selected point in the given period measured by the total number of ions which would be produced per unit volume in air by the associated corpuscular radiation at the selected point. It shall be expressed in roentgens.

“**Chief Health Officer**” means the Chief Health Officer (Department of Health).

“**contamination**” in respect of a radioactive substance acquired by attachment to the surface or by absorption or ingestion or in any other way, means a quantity of the substance in excess of that specified in Schedule 1 in respect of that substance.

“**corpuscular radiation**” means alpha particles, beta particles, electrons, positrons, protons, neutrons, and other nuclear particles, provided in all cases that such particles have speed sufficient to cause them to produce ions in matter through which they pass.

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“**council**” means the Radiological Advisory Council constituted under the *Radioactive Substances Act 1958*.

“**curie**” means the unit of radioactivity defined as the quantity of any radioactive substance in which the number of disintegrations per second is  $3.7 \times 10^{10}$ . Curie may be designated by the symbol ‘c’.

“**film badge**” means a piece of photographic film suitably enclosed and provided with appropriate filters used for the detection of exposure to radiation.

“**high radiation area**” means any area accessible to personnel, in which there exists radiation at such levels that a major portion of the body could receive in any 1 hour a radiation dose equivalent in excess of 1 millisievert.

“**ionising radiation**” means X-rays, or gamma rays or corpuscular radiation emitted from a radioactive substance or from an irradiating apparatus as prescribed under section 4. It does not include ultraviolet radiation of wavelength longer than one-hundred-thousandth of a centimetre, visible light, infra-red rays, radio waves, sound, or ultrasonics.

“**licensee**” means a person who holds a licence under the Act.

“**maximum permissible concentration**” means—

- (a) in relation to any radiation worker who inhales or ingests any radioisotope from air or drinking water—in respect of the average concentration of the radioisotope in air or drinking water used by that person the concentration of the radioisotope in air or water specified in Schedule 2, columns 2 and 3 respectively opposite the chemical symbol for that radioisotope in Schedule 2, column 1; and
- (b) in relation to any person who is not a radiation worker and who in the course of the person’s occupation inhales or ingests any radioisotope from air or drinking water—in respect of the average concentration of the radioisotope in air or drinking water used by that person, the concentration of the radioisotope in air or water specified in Schedule 2, columns 4 and 5 respectively opposite the chemical symbol for that radioisotope in Schedule 2, column 1.

“**maximum permissible dose**” means—

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- (a) in relation to any radiation worker—
  - (i) whose whole body or the major portion thereof has been or is likely to be exposed, in the course of the radiation worker's occupation, to ionising radiation from external or internal sources—a radiation dose equivalent not exceeding 30 millisievert in any period of 13 consecutive weeks, or 50 millisievert in any period of 52 consecutive weeks to the gonads, or blood-forming organs or lenses of the eyes; or
  - (ii) whose whole body or the major portion thereof has been or is likely to be exposed, in the course of the radiation worker's occupation, to ionising radiation from external sources—a radiation dose equivalent not exceeding 80 millisievert in any period of 13 consecutive weeks to the skin, or the thyroid gland; or
  - (iii) whose hands and forearms only, head and neck only, or feet and ankles only have been or are likely to be exposed in the course of the radiation worker's occupation, to ionising radiation from external sources—a radiation dose equivalent not exceeding 200 millisievert in any period of 13 consecutive weeks to the skin, the deeper tissues of the hands, forearms, head, neck, feet, or ankles, or a radiation dose equivalent not exceeding 30 millisievert in the same period, or 50 millisievert in any period of 52 consecutive weeks to the lenses of the eyes;
- (b) in relation to any person who is not a radiation worker and who in the course of the person's occupation is exposed internally or externally to radiation from any irradiating apparatus or radioactive substance—a radiation dose equivalent not exceeding 30 millisievert per year to the skin or thyroid gland, or 15 millisievert per year to the gonads, or blood-forming organs or lenses of the eyes;
- (c) however, in reckoning the dose received by any person, whether a radiation worker or otherwise, doses derived from universally present sources such as cosmic rays, the general radioactivity of the atmosphere and the earth's crust, and doses derived while the person is undergoing radiological examination for medical or dental purposes, shall not be included.

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- “**microcurie**” means the  $1/1\,000\,000$  part of a curie and may be designated by the symbol ‘ $\mu\text{c}$ ’.
- “**microrad**” means the  $1/1\,000\,000$  part of a rad and may be designated by the symbol ‘ $\mu\text{rad}$ ’.
- “**microroentgen**” means the  $1/1\,000\,000$  part of a roentgen and may be designated by the symbol ‘ $\mu\text{r}$ ’.
- “**microsievert**” means the  $1/1\,000\,000$  part of a sievert and may be designated by the symbol ‘ $\mu\text{SV}$ ’.
- “**millicurie**” means the  $1/1\,000$  part of a curie and may be designated by the symbol ‘ $\text{mc}$ ’.
- “**millirad**” means the  $1/1\,000$  part of a rad and may be designated by the symbol ‘ $\text{mrad}$ ’.
- “**milliroentgen**” means the  $1/1\,000$  part of a roentgen and may be designated by the symbol ‘ $\text{mr}$ ’.
- “**millisievert**” means the  $1/1\,000$  part of a sievert and may be designated by the symbol ‘ $\text{mSV}$ ’.
- “**monitoring**” means continuous or periodic measurement of the radiation dose equivalent received by a radiation worker.
- “**rad**” means the unit of absorbed dose, and is equal to 100 ergs per gram of irradiated material.
- “**radiation area**” means any area accessible to personnel, in which there exists radiation at such levels that a major portion of the body could receive in any 1 hour a radiation dose equivalent in excess of 50 microsievert, or in any period of 5 consecutive days a dose in excess of 1.5 millisievert.
- “**radiation dose equivalent**”, at a point in tissue is given by the equation  $H = D\partial N$  where  $D$  is the absorbed dose,  $\partial$  is the effective value of a quality factor and  $N$  is the product of all other modifying factors.  $N$  has the assigned value of 1.  $\partial$  takes on different values for various types of primary radiation. The values assigned to  $\partial$  for both external and internal radiation are given in the following table—

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Type of radiation	Value assigned to $\partial$
X-rays, $\beta$ -rays and electrons	1
Neutrons, protons and singly-charged particles of rest mass greater than 1 atomic mass unit of unknown energy	10
$\Sigma$ -particles and multiply-charged particles (and particles of unknown charge), of unknown energy	20

**“radiation hazard”** means danger of persons receiving a radiation dose equivalent in excess of the maximum permissible dose.

**“radiation safety officer”** means a person approved by the Chief Health Officer to act as a radiation safety officer pursuant to Part 5.

**“radiation unit”**, as used in Part 10 ‘1 radiation unit’ means 10 microsievert per hour at a distance of 1 m from the radioactive substance, or 12 microsievert per hour at a distance of 3 ft from the radioactive substance.

**“radiation worker”** means any person who uses or handles or assists in using or handling any radioactive substance, or who uses or operates or assists in using or operating any irradiating apparatus; but does not include persons who handle any radioactive substance while it is being transported in accordance with the provisions of Part 10.

**“roentgen”** means the air dose such that the associated corpuscular emission per 0.001293 g of air, produces in air, ions carrying 1 electrostatic unit of charge of either sign, and may be designated by the symbol ‘r’.

**“sealed source”** means a quantity of radioactive material so enclosed or bonded within metals or sealed in a capsule as to prevent escape of any radioactive substance but so that radiation is emitted from the container for use.

**“sievert”** means the SI unit of radiation dose equivalent. It may be designated by the symbol ‘Sv’. 1 Sv = 1 joule per kg.

**Prescription of irradiating apparatus and radioactive substances**

**4.(1)** For the purposes of the definition of irradiating apparatus contained in section 4 of the Act, the prescribed types of ionising radiation shall be radiation (other than sound or ultrasonics, or radio waves, or infra-red rays, or visible light, or ultraviolet rays of wavelength greater than  $\frac{1}{100\ 000}$  of a centimetre) which is propagated in the form of X-rays, gamma rays, alpha particles, beta particles, high-speed electrons, positrons, protons, neutrons, or other nuclear particles capable by virtue of their speed of producing ions, and the prescribed conditions shall be those under which a radiation dose equivalent in excess of 20 microsievert per hour can be produced by the apparatus concerned at any accessible point on its surface.

**(2)** For the purposes of the definition of radioactive substances contained in section 4 of the Act, the prescribed concentration in respect of any substance which consists of or contains any radioactive nuclide or chemical element which is, or the chemical symbol for which is specified in Schedule 1, column 1 shall be the amount of that nuclide or element in that substance specified in Schedule 1, column 2 opposite the group in which that nuclide or element is shown in Schedule 1, column 1 and shall in respect of any substance which, or the chemical symbol for which, is not so specified be 10 microcuries in that substance, provided in all cases that if the total concentration of radioactive nuclides per gram of the substance does not exceed  $2 \times \frac{1}{1\ 000}$  of a microcurie, it shall be deemed not to reach the prescribed concentration.

**Forms**

**5.** The Chief Health Officer may approve forms to be used under the Act.

**Fees**

**6.** The fees for the purposes of the Act are set out in Schedule 5.

## **PART 1A—APPLICATION OF REGULATIONS**

**6A.(1)** This regulation shall apply, subject to this section, with respect to all operations in, on or about a mine.

**(2)** In the event of inconsistency between a provision of this regulation and a provision of the regulations in force under the *Coal Mining Act 1925* or the *Mines Regulation Act 1964* the latter provision shall prevail and the provisions of this regulation shall, to the extent of the inconsistency, be inoperative.

## **PART 2—LICENCES AND REGISTRATIONS**

**7.(1)** Every application for a licence or for renewal of a licence under the Act shall be made to the Chief Health Officer in the approved form.

**(2)** The Chief Health Officer shall make and keep a proper record for the whole of Queensland of all licences issued under the Act.

**(3)** The Chief Health Officer shall refer every application for a licence or for a renewal of a licence under the Act to the Council.

**(4)** The Council shall consider every application for a licence, or for a renewal of a licence for the purpose of determining what recommendation shall be made to the Minister.

**(4A)** In considering the application the Council shall have regard to—

- (a) the qualifications of the applicant; and
- (b) the experience of the applicant in relation to the class of licence applied for; and
- (c) the purpose for which the licence is required; and
- (d) the general suitability of the applicant having regard to the purpose for which the licence is required.

**(5)** The Council may in its discretion—

- (a) refer the application to an advisory or technical committee

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appointed by the Council;

- (b) require the applicant to submit to an examination either oral or written.

**(5A)** Where the Council requires an applicant to submit to an oral examination, such examination may be conducted by an advisory or technical committee appointed by the Council.

**(5B)** In the case of a written examination—

- (a) the questions shall be prepared by an advisory or technical committee appointed by the Council;
- (b) Council shall approve the questions prepared by such committee;
- (c) the examination is to be conducted at a time and place approved by Council and under the supervision of a person approved by Council;
- (d) on completion of the examination papers, the supervisor appointed by Council shall forward the examination papers to Council;
- (e) Council shall refer the examination papers to the advisory or technical committee appointed for the purpose of the examination.

**(6)** An advisory or technical committee appointed by Council to conduct any examination, oral or written, shall advise Council of the results of any such examination.

**(7)** Council shall make its recommendation to the Minister in relation to the application after consideration of the matters referred to in this regulation.

**(8)** When Council considers that in respect of any application an oral or a written examination is necessary, and the applicant declines to undergo any examination directed by Council, Council shall not in respect of that application make any recommendation to the Minister.

**8.** No person, whether or not required by the Act to be a holder of a licence, shall have in the person's possession or under the person's control or shall use or operate any irradiating apparatus as prescribed in section 4, unless such person is the holder of a certificate of registration or certificate

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of renewal of registration of such irradiating apparatus issued under this regulation or is acting under the supervision or instruction of a person who is the holder of a certificate of registration or certificate of renewal of registration, issued under this regulation.

**9.** Every application for registration or renewal of registration of any irradiating apparatus shall be made in the approved form to the Chief Health Officer, who may issue a certificate of registration or renewal of registration.

**10.(1)** The Chief Health Officer may at his or her discretion grant and renew or refuse to grant or renew registration of any irradiating apparatus, or may, before granting registration or renewal of registration, require any specified alterations or repairs to be done to such apparatus.

**(2)** The Chief Health Officer may at any time cancel the registration of any irradiating apparatus registered under this regulation.

**11.** For the purposes of section 10 the Chief Health Officer may require an inspector to inspect and report upon any irradiating apparatus.

**12.(1)** Every applicant for registration or renewal of registration of any irradiating apparatus shall produce with the applicant's application for registration or renewal as the case may be a certificate in the approved form by some person approved by the Chief Health Officer (which approval may be particularly by notice in writing or generally by publication in the Gazette of a list of such approved persons) that such apparatus has been examined within the period of 1 year immediately preceding the date of such application for registration or renewal and has been found to be in safe working order.

**(2)** Every person to whom a certificate of registration or renewal of registration of any irradiating apparatus has been granted under this regulation shall, is so required by the Chief Health Officer or by any inspector, make such apparatus available for examination by the Chief Health Officer or by any inspector in accordance with the terms of such requirement.

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**13.** The Chief Health Officer shall make and keep a proper record for the whole of Queensland of all registrations of irradiating apparatus under this regulation.

**14.(1)** Unless sooner cancelled, surrendered, or renewed, every grant of registration of any irradiating apparatus under this regulation shall be in force—

- (a) for the period less than 12 months expressly stated in the certificate of registration or in any endorsement thereon; or
- (b) where a period less than 12 months is not expressly stated in or in an endorsement on the certificate of registration, for the period of 12 months, from and including the date of issue or renewal, as the case may be, of such certificate.

**(2)** For the purposes of this section, the renewal for any period of such a certificate shall be deemed to be made on the first day of that period.

**15.(1)** Where a person to whom a certificate of registration in respect of any irradiating apparatus has been issued under this regulation is the holder of a licence under the Act in respect of such apparatus, and such licence has been cancelled or suspended under the provisions of section 11 of the Act, then such registration shall be deemed to have been also cancelled or suspended as the case may be.

**(2)** Where any licence has been so suspended for a specified period, and such period has expired, and where any licence suspended indefinitely has again come into force, such registration shall be deemed to have again come into force on the date on which the licence again came into force.

**16.(1)** Any person to whom a certificate of registration of any irradiating apparatus has been granted under this regulation shall, at the request of the Chief Health Officer affix to such apparatus such markings of identification as the Chief Health Officer may specify.

**(2)** Where any such irradiating apparatus consists of more than one distinct portion, such person shall at the request of the Chief Health Officer, affix such means of identification to each and every separate portion.

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(3) All markings of identification specified under this section shall be of such size and character as to be easily read or identified from a distance of 6 ft.

17.(1) In the event of a proposed transfer of possession or control of any irradiating apparatus in respect of which a certificate of registration or renewal of registration under this regulation is in force, application for transfer of such registration shall forthwith be made in the approved form to the Chief Health Officer by the person to whom such certificate was granted, and by the person who has acquired the possession or control of such apparatus.

(2) The Chief Health Officer may, at his or her discretion, without requiring payment of any further fee, transfer such registration to the person who has acquired the possession or custody of such apparatus and endorse the certificate of registration or renewal of registration accordingly.

### **PART 3—EXEMPTIONS**

18.(1) Any person who carries out any research, or performs any work, or being an enrolled student performs any experiment in the course of the person's education, and who, in the carrying out or performance of such research, work, or experiment, has in the person's possession or uses any radioactive substance or irradiating apparatus shall, whilst carrying out or performing such research, work, or experiment under the direction of a licensee, be exempt from the provisions of section 13(1) or 14(1) and (3) of the Act, as the case may be, to the extent that such research, work, or experiment is authorised by the licence for the time being in force in respect of such licensee.

(2) Any person who has in the person's possession or uses or sells any timepiece, instrument or other device containing any radioactive substance embodied in luminous paint shall be exempt from the provisions of section 13(1) of the provisions of the Act in respect of such possession, use or sale.

(2A) However, this exemption shall not apply in respect of the

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manufacture or repair of any such timepiece, instrument or other device where such manufacture or repair involves the application of radioactive paint.

(3) No person who, as an employee of any other person to whom a licence has been issued under the Act, is engaged in the transport of any radioactive substance, shall be required to obtain a licence under the Act for such transport.

(4) Any person who has in the person's possession any radioactive substance merely by reason of the fact that the person is undergoing or has undergone treatment by a medical practitioner or dentist licensed under the Act, or by a person acting under the supervision or instructions of such medical practitioner or dentist, shall be exempt from the provisions of section 13(1) of the Act—

- (a) whilst the person is being treated as an in-patient in any hospital or clinic; and
- (b) whilst the person is elsewhere with the written permission of the medical practitioner or dentist who has carried out or authorised the treatment, or of a person acting under the supervision or instructions of that medical practitioner or dentist in relation to that treatment.

20.(1) The Minister, upon the advice of the Council may exempt from the provisions of section 13(1) or 14(1) of the Act, as the case may be, any radioactive substance or irradiating apparatus which the Minister considers is without hazard, and may require such substance or apparatus to be so labelled or marked as the Minister may think fit.

(2) Such exemption and any such requirement as labelling or marking may be notified to a particular person in writing or generally by publication in the Gazette.

## **PART 4—CONTROL OF RADIATION EXPOSURE**

21. No person who has in the person's possession or custody or uses

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any radioactive substance or irradiating apparatus shall cause, permit, or suffer any person, or any part of any person, to receive a radiation dose equivalent greater than is absolutely necessary in the circumstances, and in no case a radiation dose equivalent greater than the appropriate maximum permissible dose.

**22.** Every person who has in the person's possession or custody or uses any radioactive substance not being a sealed source shall take or cause to be taken all such steps as are reasonably necessary—

- (a) to prevent or to minimise the production of contamination which could lead to exposure of any person or any part of any person either externally or internally to ionising radiation therefrom; and
- (b) to ensure that any concentration in air or drinking water likely to be inhaled or ingested by any person of such radioactive substance shall not exceed the appropriate maximum permissible concentration.

**23.** The provisions of sections 21 and 22 shall not be construed so as to limit the kind or amount of radioactive substance or ionising radiation which may be intentionally applied to a person as a necessary part of any diagnostic or therapeutic procedure by or under the direction of a medical practitioner or dentist.

**24.(1)** In any proceedings against any person for an offence against the provisions of section 21 or 22 it shall be a defence to prove that an accident or other emergency existed whereby it became necessary that some person or persons should receive a radiation dose equivalent in excess of the maximum permissible dose.

**(2)** However, section 21 and 22 shall not apply—

- (a) in any case where any person receives such a radiation dose equivalent is a female person; or
- (b) in any case where any person receives a radiation dose equivalent in excess of 125 millisievert.

## **PART 5—RADIATION SAFETY OFFICER**

**25.(1)** Every person required by the Act to be a holder of a licence under the Act, shall appoint a person who has satisfactorily undertaken a course of study in the use of radiation monitoring equipment and the principles of radiation safety to the satisfaction of the Chief Health Officer, as a radiation safety officer for the purposes of the supervision of the use or custody of any radioactive substance or irradiating apparatus specified in the licence for the uses described in the licence.

**(2)** Every person required by the provisions of subsection (1) to appoint a radiation safety officer, shall forthwith submit for the approval of the Chief Health Officer, particulars in the approved form in relation to the person whom the person proposes to appoint as such radiation safety officer.

**26.(1)** The Chief Health Officer may, if he or she is of the opinion that any work involving the use of any radioactive substance or of any irradiating apparatus is such that the appointment of more than 1 radiation safety officer is necessary, require any person who is obliged under the provisions of section 25 to appoint a radiation safety officer, to appoint such additional radiation safety officer or officers, as he or she shall deem necessary, either generally or in respect of any particular place or premises or part of any premises or in respect of any particular work.

**(2)** The Chief Health Officer may, if he or she deems fit, approve the appointment of any person as a radiation safety officer in respect of any number of persons required under the provisions of section 25 to appoint a radiation safety officer.

**27.** No person shall act as a radiation safety officer unless and until the Chief Health Officer has notified the licensee or employer of a radiation worker or any radiation worker who is not an employee of any other person of his or her approval of such appointment.

**28.** Notwithstanding anything contained in sections 25 and 26, any licensee or employer of a radiation worker or any radiation worker who is

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not an employee of any other person, may with the approval of the Chief Health Officer appoint himself or herself as a radiation safety officer.

**29.(1)** The Chief Health Officer may, at any time, at his or her discretion, rescind the approval of the appointment of any person as a radiation safety officer.

**(2)** Upon notification by the Chief Health Officer of any such rescission, the licensee or employer of a radiation worker or any radiation worker who is not an employee of any other person shall forthwith submit for the approval of the Chief Health Officer particulars in the approved form of some other person whom he or she proposes to appoint as a radiation safety officer.

**30.** Every radiation safety officer shall, within the limits of the approval of the radiation safety officer's appointment—

- (a) inform himself or herself of the radiation hazards attendant upon the presence of radiation;
- (b) provide or cause to be provided all necessary instructions concerning radiation hazards and safe working practices—
  - (i) to all employees whose duties necessitate the handling of any radioactive substance or the operation of any irradiating apparatus that produces a radiation hazard; and
  - (ii) to all employees who are not regularly employed at such work, but who may occasionally be exposed to radiation;
- (c) supervise or instruct all persons performing any work involving the handling of any radioactive substance or of any irradiating apparatus, and give all necessary instructions to such persons with respect to the precautions to be taken to avoid excessive exposure of any person to radiation;
- (d) ensure that all radiation workers under his or her supervision in any place and all other persons permitted to be in such place are properly and adequately instructed as to the precautions to be followed to avoid contamination of any person by any radioactive substance, and are supplied with all such devices as may be

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necessary to prevent such workers or other persons being so contaminated;

- (e) ensure that no radioactive substance (including that in patients, animals or equipment) is allowed to leave his or her control, or the control of any other person to whom it has properly been issued, under circumstances that may subject other persons to radiation in amounts in excess of those indicated in this regulation;
- (f) where the radiation safety officer is an employee either of a licensee or of an employer of a radiation worker notify such licensee or employer when any place under his or her supervision (which place is not normally occupied by any person) becomes dangerous by reason of a radiation hazard in that place;
- (g) where the radiation safety officer is an employee either of a licensee or of an employer of a radiation worker notify such licensee or employer of the existence of any conditions or situations in any place under his or her supervision, which, though not normally constituting a radiation hazard, may become a radiation hazard under special or unusual circumstances;
- (h) where the radiation safety officer is an employee either of a licensee or of an employer of a radiation worker notify such licensee or employer if the radiation safety officer becomes aware of the existence of a radiation hazard in any place under his or her supervision, apparently not originating from sources within such place.

**31.** Every licensee or employer of a radiation worker who is notified by a radiation safety officer of any matter referred to in section 30(f), (g) or (h), and every radiation safety officer who is a licensee or employer or a radiation worker, or a radiation worker who is not an employee of any other person, who becomes aware of any such matter, shall forthwith notify the Chief Health Officer of such matter.

**32.** Where a radioactive substance in the possession of a licensee or employer of a radiation worker or of any radiation worker who is not an employee of any other person is used in any building or place other than the

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premises of such licensee, employer, or radiation worker, such licensee, employer or radiation worker shall—

- (a) take all steps reasonably necessary to prevent any person other than the person or persons using such substance from being exposed to any radiation hazard resulting from the use of such substance;
- (b) where such substance cannot be returned to the premises of such licensee, employer or radiation worker, immediately upon completion of its use, place such substance or cause such substance to be placed in a storage container immediately upon the expiration of the daily work period during which such substance has been used;
- (c) cause such substance at all times when not in use to be kept in safe custody in such other building or place;
- (d) cause to be exhibited in such other building or place notices by way of diagrams or photographs of the container of such substance, showing the dimensions of such container and stating any identifying feature of the container and the steps to be taken by the person finding such container;
- (e) cause the notices mentioned in paragraph (d) to be continuously exhibited until such substance has been returned to the premises of such licensee, employer or radiation worker and there placed in safe custody.

**33.** Any person, whether or not a radiation worker who enters any place where there is a radiation hazard, shall use any devices or equipment available at such place, and shall comply with any directions given by any radiation safety officer or radiation worker, with respect to the precautions to be observed to prevent contamination from any radioactive substance or exposure to radiation in such place.

**34.** Where any radioactive substance in the possession of any licensee, employer of a radiation worker, or radiation worker who is not an employee of any other person, is lost or damaged, such licensee, employer, or radiation worker, shall forthwith by telegraph or telephone notify the Chief

Health Officer of such loss or damage.

**35.** Every radiation worker who is in any place in which there is a radiation hazard shall—

- (a) obey all instructions and directions issued by a radiation safety officer concerning radiation hazards, safe working practices, and precautions to be taken to avoid excessive exposure of any person to radiation;
- (b) use all appropriate devices supplied to prevent or minimise contamination;
- (c) notify the radiation safety officer of any defect in the radiation safety at such place which has come to his or her notice.

## **PART 6—MONITORING**

**36.(1)** Every licensee or employer of a radiation worker shall, if directed by the Chief Health Officer, issue to every radiation worker employed by the licensee or employer such film badges or other devices used for the purpose of measuring radiation dose equivalents as the Chief Health Officer may specify, so that each such radiation worker shall at all times whilst the radiation worker is in any place within the control of such licensee or employer where there is a radiation hazard be issued with such a film badge or device.

**(2)** Every licensee or employer of a radiation worker who issues such a film badge or other device shall instruct every radiation worker to whom such a film badge or device is issued to wear or use such film badge or device in accordance with any directions as to such wearing or use given to such licensee or employer by the Chief Health Officer.

**(3)** The Chief Health Officer may direct any such licensee or employer of a radiation worker that such licensee or employer and any such radiation worker whilst he or she is in any place within the control of such licensee or employer where there is a radiation hazard shall wear or use the film badge or other device specified at all times when likely to be exposed to radiation

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from any radioactive substance or irradiating apparatus, or may give such other directions as the Chief Health Officer may see fit.

(4) The Chief Health Officer in order to ascertain the amount of radiation to which any radiation worker, required under this section to wear or use a film badge or other device, has been exposed, may direct such licensee or employer of a radiation worker to have such film badge or other device processed in such manner, by such person, and at such intervals of time as the Chief Health Officer may see fit.

37. Every person who has been directed to wear or use a film badge or other device in accordance with the provisions of section 36 shall wear or use such film badge or other device in accordance with the directions given to such person by the Chief Health Officer or by the licensee or employer who issued such film badge or other device to such person as the case may be.

38. Every licensee or employer of a radiation worker who issues or is required to wear or use a film badge or other device, in accordance with section 36, shall in order to ascertain the amount of radiation to which the wearer or user of such film badge or other device has been exposed, have such film badge or other device processed in such manner, by such person, and at such intervals of time as the Chief Health Officer may direct.

39.(1) For the purposes of sections 36 to 38 and without limiting in any way the definition of radiation worker contained in section 3, the term “**radiation worker**” shall include any person, other than a person undergoing exposure to radiation as a necessary part of any diagnostic or therapeutic procedure by or under the direction of a medical practitioner or dentist, who—

- (a) enters a radiation area under such circumstances that the person receives, or is likely to receive, a radiation dosage in excess of 1% of the maximum permissible dose specified in section 3 as the annual dosage in respect of persons who are not radiation workers; or
- (b) enters a high radiation area.

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(2) For the purposes of sections 36 to 38 the term “**employer**” of a radiation worker shall include any radiation worker who is not an employee of any other person, and the provisions of those sections shall apply in respect of such radiation worker so far as they may be applicable.

**40.(1)** Every licensee or employer of a radiation worker shall in respect to every radiation worker in his or her employ, keep a file containing such details as are specified in this regulation.

(2) Every radiation worker who is not an employee of any other person shall in respect of himself or herself keep a file containing such details as are specified in this regulation.

**41.** Every person required under the provisions of this Part to keep a file or files shall keep such file or files in or to the effect of the approved form, and shall in addition record on every such file the following particulars—

- (a) where the person in respect of whom the file is required to be kept is a person who is required to be issued with or to wear or use a film badge or other device in accordance with this Part—particulars of the amount of radiation to which such person has from time to time been exposed as ascertained from such film badge or other device;
- (b) where the person who is required to keep such file discovers or has reasonable grounds to suspect that the person in respect of whom such file is required to be kept has received a radiation dose equivalent of radiation to the whole body or to the major portion thereof which exceeds 10 millisievert in any 1 week or 30 millisievert in any period of 4 consecutive weeks, or has received a radiation dose equivalent to the head and neck only, or the hands and forearms only, or the feet and lower legs only, which in any such case exceeds 100 millisievert in any 1 week or 300 millisievert in any period of 4 consecutive weeks—particulars of the manner in which such person received or is suspected of having received such dose.

**42.(1)** In any case to which section 41(b) shall apply, the person required

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to record such particulars shall report to the Chief Health Officer within 48 hours of discovering or first suspecting that a person has received a radiation dose referred to in that paragraph, setting forth the circumstances under which and the manner in which the person affected received or is suspected of having received that radiation dose and the steps taken to prevent any other person under similar circumstances or in similar manner receiving such a radiation dose.

(2) The person required to furnish such report shall attach a copy of such report to the file kept by the person pursuant to this regulation in relation to the person affected.

43. Every licensee shall keep, and on the request of the Chief Health Officer or of any inspector, shall produce to the Chief Health Officer or inspector, as the case may be, a record of the amount and kind of radioactive substances from time to time in the possession of such licensee, and of the manner of use or disposal of any such radioactive substances.

44. Every person required to keep a file or files under the provisions of this regulation shall upon the request of the Chief Health Officer or of any inspector produce for inspection any such file or files, and shall supply a copy of such file or files on demand of the Chief Health Officer or of any inspector.

## **PART 7—STORAGE OF RADIOACTIVE SUBSTANCES**

45. Every person who has any radioactive substance in his or her possession or custody shall, when such substance is not being used—

- (a) store such substance in a container properly designed and constructed so as to withstand corrosion, radiation and extreme temperatures, and so as to ensure that no person may from such storage receive an effective dose in excess of the maximum permissible dose prescribed for persons who are not radiation

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workers;

- (b) where there is any possibility that chemical, radiation, or other action might weaken or rupture such container to such an extent as to cause a leakage therefrom, or where the Chief Health Officer so directs, place the container containing such radioactive substance on a tray or other similar receptacle so as to retain the entire amount of such radioactive substance;
- (c) affix to every container containing such radioactive substance a radiation hazard symbol as in the approved form and also a label on which shall be legibly written or printed—
  - (i) the kind and quantity of the radioactive substance in such container; and
  - (ii) the date on which the radioactivity of such radioactive substance in such container was last measured, and its activity; and
  - (iii) the name of the person having the custody of such radioactive substance.

**46.** Every person who has any radioactive substance in his or her possession or custody which emits or which is capable of emitting a radioactive gas, shall, when the substance is not being used, store the substance in its container in a vault or room ventilated in such manner that the concentration in the air of such radioactive gas cannot exceed the maximum permissible concentration prescribed for persons who are not radiation workers.

**47.** Every person who has in his or her possession or custody a radioactive substance of radioactivity exceeding 1 curie shall when such substance is not being used, store it in such a container as the Chief Health Officer may direct.

## **PART 8—CONTROL OF RADIOACTIVE**

## CONTAMINATION

**48.** No person shall use any radioactive substance not being a sealed source unless—

- (a) the person has been instructed in the hazards associated with the use of radioactive substances not being sealed sources and in the appropriate methods of decontamination;
- (b) the person has immediately at hand, instruments suitable for detecting contamination and estimating the degree of contamination;
- (c) there is exhibited at the place where the person is using the substance, a list of instructions approved by the Chief Health Officer as the instructions to be followed in cases of accidental contamination by any radioactive substance.

**49.** Every licensee and every radiation safety officer shall take all steps reasonably necessary to ensure that every person under his or her control or supervision working with radioactive substances not being sealed sources shall check the person's clothing, hands and footwear with appropriate instruments for detecting radioactive contamination before leaving the area in which any radioactive substance, not being a sealed source, is being used.

**50.** Where a licensee, or a radiation safety officer, discovers or has reasonable grounds to suspect that any person, whether or not in the employment or under the control or supervision of such licensee, or radiation safety officer, has on any premises under the control or supervision of such licensee, or radiation safety officer, become contaminated in or on the person's body or on the person's clothing by any radioactive substance, such licensee or radiation safety officer shall cause to be removed, and every such employee or other person shall permit to be removed, before leaving the place where such contamination occurred or is suspected of having occurred—

- (a) any contamination of the body of such employee or other person, to the satisfaction of such licensee or radiation safety officer; and

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- (b) any article of clothing which such licensee or radiation safety officer has discovered or suspects has become contaminated.

**51.(1)** Where a licensee or a radiation safety officer, discovers or has reasonable grounds to suspect that any article of clothing or any cloth, bandage or other article used in medical practice has become contaminated by any radioactive substance, the licensee or radiation safety officer shall retain such clothing, cloth, bandage or other article in the place where the contamination occurred until it has been decontaminated.

**(2)** No person shall forward any such clothing, cloth, bandage or other article or other material to any public or hospital laundry or cleaning establishment except with the authority of the Chief Health Officer.

**52.** No person shall dispose of any waste from decontamination procedures except in accordance with the provisions of this regulation relating to the disposal of radioactive substances.

**53.** The provisions of sections 48 to 50 shall not be construed so as to limit the kind and amount of radioactive substance which may intentionally be administered to any person as a necessary part of diagnostic or therapeutic procedures by or under the direction of a medical practitioner.

**54.** When any radioactive substance is accidentally released, either within or beyond the premises of any licensee, in such circumstances as to make it likely that a dangerous amount of a radioactive substance has been inhaled or ingested by any person, or so as to cause or be likely to cause contamination of any person, clothing, building or place, the radiation safety officer appointed in respect of such premises or part of such premises where such release occurs, or if there is no radiation safety officer appointed in respect of such premises, then such licensee shall—

- (a) immediately such release comes to his or her knowledge—
  - (i) take all steps reasonably necessary to prevent the spread of contamination to any person or article or to any other part of the premises or any other place; and

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- (ii) take all steps reasonably necessary to reduce such contamination to a safe level; and
  - (iii) notify the Chief Health Officer by the quickest possible means of such escape, and the immediate steps taken by him or her to prevent the spread of contamination, and to reduce the contamination to a safe level;
- (b) as soon as practicable furnish to the Chief Health Officer a detailed report in writing as to the circumstances of such release, and as to the subsequent action taken by him or her in relation thereto.

## **PART 9—LABELLING OF RADIOACTIVE SUBSTANCES AND IRRADIATING APPARATUS**

**55.** No person shall have any sealed source in his or her possession unless—

- (a) it is in use for diagnostic or therapeutic purposes under the control of a medical practitioner, registered veterinary surgeon or dentist; or
- (b) it is in process of manufacture or testing, or forms part of an experiment, investigation, or research; or
- (c) it is stored in a container clearly and permanently labelled with the words—

‘DANGER—RADIOACTIVE’

**56.(1)** Every licensee, employer of a radiation worker, and radiation worker who is not an employee of any other person, shall cause to be conspicuously exhibited in all places under his or her control in which any radioactive substance is stored or used, and where there is a radiation hazard, a sign or signs on which is shown a symbol in or to the effect of the radiation hazard symbol in the approved form, except in cases where such a sign would be likely to disturb patients undergoing treatment.

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(2) In relation to radioactive substances whether contained in an irradiating apparatus or not the sign specified shall in addition contain the following words printed in white upon a red background above the symbol specified—

‘DANGER—RADIOACTIVE’

(3) In relation to irradiating apparatus, unless actually containing a radioactive substance, the sign specified shall in addition contain the following words printed in white upon a red background above the symbol specified—

‘DANGER—RADIATION

This apparatus produces radiation when energised.’

57. Every licensee, employer of a radiation worker, and radiation worker who is not an employee of any other person, whose premises or any part thereof constitute a radiation area, or a high radiation area, as the case may be, shall conspicuously exhibit in such place or places so as to be clearly visible to all persons who may enter such premises or such part thereof a sign or signs bearing the radiation hazard symbol in the approved form, and in addition the following words—

‘DANGER

RADIATION AREA’

or

‘DANGER

HIGH RADIATION AREA’

as the case may be provided that the provisions of this section shall not apply in cases where such a sign would be likely to disturb patients undergoing treatment.

58. Every person who is required by section 55, 56, or 57 to label any substance or exhibit any sign shall ensure that—

- (a) the symbol and lettering on such label or sign shall be as large as practicable; and

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- (b) the whole of the label or sign shall be surrounded by a black border.

**59.** No person shall use any label or exhibit any sign specified in section 55, 56, or 57, except in accordance with the provisions of such sections.

**60.(1)** Every licensee, employer of a radiation worker, and radiation worker who is not an employee of any other person, whose premises or any part thereof constitute a high radiation area shall provide in such premises or part thereof a control device which shall upon entry of any person into such premises or part thereof either cause the level of radiation to be reduced below that at which that person may receive a radiation dose equivalent of 1 millisievert in 1 hour, or shall energise a conspicuous visible or clearly audible alarm signal in such a way that the person entering such premises or part thereof and the person for the time being in charge of such premises or part thereof are made aware of such entry.

**(2)** However, the provisions of this section shall not apply in respect of any high radiation area established for a period not exceeding 30 days.

## **PART 10—PACKING AND TRANSPORT OF RADIOACTIVE SUBSTANCES**

**72.(1)** Where any accident to a vehicle, ship or aircraft results in breakage of, or suspected breakage of, or unusual delay in delivery of any radioactive substance, the person responsible for the time being for the custody thereof shall segregate the package or substance as far as possible from human contact, and shall immediately notify the consignor and the Chief Health Officer.

**(2)** Where a package containing a radioactive substance has been broken, the person responsible for the time being for the custody thereof shall immediately notify the consignor and the Chief Health Officer, and shall exercise all reasonable care to prevent contact with or inhalation of the

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radioactive substance by any person and shall segregate the package or substance as far as possible from human contact.

**75.** Notwithstanding anything contained in this regulation, where any container of a radioactive substance has been used to transport such substance to Queensland from any other place where there is in force a law relating to the packing, marking and labelling of radioactive substances, it shall be deemed to comply with the provisions of this regulation relating to the packing, marking and labelling of radioactive substances if it is packed, marked and labelled in accordance with the law in that behalf in force for the time being in such other place from which it was received.

**76.(1)** The Minister may in writing exempt any person from compliance with any specified provisions of this regulation in relation to a particular consignment of any radioactive substance, or may modify the requirements of any such specified provision if the Minister is satisfied that adequate freedom from radiation hazards can and will be otherwise secured.

**(2)** The Minister may at any time in writing revoke any such exemption or modification.

**77.(1)** Notwithstanding anything contained in this regulation, the carriage of radioactive substances by aircraft shall be in accordance with the provisions of Air Navigation Orders, Part 33 (Carriage of Dangerous Goods), currently in force, as issued by the Director-General of Civil Aviation in pursuance of the powers vested by the Air Navigation Regulations of the Air Navigation Act (Cwlth).

**(2)** Whereas for the purposes of Air Navigation Orders, Part 33, dangerous goods include radioactive materials as defined in the regulations relating to the carriage of restricted articles by air, published by the International Air Transport Association of Montreal, Canada, the term "radioactive substance" as defined in the Act shall be construed to have the same meaning as the term "radioactive material" as defined in the said regulations of the International Air Transport Association.

**(3)** The provisions of Air Navigation Orders, Part 33, with respect to labelling of packages containing radioactive substances shall, if the Director-

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General of Civil Aviation of the Commonwealth Department of Civil Aviation so approves, be deemed to be complied with by the use of labels shown in Schedule 5, Form No. 1 and Form No. 2.

**78.(1)** Notwithstanding anything contained in this regulation, an article containing a radioactive substance shall be eligible for transmission by post if packed in such a manner as the Postmaster-General considers necessary in accordance with the provisions of the Post and Telegraph Act (Cwlth) and regulations thereunder.

**(2)** Where for the purpose of the Post and Telegraph Act and regulations thereunder, the term 'radioactive material' is used, this term shall be construed to have the same meaning as the term 'radioactive substance' as defined in the Act.

**79.** Notwithstanding anything contained in this regulation, the carriage of radioactive substances interstate by ship shall be in accordance with the provisions of the Navigation Act (Cwlth), the Navigation (Dangerous Goods) Regulations and the rules relating to dangerous goods and the packing, stowing and carriage of dangerous goods issued in pursuance of the Navigation (Dangerous Goods) Regulations of the said Navigation Act.

## **PART 11—DISPOSAL OF RADIOACTIVE WASTES**

**80.** No person shall dispose of any radioactive substance otherwise than in accordance with this Part.

**81.** No person shall release any radioactive substance except in such manner that the radioactive substance released will not cause such contamination of the environment as may result in any person receiving more than the maximum permissible dose.

**82.(1)** Where any gaseous radioactive substance is disposed of by

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discharging it into the air, the concentration of such substance in air at the point of discharge shall not exceed the concentration shown opposite the symbol denoting that substance in Schedule 2, column 3 or such other concentration as may from time to time be approved by the Chief Health Officer.

(2) Where any liquid radioactive substance is disposed of by discharging it from any premises the concentration of radioactive substance in the liquid waste at the point of discharge from the premises shall not exceed the concentration shown opposite the symbol denoting that substance in Schedule 2, column 2 or such other concentration as may from time to time be approved by the Chief Health Officer.

(3) No solid radioactive substance shall be disposed of except in accordance with procedures that may from time to time be approved by the Chief Health Officer.

## **PART 12—MEDICAL EXAMINATIONS ETC.**

**83.(1)** All employees who may be exposed to a radiation hazard shall, prior to commencing employment, during employment at such intervals as the Chief Health Officer directs, and on the termination of employment, be medically examined by a medical practitioner approved by the Chief Health Officer.

(2) The Chief Health Officer may exempt any such employee from any or all of the provisions of this regulation relating to medical examinations.

(3) The type and frequency of such medical examinations shall be at the discretion of the Chief Health Officer.

(4) A medical practitioner who makes any examination under this regulation shall forthwith forward to the employer of the person examined a report in writing containing only such clinical details in relation to the examination as are medically relevant to the past, present, or future employment as a radiation worker of the person examined, including a certificate as to whether or not such person is fit for employment as a radiation worker.

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(5) The contents of every such report shall be recorded by the employer concerned upon the personal file required to be kept under this regulation in respect of the person examined.

(6) The cost of any such medical examination shall be paid by the employer of the person examined to the medical practitioner who makes such examination.

(7) Every such amount shall at the expiration of 14 days after the date of such examination be deemed to be a debt due to the medical practitioner who performed the examination and payable to the medical practitioner, and shall be recoverable by the medical practitioner in any court of competent jurisdiction.

**84.** For the purposes of sections 83 and 85—

“**employer**” shall be deemed to mean and include—

- (a) the person whose offer of employment as a radiation worker the person examined has accepted; and
- (b) the employer of such examined person; and
- (c) the person by whom such examined person was last employed as a radiation worker.

**85.(1)** The Chief Health Officer may disapprove of the employment or continued employment of any person as a radiation worker either finally or for such period of time under such conditions as the Chief Health Officer may direct.

**(1A)** Such disapproval shall be notified in writing to such radiation worker and to any employer concerned.

**(2)** No person shall employ or continue to employ any person as a radiation worker or offer for employment or continue in employment as a radiation worker in contravention of any such disapproval of the Chief Health Officer.

**(3)** No person shall employ as a radiation worker any person under the age of 17 years.

## **PART 13—PENALTY**

**86.** Any person guilty of an offence against this regulation shall, if no specific penalty is provided for that offence, be liable to a penalty not exceeding \$200, and (if the offence is a continuing one) a further sum not exceeding \$20 for each and every day during which the offence continues.

## **PART 14—POWER OF DELEGATION**

**87.(1)** The Chief Health Officer may from time to time, in relation to any matters or class of matters, or in relation to a particular part of the State, by instrument in writing under his or her hand delegate all or any of his or her powers, authorities and functions under this regulation as may be specified in the instrument (other than this power of delegation) so that the delegated powers, authorities and functions may be exercised or, as the case may be, shall be performed by the delegate with respect to the matters or class of matters or in relation to the particular part of the State specified in the instrument.

**(1A)** Any delegation under this section may, if the Chief Health Officer deems it so desirable, be made by the delegation of all or any of his or her powers, authorities and functions under this regulation as may be specified in the instrument of delegation to the holder of an office under the Crown in right of this State, specifying the office but without naming the holder; and in every such case each successive holder of the office in question and each person who for the time being occupies or performs the duties of that office may exercise or, as the case may be, shall perform without further or other authority and while he or she holds or occupies or performs the duties of that office the delegated powers, authorities and functions with respect to the matters or class of matters or in relation to the particular part of the State specified in the instrument.

**(2)** Where, by or under this section, the exercise of a power, authority or function of the Chief Health Officer is dependant upon the opinion, belief, or state of mind of the Chief Health Officer, in relating to any matter, that power, authority or function may be exercised upon the opinion, belief, or

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state of mind of the person to whom it is delegated by an instrument of delegation under this section.

(3) The Chief Health Officer may, at will, revoke a delegation made by the chief executive under this section.

(3A) No delegation shall prevent the exercise of any power, authority or function by the Chief Health Officer.

(4) The Chief Health Officer may make such and so many delegations under this section and to such number of persons and either at any one and the same time or from time to time as the Chief Health Officer may consider necessary or desirable.

**SCHEDULE 1****RADIOACTIVE NUCLIDES—PRESCRIBED  
MINIMUM AMOUNT**

Column 1	Column 2
Group 1— Sr-90 + Y-90, Pb-210 + Bi-210 (RaD+E), Po-210, At-211, Ra-226 + 55% daughter products, Ac-227, U-233, Pu-239, Am-241, Cm-242	Microcuries  1
Group 2— Ca-45, Fe-59, Sr-89, Y-91, Ru-106 + Rh-106, I-131, Ba-140 + La-140, Ce-144 + Pr-144, Sm-151, Eu-154, Tm-170, Th-234 + Pa-234, natural thorium, natural uranium	10
Group 3— Na-22, Na-24, P-32, S-35, Cl-36, K-42, Sc-46, Sc-47, Sc-48, V-48, Mn-52, Mn-54, Mn-56, Fe-55, Co-58, Co-60, Ni-59, Cu-64, Zn-65, Ga-72, As-74, As-76, Br-82, Rb-86, Zr-95 + Nb-95, Nb-95, Mo-99, Tc-96, Rh-105, Pd-103 + Rh-103, Ag-105, Ag-111, Cd-109 + Ag-109, Sn-113, Te-127, Te-129, I-132, Cs-137 + Ba-137, La-140, Pr-143, Pm-147, Ho-166, Lu-177, Ta-182, W-181, Re-183, Ir-190, Ir-192, Pt-191, Pt-193, Au-196, Au-198, Au-199, Tl-200, Tl-202, Tl-204, Pb-203	100
Group 4— H-3, Be-7, C-14, F-18, Cr-51, Ge-71, Tl-201	1 000

## SCHEDULE 2

### CONCENTRATIONS IN WATER AND AIR ABOVE NATURAL BACKGROUND

—			Radiation workers		Persons other than radiation workers	
Column 1			Column 2	Column 3	Column 4	Column 5
Element (atomic number)	Isotope <sup>1</sup>		Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )
Actinium (89)	Ac 227	S	$6 \times 10^{-5}$	$2 \times 10^{-12}$	$2 \times 10^{-6}$	$8 \times 10^{-14}$
		I	$9 \times 10^{-3}$	$3 \times 10^{-11}$	$3 \times 10^{-4}$	$9 \times 10^{-13}$
	Ac 228	S	$3 \times 10^{-3}$	$8 \times 10^{-8}$	$9 \times 10^{-5}$	$3 \times 10^{-9}$
		I	$3 \times 10^{-3}$	$2 \times 10^{-8}$	$9 \times 10^{-5}$	$6 \times 10^{-10}$
Americium (95)	Am 241	S	$1 \times 10^{-4}$	$6 \times 10^{-12}$	$4 \times 10^{-6}$	$2 \times 10^{-13}$
		I	$8 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$4 \times 10^{-12}$
	Am 243	S	$1 \times 10^{-4}$	$6 \times 10^{-12}$	$4 \times 10^{-6}$	$2 \times 10^{-13}$
		I	$8 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$4 \times 10^{-12}$
Antimony (51)	Sb 122	S	$8 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$6 \times 10^{-9}$
		I	$8 \times 10^{-4}$	$1 \times 10^{-7}$	$3 \times 10^{-5}$	$5 \times 10^{-9}$
	Sb 124	S	$7 \times 10^{-4}$	$2 \times 10^{-7}$	$2 \times 10^{-5}$	$5 \times 10^{-9}$
		I	$7 \times 10^{-4}$	$2 \times 10^{-8}$	$2 \times 10^{-5}$	$7 \times 10^{-10}$
	Sb 125	S	$3 \times 10^{-3}$	$5 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$3 \times 10^{-8}$	$1 \times 10^{-4}$	$9 \times 10^{-10}$
Argon <sup>2</sup> (18)	A 37	Sub	..	$6 \times 10^{-3}$	..	$1 \times 10^{-4}$
	A 41	Sub	..	$2 \times 10^{-6}$	..	$4 \times 10^{-8}$
Arsenic (33)	As 73	S	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$5 \times 10^{-4}$	$7 \times 10^{-8}$
		I	$1 \times 10^{-2}$	$4 \times 10^{-7}$	$5 \times 10^{-4}$	$1 \times 10^{-8}$
	As 74	S	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$5 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$1 \times 10^{-7}$	$5 \times 10^{-5}$	$4 \times 10^{-9}$
	As 76	S	$6 \times 10^{-4}$	$1 \times 10^{-7}$	$2 \times 10^{-5}$	$4 \times 10^{-9}$
		I	$6 \times 10^{-4}$	$1 \times 10^{-7}$	$2 \times 10^{-5}$	$3 \times 10^{-9}$
	As 77	S	$2 \times 10^{-3}$	$5 \times 10^{-7}$	$8 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$8 \times 10^{-5}$	$1 \times 10^{-8}$
Astatine (85)	At 211	S	$5 \times 10^{-5}$	$7 \times 10^{-9}$	$2 \times 10^{-6}$	$2 \times 10^{-10}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-8}$	$7 \times 10^{-5}$	$1 \times 10^{-9}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).

<sup>2</sup> Noble gas—Values given for submersion in an infinite cloud.

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

–			Radiation workers		Persons other than radiation workers	
Column 1			Column 2	Column 3	Column 4	Column 5
Element (atomic number)	Isotope <sup>1</sup>		Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )
Barium (56)	Ba 131	S	$5 \times 10^{-3}$	$1 \times 10^{-6}$	$2 \times 10^{-4}$	$4 \times 10^{-8}$
		I	$5 \times 10^{-3}$	$4 \times 10^{-7}$	$2 \times 10^{-4}$	$1 \times 10^{-8}$
	Ba 140	S	$8 \times 10^{-4}$	$1 \times 10^{-7}$	$3 \times 10^{-5}$	$4 \times 10^{-9}$
		I	$7 \times 10^{-4}$	$4 \times 10^{-8}$	$2 \times 10^{-5}$	$1 \times 10^{-9}$
Berkelium (97)	Bk 249	S	$2 \times 10^{-2}$	$9 \times 10^{-10}$	$6 \times 10^{-4}$	$3 \times 10^{-11}$
		I	$2 \times 10^{-2}$	$1 \times 10^{-7}$	$6 \times 10^{-4}$	$4 \times 10^{-9}$
Beryllium (4)	Be 7	S	$5 \times 10^{-2}$	$6 \times 10^{-6}$	$2 \times 10^{-3}$	$2 \times 10^{-7}$
		I	$5 \times 10^{-2}$	$1 \times 10^{-6}$	$2 \times 10^{-3}$	$4 \times 10^{-8}$
Bismuth (83)	Bi 206	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$6 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$1 \times 10^{-7}$	$4 \times 10^{-5}$	$5 \times 10^{-9}$
	Bi 207	S	$2 \times 10^{-3}$	$2 \times 10^{-7}$	$6 \times 10^{-5}$	$6 \times 10^{-9}$
		I	$2 \times 10^{-3}$	$1 \times 10^{-8}$	$6 \times 10^{-5}$	$5 \times 10^{-10}$
	Bi 210	S	$1 \times 10^{-3}$	$6 \times 10^{-9}$	$4 \times 10^{-5}$	$2 \times 10^{-10}$
		I	$1 \times 10^{-3}$	$6 \times 10^{-9}$	$4 \times 10^{-5}$	$2 \times 10^{-10}$
	Bi 212	S	$1 \times 10^{-2}$	$1 \times 10^{-7}$	$4 \times 10^{-4}$	$3 \times 10^{-9}$
		I	$1 \times 10^{-2}$	$2 \times 10^{-7}$	$4 \times 10^{-3}$	$7 \times 10^{-9}$
Bromine (35)	Br 82	S	$8 \times 10^{-3}$	$1 \times 10^{-6}$	$3 \times 10^{-4}$	$4 \times 10^{-8}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$6 \times 10^{-9}$
Cadmium (48)	Cd 109	S	$5 \times 10^{-3}$	$5 \times 10^{-8}$	$2 \times 10^{-4}$	$2 \times 10^{-9}$
		I	$5 \times 10^{-3}$	$7 \times 10^{-8}$	$2 \times 10^{-4}$	$3 \times 10^{-9}$
	Cd 115m	S	$7 \times 10^{-4}$	$4 \times 10^{-8}$	$3 \times 10^{-5}$	$1 \times 10^{-9}$
		I	$7 \times 10^{-4}$	$4 \times 10^{-8}$	$3 \times 10^{-5}$	$1 \times 10^{-9}$
	Cd 115	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$8 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$6 \times 10^{-9}$
Calcium (20)	Ca 45	S	$3 \times 10^{-4}$	$3 \times 10^{-8}$	$9 \times 10^{-6}$	$1 \times 10^{-9}$
		I	$5 \times 10^{-3}$	$1 \times 10^{-7}$	$2 \times 10^{-4}$	$4 \times 10^{-9}$
	Ca 47	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$5 \times 10^{-5}$	$6 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$6 \times 10^{-9}$
Californium (98)	Cf 249	S	$1 \times 10^{-4}$	$2 \times 10^{-12}$	$4 \times 10^{-6}$	$5 \times 10^{-14}$
		I	$7 \times 10^{-4}$	$1 \times 10^{-10}$	$2 \times 10^{-5}$	$3 \times 10^{-12}$
	Cf 250	S	$4 \times 10^{-4}$	$5 \times 10^{-12}$	$1 \times 10^{-5}$	$2 \times 10^{-13}$
		I	$7 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$3 \times 10^{-12}$
	Cf 252	S	$7 \times 10^{-4}$	$2 \times 10^{-11}$	$2 \times 10^{-5}$	$7 \times 10^{-13}$
		I	$7 \times 10^{-4}$	$1 \times 10^{-10}$	$2 \times 10^{-5}$	$4 \times 10^{-12}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).  
m = metastable excited state.

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

–		Radiation workers		Persons other than radiation workers		
Column 1		Column 2	Column 3	Column 4	Column 5	
Element (atomic number)	Isotope <sup>1</sup>	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	
Carbon (6)	C 14	$2 \times 10^{-2}$	$4 \times 10^{-6}$	$8 \times 10^{-4}$	$1 \times 10^{-7}$	
	(CO <sub>2</sub> ) S Sub	..	$5 \times 10^{-5}$	..	$1 \times 10^{-6}$	
Cerium (58)	Ce 141	$3 \times 10^{-3}$	$4 \times 10^{-7}$	$9 \times 10^{-5}$	$2 \times 10^{-8}$	
		I	$3 \times 10^{-3}$	$2 \times 10^{-7}$	$5 \times 10^{-9}$	
	Ce 143	$1 \times 10^{-3}$	$3 \times 10^{-7}$	$4 \times 10^{-5}$	$9 \times 10^{-9}$	
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$7 \times 10^{-9}$
	Ce 144	$4 \times 10^{-4}$	$1 \times 10^{-8}$	$1 \times 10^{-5}$	$3 \times 10^{-10}$	
		I	$3 \times 10^{-4}$	$6 \times 10^{-9}$	$1 \times 10^{-5}$	$2 \times 10^{-10}$
Caesium (55)	Cs 131	$7 \times 10^{-2}$	$1 \times 10^{-5}$	$2 \times 10^{-3}$	$4 \times 10^{-7}$	
		I	$3 \times 10^{-2}$	$3 \times 10^{-6}$	$9 \times 10^{-4}$	$1 \times 10^{-7}$
	Cs 134m	$2 \times 10^{-1}$	$4 \times 10^{-5}$	$6 \times 10^{-3}$	$1 \times 10^{-6}$	
		I	$3 \times 10^{-2}$	$6 \times 10^{-6}$	$1 \times 10^{-3}$	$2 \times 10^{-7}$
	Cs 134	$3 \times 10^{-4}$	$4 \times 10^{-8}$	$9 \times 10^{-6}$	$1 \times 10^{-9}$	
		I	$1 \times 10^{-3}$	$1 \times 10^{-8}$	$4 \times 10^{-5}$	$4 \times 10^{-10}$
	Cs 135	$3 \times 10^{-3}$	$5 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$	
		I	$7 \times 10^{-3}$	$9 \times 10^{-8}$	$2 \times 10^{-4}$	$3 \times 10^{-9}$
	Cs 136	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$9 \times 10^{-5}$	$1 \times 10^{-8}$	
		I	$2 \times 10^{-3}$	$2 \times 10^{-7}$	$6 \times 10^{-5}$	$6 \times 10^{-9}$
	Cs 137	$4 \times 10^{-4}$	$6 \times 10^{-8}$	$2 \times 10^{-5}$	$2 \times 10^{-9}$	
		I	$1 \times 10^{-3}$	$1 \times 10^{-8}$	$4 \times 10^{-5}$	$5 \times 10^{-10}$
Chlorine (17)	Cl 36	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$8 \times 10^{-5}$	$1 \times 10^{-8}$	
		I	$2 \times 10^{-3}$	$2 \times 10^{-8}$	$6 \times 10^{-5}$	$8 \times 10^{-10}$
	Cl 38	$1 \times 10^{-2}$	$3 \times 10^{-6}$	$4 \times 10^{-4}$	$9 \times 10^{-8}$	
		I	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$4 \times 10^{-4}$	$7 \times 10^{-8}$
Chromium (24)	Cr 51	$5 \times 10^{-2}$	$1 \times 10^{-5}$	$2 \times 10^{-3}$	$4 \times 10^{-7}$	
		I	$5 \times 10^{-2}$	$2 \times 10^{-6}$	$2 \times 10^{-3}$	$8 \times 10^{-8}$
Cobalt (27)	Co 57	$2 \times 10^{-2}$	$3 \times 10^{-6}$	$5 \times 10^{-4}$	$1 \times 10^{-7}$	
		I	$1 \times 10^{-2}$	$2 \times 10^{-7}$	$4 \times 10^{-4}$	$6 \times 10^{-9}$
	Co 58m	$8 \times 10^{-2}$	$2 \times 10^{-5}$	$3 \times 10^{-3}$	$6 \times 10^{-7}$	
		I	$6 \times 10^{-2}$	$9 \times 10^{-6}$	$2 \times 10^{-3}$	$3 \times 10^{-7}$
	Co 58	$4 \times 10^{-3}$	$8 \times 10^{-7}$	$1 \times 10^{-4}$	$3 \times 10^{-8}$	
		I	$3 \times 10^{-3}$	$5 \times 10^{-8}$	$9 \times 10^{-5}$	$2 \times 10^{-9}$
	Co 60	$1 \times 10^{-3}$	$3 \times 10^{-7}$	$5 \times 10^{-5}$	$1 \times 10^{-8}$	
		I	$1 \times 10^{-3}$	$9 \times 10^{-9}$	$3 \times 10^{-5}$	$3 \times 10^{-10}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).  
m = metastable excited state.

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

-		Radiation workers		Persons other than radiation workers		
Column 1		Column 2	Column 3	Column 4	Column 5	
Element (atomic number)	Isotope <sup>1</sup>	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	
Copper (29)	Cu 64	S	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$3 \times 10^{-4}$	$7 \times 10^{-8}$
		I	$6 \times 10^{-3}$	$1 \times 10^{-6}$	$2 \times 10^{-4}$	$4 \times 10^{-8}$
Curium (96)	Cm 242	S	$7 \times 10^{-4}$	$1 \times 10^{-10}$	$2 \times 10^{-5}$	$4 \times 10^{-12}$
		I	$7 \times 10^{-4}$	$2 \times 10^{-10}$	$3 \times 10^{-5}$	$6 \times 10^{-12}$
	Cm 243	S	$1 \times 10^{-4}$	$6 \times 10^{-12}$	$5 \times 10^{-6}$	$2 \times 10^{-13}$
		I	$7 \times 10^{-4}$	$1 \times 10^{-10}$	$2 \times 10^{-5}$	$3 \times 10^{-12}$
	Cm 244	S	$2 \times 10^{-4}$	$9 \times 10^{-12}$	$7 \times 10^{-6}$	$3 \times 10^{-13}$
		I	$8 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$3 \times 10^{-12}$
	Cm 245	S	$1 \times 10^{-4}$	$5 \times 10^{-12}$	$4 \times 10^{-6}$	$2 \times 10^{-13}$
		I	$8 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$4 \times 10^{-12}$
Cm 246	S	$1 \times 10^{-4}$	$5 \times 10^{-12}$	$4 \times 10^{-6}$	$2 \times 10^{-13}$	
	I	$8 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$4 \times 10^{-12}$	
Dysprosium (66)	Dy 165	S	$1 \times 10^{-2}$	$3 \times 10^{-6}$	$4 \times 10^{-4}$	$9 \times 10^{-8}$
		I	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$4 \times 10^{-4}$	$7 \times 10^{-8}$
	Dy 166	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$8 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$7 \times 10^{-9}$
Erbium (68)	Er 169	S	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$9 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$4 \times 10^{-7}$	$9 \times 10^{-5}$	$1 \times 10^{-8}$
	Er 171	S	$3 \times 10^{-3}$	$7 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
Europium (63)	Eu 152 (T <sub>1/2</sub> =9.2hrs.)I	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
	Eu 152 (T <sub>1/2</sub> =13 yrs.)I	S	$2 \times 10^{-3}$	$1 \times 10^{-8}$	$8 \times 10^{-5}$	$4 \times 10^{-10}$
		I	$2 \times 10^{-3}$	$2 \times 10^{-8}$	$8 \times 10^{-5}$	$6 \times 10^{-10}$
	Eu 154	S	$6 \times 10^{-4}$	$4 \times 10^{-9}$	$2 \times 10^{-5}$	$1 \times 10^{-10}$
		I	$6 \times 10^{-4}$	$7 \times 10^{-9}$	$2 \times 10^{-5}$	$2 \times 10^{-10}$
Eu 155	S	$6 \times 10^{-3}$	$9 \times 10^{-8}$	$2 \times 10^{-4}$	$3 \times 10^{-9}$	
	I	$6 \times 10^{-3}$	$7 \times 10^{-8}$	$2 \times 10^{-4}$	$3 \times 10^{-9}$	
Fluorine (9)	F 18	S	$2 \times 10^{-2}$	$5 \times 10^{-6}$	$8 \times 10^{-4}$	$2 \times 10^{-7}$
		I	$1 \times 10^{-2}$	$3 \times 10^{-6}$	$5 \times 10^{-4}$	$9 \times 10^{-8}$
Gadolinium (64)	Gd 153	S	$6 \times 10^{-3}$	$2 \times 10^{-7}$	$2 \times 10^{-4}$	$8 \times 10^{-9}$
		I	$6 \times 10^{-3}$	$9 \times 10^{-8}$	$2 \times 10^{-4}$	$3 \times 10^{-9}$
	Gd 159	S	$2 \times 10^{-3}$	$5 \times 10^{-7}$	$8 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$8 \times 10^{-5}$	$1 \times 10^{-8}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

-		Radiation workers		Persons other than radiation workers		
Column 1		Column 2	Column 3	Column 4	Column 5	
Element (atomic number)	Isotope <sup>1</sup>	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	
Gallium (31)	Ga 72	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$8 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$6 \times 10^{-9}$
Germanium (32)	Ge 71	S	$5 \times 10^{-2}$	$1 \times 10^{-5}$	$2 \times 10^{-3}$	$4 \times 10^{-7}$
		I	$5 \times 10^{-2}$	$6 \times 10^{-6}$	$2 \times 10^{-3}$	$2 \times 10^{-7}$
Gold (79)	Au 196	S	$5 \times 10^{-3}$	$1 \times 10^{-6}$	$2 \times 10^{-4}$	$4 \times 10^{-8}$
		I	$4 \times 10^{-3}$	$6 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
	Au 198	S	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$5 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$5 \times 10^{-5}$	$8 \times 10^{-9}$
	Au 199	S	$5 \times 10^{-3}$	$1 \times 10^{-6}$	$2 \times 10^{-4}$	$4 \times 10^{-8}$
		I	$4 \times 10^{-3}$	$8 \times 10^{-7}$	$2 \times 10^{-4}$	$3 \times 10^{-8}$
Hafnium (72)	Hf 181	S	$2 \times 10^{-3}$	$4 \times 10^{-8}$	$7 \times 10^{-5}$	$1 \times 10^{-9}$
		I	$2 \times 10^{-3}$	$7 \times 10^{-8}$	$7 \times 10^{-5}$	$3 \times 10^{-9}$
Holmium (67)	Ho 166	S	$9 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$7 \times 10^{-9}$
		I	$9 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$6 \times 10^{-9}$
Hydrogen (1)	H3	S	$1 \times 10^{-1}$	$2 \times 10^{-5}$	$3 \times 10^{-3}$	$5 \times 10^{-7}$
		Sub	..	$2 \times 10^{-3}$	..	$4 \times 10^{-5}$
Indium (49)	In 113m	S	$4 \times 10^{-2}$	$8 \times 10^{-6}$	$1 \times 10^{-3}$	$3 \times 10^{-7}$
		I	$4 \times 10^{-2}$	$7 \times 10^{-6}$	$1 \times 10^{-3}$	$2 \times 10^{-7}$
	In 114m	S	$5 \times 10^{-4}$	$1 \times 10^{-7}$	$2 \times 10^{-5}$	$4 \times 10^{-9}$
		I	$5 \times 10^{-4}$	$2 \times 10^{-8}$	$2 \times 10^{-5}$	$7 \times 10^{-10}$
	In 115m	S	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$4 \times 10^{-4}$	$8 \times 10^{-8}$
		I	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$4 \times 10^{-4}$	$6 \times 10^{-8}$
	In 115	S	$3 \times 10^{-3}$	$2 \times 10^{-7}$	$9 \times 10^{-5}$	$9 \times 10^{-9}$
		I	$3 \times 10^{-3}$	$3 \times 10^{-8}$	$9 \times 10^{-5}$	$1 \times 10^{-9}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).  
m = metastable excited state.

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

—			Radiation workers		Persons other than radiation workers	
Column 1			Column 2	Column 3	Column 4	Column 5
Element (atomic number)	Isotope <sup>1</sup>		Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )
Iodine (53)	I 126	S	$8 \times 10^{-5}$	$1 \times 10^{-8}$	$3 \times 10^{-6}$	$4 \times 10^{-10}$
		I	$3 \times 10^{-3}$	$3 \times 10^{-7}$	$9 \times 10^{-5}$	$1 \times 10^{-8}$
	I 129	S	$2 \times 10^{-5}$	$2 \times 10^{-9}$	$6 \times 10^{-7}$	$6 \times 10^{-11}$
		I	$6 \times 10^{-3}$	$7 \times 10^{-8}$	$2 \times 10^{-4}$	$2 \times 10^{-9}$
	I 131	S	$9 \times 10^{-5}$	$1 \times 10^{-8}$	$3 \times 10^{-6}$	$4 \times 10^{-10}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
	I 132	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$6 \times 10^{-5}$	$8 \times 10^{-9}$
		I	$5 \times 10^{-3}$	$9 \times 10^{-7}$	$2 \times 10^{-4}$	$3 \times 10^{-8}$
	I 133	S	$3 \times 10^{-4}$	$5 \times 10^{-8}$	$7 \times 10^{-6}$	$2 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$7 \times 10^{-9}$
	I 134	S	$5 \times 10^{-3}$	$8 \times 10^{-7}$	$2 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$2 \times 10^{-2}$	$3 \times 10^{-6}$	$6 \times 10^{-4}$	$1 \times 10^{-7}$
I 135	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$5 \times 10^{-9}$	
	I	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$7 \times 10^{-5}$	$1 \times 10^{-8}$	
Iridium (77)	Ir 190	S	$6 \times 10^{-3}$	$1 \times 10^{-6}$	$2 \times 10^{-4}$	$4 \times 10^{-8}$
		I	$5 \times 10^{-3}$	$4 \times 10^{-7}$	$2 \times 10^{-4}$	$1 \times 10^{-8}$
	Ir 192	S	$1 \times 10^{-3}$	$1 \times 10^{-7}$	$4 \times 10^{-5}$	$4 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$3 \times 10^{-8}$	$4 \times 10^{-5}$	$9 \times 10^{-10}$
	Ir 194	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$8 \times 10^{-9}$
I		$9 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$5 \times 10^{-9}$	
Iron (26)	Fe 55	S	$2 \times 10^{-2}$	$9 \times 10^{-7}$	$8 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$7 \times 10^{-2}$	$1 \times 10^{-6}$	$2 \times 10^{-3}$	$3 \times 10^{-8}$
	Fe 59	S	$2 \times 10^{-3}$	$1 \times 10^{-7}$	$6 \times 10^{-5}$	$5 \times 10^{-9}$
		I	$2 \times 10^{-3}$	$5 \times 10^{-8}$	$5 \times 10^{-5}$	$2 \times 10^{-9}$
Krypton <sup>2</sup> (36)	Kr 85m	Sub	..	$6 \times 10^{-6}$	..	$1 \times 10^{-7}$
	Kr 85	Sub	..	$1 \times 10^{-5}$	..	$3 \times 10^{-7}$
	Kr 87	Sub	..	$1 \times 10^{-6}$	..	$2 \times 10^{-8}$
Lanthanum (57)	La 140	S	$7 \times 10^{-4}$	$2 \times 10^{-7}$	$2 \times 10^{-5}$	$5 \times 10^{-9}$
		I	$7 \times 10^{-4}$	$1 \times 10^{-7}$	$2 \times 10^{-5}$	$4 \times 10^{-9}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).

<sup>2</sup> Noble gas—Values given for submersion in an infinite cloud.

m = metastable excited state.

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

–			Radiation workers		Persons other than radiation workers	
Column 1			Column 2	Column 3	Column 4	Column 5
Element (atomic number)	Isotope <sup>1</sup>		Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )
Lead (82)	Pb 203	S	$1 \times 10^{-2}$	$3 \times 10^{-6}$	$4 \times 10^{-4}$	$9 \times 10^{-8}$
		I	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$4 \times 10^{-4}$	$6 \times 10^{-8}$
	Pb 210	S	$4 \times 10^{-6}$	$1 \times 10^{-10}$	$1 \times 10^{-7}$	$4 \times 10^{-12}$
		I	$5 \times 10^{-3}$	$2 \times 10^{-10}$	$2 \times 10^{-4}$	$8 \times 10^{-12}$
	Pb 212	S	$6 \times 10^{-4}$	$2 \times 10^{-8}$	$2 \times 10^{-5}$	$6 \times 10^{-9}$
		I	$5 \times 10^{-4}$	$2 \times 10^{-8}$	$2 \times 10^{-5}$	$7 \times 10^{-10}$
Lutetium (71)	Lu 177	S	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$5 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
Manganese (25)	Mn 52	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$7 \times 10^{-9}$
		I	$9 \times 10^{-4}$	$1 \times 10^{-7}$	$3 \times 10^{-5}$	$5 \times 10^{-9}$
	Mn 54	S	$4 \times 10^{-3}$	$4 \times 10^{-7}$	$1 \times 10^{-4}$	$1 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$4 \times 10^{-8}$	$1 \times 10^{-4}$	$1 \times 10^{-9}$
	Mn 56	S	$4 \times 10^{-3}$	$8 \times 10^{-7}$	$1 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$5 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
Mercury (80)	Hg 197m	S	$6 \times 10^{-3}$	$7 \times 10^{-7}$	$2 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$5 \times 10^{-3}$	$8 \times 10^{-7}$	$2 \times 10^{-4}$	$3 \times 10^{-8}$
	Hg 197	S	$9 \times 10^{-3}$	$1 \times 10^{-6}$	$3 \times 10^{-4}$	$4 \times 10^{-8}$
		I	$1 \times 10^{-2}$	$3 \times 10^{-6}$	$5 \times 10^{-4}$	$9 \times 10^{-8}$
	Hg 203	S	$5 \times 10^{-4}$	$7 \times 10^{-8}$	$2 \times 10^{-5}$	$2 \times 10^{-9}$
		I	$3 \times 10^{-3}$	$1 \times 10^{-7}$	$1 \times 10^{-4}$	$4 \times 10^{-9}$
Molybdenum (42)	Mo 99	S	$5 \times 10^{-3}$	$7 \times 10^{-7}$	$2 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$7 \times 10^{-9}$
Neodymium (60)	Nd 144	S	$2 \times 10^{-3}$	$8 \times 10^{-11}$	$7 \times 10^{-5}$	$3 \times 10^{-12}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-10}$	$8 \times 10^{-5}$	$1 \times 10^{-11}$
	Nd 147	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$2 \times 10^{-7}$	$6 \times 10^{-5}$	$8 \times 10^{-9}$
	Nd 149	S	$8 \times 10^{-3}$	$2 \times 10^{-6}$	$3 \times 10^{-4}$	$6 \times 10^{-8}$
		I	$8 \times 10^{-3}$	$1 \times 10^{-6}$	$3 \times 10^{-4}$	$5 \times 10^{-8}$
Neptunium (93)	Np 237	S	$9 \times 10^{-5}$	$4 \times 10^{-12}$	$3 \times 10^{-6}$	$1 \times 10^{-13}$
		I	$9 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$4 \times 10^{-12}$
	Np 239	S	$4 \times 10^{-3}$	$8 \times 10^{-7}$	$1 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$4 \times 10^{-3}$	$7 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).  
m = metastable excited state.

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

–		Radiation workers		Persons other than radiation workers		
Column 1		Column 2	Column 3	Column 4	Column 5	
Element (atomic number)	Isotope <sup>1</sup>	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	
Nickel (28)	Ni 59	S	$6 \times 10^{-3}$	$5 \times 10^{-7}$	$2 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$6 \times 10^{-2}$	$8 \times 10^{-7}$	$2 \times 10^{-3}$	$3 \times 10^{-8}$
	Ni 63	S	$8 \times 10^{-4}$	$6 \times 10^{-8}$	$3 \times 10^{-5}$	$2 \times 10^{-9}$
		I	$2 \times 10^{-2}$	$3 \times 10^{-7}$	$7 \times 10^{-4}$	$1 \times 10^{-8}$
	Ni 65	S	$4 \times 10^{-3}$	$9 \times 10^{-7}$	$1 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$5 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
Niobium (Columbium) (41)	Nb 93m	S	$1 \times 10^{-2}$	$1 \times 10^{-7}$	$4 \times 10^{-4}$	$4 \times 10^{-9}$
		I	$1 \times 10^{-2}$	$2 \times 10^{-7}$	$4 \times 10^{-4}$	$5 \times 10^{-9}$
	Nb 95	S	$3 \times 10^{-3}$	$5 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$1 \times 10^{-7}$	$1 \times 10^{-4}$	$3 \times 10^{-9}$
	Nb 97	S	$3 \times 10^{-2}$	$6 \times 10^{-6}$	$9 \times 10^{-4}$	$2 \times 10^{-7}$
		I	$3 \times 10^{-2}$	$5 \times 10^{-6}$	$9 \times 10^{-4}$	$2 \times 10^{-7}$
Osmium (76)	Os 185	S	$2 \times 10^{-3}$	$5 \times 10^{-7}$	$7 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$5 \times 10^{-8}$	$7 \times 10^{-5}$	$2 \times 10^{-9}$
	Os 191m	S	$7 \times 10^{-2}$	$2 \times 10^{-5}$	$3 \times 10^{-3}$	$6 \times 10^{-7}$
		I	$7 \times 10^{-2}$	$9 \times 10^{-6}$	$2 \times 10^{-3}$	$3 \times 10^{-7}$
	Os 191	S	$5 \times 10^{-3}$	$1 \times 10^{-6}$	$2 \times 10^{-4}$	$4 \times 10^{-8}$
		I	$5 \times 10^{-3}$	$4 \times 10^{-7}$	$2 \times 10^{-4}$	$1 \times 10^{-8}$
	Os 193	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$5 \times 10^{-5}$	$9 \times 10^{-9}$
Palladium (46)	Pd 103	S	$1 \times 10^{-2}$	$1 \times 10^{-6}$	$3 \times 10^{-4}$	$5 \times 10^{-8}$
		I	$8 \times 10^{-3}$	$7 \times 10^{-7}$	$3 \times 10^{-4}$	$3 \times 10^{-8}$
	Pd 109	S	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$9 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$7 \times 10^{-5}$	$1 \times 10^{-8}$
Phosphorous (15)	P 32	S	$5 \times 10^{-4}$	$7 \times 10^{-8}$	$2 \times 10^{-5}$	$2 \times 10^{-9}$
		I	$7 \times 10^{-4}$	$8 \times 10^{-8}$	$2 \times 10^{-5}$	$3 \times 10^{-9}$
Platinum (78)	Pt 191	S	$4 \times 10^{-3}$	$8 \times 10^{-7}$	$1 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
	Pt 193m	S	$3 \times 10^{-2}$	$7 \times 10^{-6}$	$1 \times 10^{-3}$	$2 \times 10^{-7}$
		I	$3 \times 10^{-2}$	$5 \times 10^{-6}$	$1 \times 10^{-3}$	$2 \times 10^{-7}$
	Pt 193	S	$3 \times 10^{-2}$	$1 \times 10^{-6}$	$9 \times 10^{-4}$	$4 \times 10^{-8}$
		I	$5 \times 10^{-2}$	$3 \times 10^{-7}$	$2 \times 10^{-3}$	$1 \times 10^{-8}$
	Pt 197m	S	$3 \times 10^{-2}$	$6 \times 10^{-6}$	$1 \times 10^{-3}$	$2 \times 10^{-7}$
		I	$3 \times 10^{-2}$	$5 \times 10^{-6}$	$9 \times 10^{-4}$	$2 \times 10^{-7}$
	Pt 197	S	$4 \times 10^{-3}$	$8 \times 10^{-7}$	$1 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).  
m = metastable excited state.

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## SCHEDULE 2 (continued)

–		Radiation workers		Persons other than radiation workers		
Column 1		Column 2	Column 3	Column 4	Column 5	
Element (atomic number)	Isotope <sup>1</sup>	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	
Plutonium (94)	Pu 238	S	$1 \times 10^{-4}$	$2 \times 10^{-12}$	$5 \times 10^{-6}$	$7 \times 10^{-14}$
		I	$8 \times 10^{-4}$	$3 \times 10^{-11}$	$3 \times 10^{-5}$	$1 \times 10^{-12}$
	Pu 239	S	$1 \times 10^{-4}$	$2 \times 10^{-12}$	$5 \times 10^{-6}$	$6 \times 10^{-14}$
		I	$9 \times 10^{-4}$	$4 \times 10^{-11}$	$3 \times 10^{-5}$	$1 \times 10^{-12}$
	Pu 240	S	$1 \times 10^{-4}$	$2 \times 10^{-12}$	$5 \times 10^{-6}$	$6 \times 10^{-14}$
		I	$9 \times 10^{-4}$	$4 \times 10^{-11}$	$3 \times 10^{-5}$	$1 \times 10^{-12}$
	Pu 241	S	$7 \times 10^{-3}$	$9 \times 10^{-11}$	$2 \times 10^{-4}$	$3 \times 10^{-12}$
		I	$4 \times 10^{-2}$	$4 \times 10^{-8}$	$1 \times 10^{-3}$	$1 \times 10^{-9}$
Pu 242	S	$1 \times 10^{-4}$	$2 \times 10^{-12}$	$5 \times 10^{-6}$	$6 \times 10^{-14}$	
	I	$9 \times 10^{-4}$	$4 \times 10^{-11}$	$3 \times 10^{-5}$	$1 \times 10^{-12}$	
Polonium (84)	Po 210	S	$2 \times 10^{-5}$	$5 \times 10^{-10}$	$7 \times 10^{-7}$	$2 \times 10^{-11}$
		I	$8 \times 10^{-4}$	$2 \times 10^{-10}$	$3 \times 10^{-5}$	$7 \times 10^{-12}$
Potassium (19)	K 42	S	$9 \times 10^{-3}$	$2 \times 10^{-6}$	$3 \times 10^{-4}$	$7 \times 10^{-8}$
		I	$6 \times 10^{-4}$	$1 \times 10^{-7}$	$2 \times 10^{-5}$	$4 \times 10^{-9}$
Praseody- mium (59)	Pr 142	S	$9 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$7 \times 10^{-9}$
		I	$9 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$5 \times 10^{-9}$
	Pr 143	S	$1 \times 10^{-3}$	$3 \times 10^{-7}$	$5 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$5 \times 10^{-5}$	$6 \times 10^{-9}$
Promethium (61)	Pm 147	S	$6 \times 10^{-3}$	$6 \times 10^{-8}$	$2 \times 10^{-4}$	$2 \times 10^{-9}$
		I	$6 \times 10^{-3}$	$1 \times 10^{-7}$	$2 \times 10^{-4}$	$3 \times 10^{-9}$
	Pm 149	S	$1 \times 10^{-3}$	$3 \times 10^{-7}$	$4 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$8 \times 10^{-9}$
Protactinium (91)	Pa 230	S	$7 \times 10^{-3}$	$2 \times 10^{-9}$	$2 \times 10^{-4}$	$6 \times 10^{-11}$
		I	$7 \times 10^{-3}$	$8 \times 10^{-10}$	$3 \times 10^{-4}$	$3 \times 10^{-11}$
	Pa 231	S	$3 \times 10^{-5}$	$1 \times 10^{-12}$	$9 \times 10^{-7}$	$4 \times 10^{-14}$
		I	$8 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$4 \times 10^{-12}$
	Pa 233	S	$4 \times 10^{-3}$	$6 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$2 \times 10^{-7}$	$1 \times 10^{-4}$	$6 \times 10^{-9}$
Radium (88)	Ra 223	S	$2 \times 10^{-5}$	$2 \times 10^{-9}$	$7 \times 10^{-7}$	$6 \times 10^{-11}$
		I	$1 \times 10^{-4}$	$2 \times 10^{-10}$	$4 \times 10^{-6}$	$8 \times 10^{-12}$
	Ra 224	S	$7 \times 10^{-5}$	$5 \times 10^{-9}$	$2 \times 10^{-6}$	$2 \times 10^{-10}$
		I	$2 \times 10^{-4}$	$7 \times 10^{-10}$	$5 \times 10^{-6}$	$2 \times 10^{-11}$
	Ra 226	S	$4 \times 10^{-7}$	$3 \times 10^{-11}$	$1 \times 10^{-8}$	$1 \times 10^{-12}$
		I	$9 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$6 \times 10^{-9}$
	Ra 228	S	$8 \times 10^{-7}$	$7 \times 10^{-11}$	$3 \times 10^{-8}$	$2 \times 10^{-12}$
		I	$7 \times 10^{-4}$	$4 \times 10^{-11}$	$3 \times 10^{-5}$	$1 \times 10^{-12}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

–			Radiation workers		Persons other than radiation workers	
Column 1			Column 2	Column 3	Column 4	Column 5
Element (atomic number)	Isotope <sup>1</sup>		Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )
Radon (86)	Rn 220	S	..	$9 \times 10^{-7}$	..	$3 \times 10^{-8}$
		I	..	..	..	..
	Rn 222	S	..	$9 \times 10^{-8}$	..	$3 \times 10^{-9}$
Rhenium (75)	Re 183	S	$2 \times 10^{-2}$	$3 \times 10^{-6}$	$6 \times 10^{-4}$	$9 \times 10^{-8}$
		I	$8 \times 10^{-3}$	$2 \times 10^{-7}$	$3 \times 10^{-4}$	$5 \times 10^{-9}$
	Re 186	S	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$9 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$5 \times 10^{-5}$	$8 \times 10^{-9}$
	Re 187	S	$7 \times 10^{-2}$	$9 \times 10^{-6}$	$3 \times 10^{-3}$	$3 \times 10^{-7}$
		I	$4 \times 10^{-2}$	$5 \times 10^{-7}$	$2 \times 10^{-3}$	$2 \times 10^{-8}$
	Re 188	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
	I	$9 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$6 \times 10^{-9}$	
Rhodium (45)	Rh 103m	S	$4 \times 10^{-1}$	$8 \times 10^{-5}$	$1 \times 10^{-2}$	$3 \times 10^{-6}$
		I	$3 \times 10^{-1}$	$6 \times 10^{-5}$	$1 \times 10^{-2}$	$2 \times 10^{-6}$
	Rh 105	S	$4 \times 10^{-3}$	$8 \times 10^{-7}$	$1 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$5 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
Rubidium (37)	Rb 86	S	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$7 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$7 \times 10^{-4}$	$7 \times 10^{-8}$	$2 \times 10^{-5}$	$2 \times 10^{-9}$
	Rb 87	S	$3 \times 10^{-3}$	$5 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$5 \times 10^{-3}$	$7 \times 10^{-8}$	$2 \times 10^{-4}$	$2 \times 10^{-9}$
Ruthenium (44)	Ru 97	S	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$4 \times 10^{-4}$	$8 \times 10^{-8}$
		I	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$3 \times 10^{-4}$	$6 \times 10^{-8}$
	Ru 103	S	$2 \times 10^{-3}$	$5 \times 10^{-7}$	$8 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$8 \times 10^{-8}$	$8 \times 10^{-5}$	$3 \times 10^{-9}$
	Ru 105	S	$3 \times 10^{-3}$	$7 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$5 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
	Ru 106	S	$4 \times 10^{-4}$	$8 \times 10^{-8}$	$1 \times 10^{-5}$	$3 \times 10^{-9}$
	I	$3 \times 10^{-4}$	$6 \times 10^{-9}$	$1 \times 10^{-5}$	$2 \times 10^{-10}$	
Samarium (62)	Sm 147	S	$2 \times 10^{-3}$	$7 \times 10^{-11}$	$6 \times 10^{-5}$	$2 \times 10^{-12}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-10}$	$7 \times 10^{-5}$	$9 \times 10^{-12}$
	Sm 151	S	$1 \times 10^{-2}$	$6 \times 10^{-8}$	$4 \times 10^{-4}$	$2 \times 10^{-9}$
		I	$1 \times 10^{-2}$	$1 \times 10^{-7}$	$4 \times 10^{-4}$	$5 \times 10^{-9}$
	Sm 153	S	$2 \times 10^{-3}$	$5 \times 10^{-7}$	$8 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$8 \times 10^{-5}$	$1 \times 10^{-8}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).  
m = metastable excited state.

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

-		Radiation workers		Persons other than radiation workers		
Column 1		Column 2	Column 3	Column 4	Column 5	
Element (atomic number)	Isotope <sup>1</sup>	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	
Scandium (21)	Sc 46	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$8 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-8}$	$4 \times 10^{-5}$	$8 \times 10^{-10}$
	Sc 47	S	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$9 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$5 \times 10^{-7}$	$9 \times 10^{-5}$	$2 \times 10^{-8}$
	Sc 48	S	$8 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$6 \times 10^{-9}$
		I	$8 \times 10^{-4}$	$1 \times 10^{-7}$	$3 \times 10^{-5}$	$5 \times 10^{-9}$
Selenium (34)	Se 75	S	$9 \times 10^{-3}$	$1 \times 10^{-6}$	$3 \times 10^{-4}$	$4 \times 10^{-8}$
		I	$8 \times 10^{-3}$	$1 \times 10^{-7}$	$3 \times 10^{-4}$	$4 \times 10^{-9}$
Silicon (14)	Si 31	S	$3 \times 10^{-2}$	$6 \times 10^{-6}$	$9 \times 10^{-4}$	$2 \times 10^{-7}$
		I	$6 \times 10^{-3}$	$1 \times 10^{-6}$	$2 \times 10^{-4}$	$3 \times 10^{-8}$
Silver (47)	Ag 105	S	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$8 \times 10^{-8}$	$1 \times 10^{-4}$	$3 \times 10^{-9}$
	Ag 110m	S	$9 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$7 \times 10^{-9}$
		I	$9 \times 10^{-4}$	$1 \times 10^{-8}$	$3 \times 10^{-5}$	$3 \times 10^{-10}$
	Ag 111	S	$1 \times 10^{-3}$	$3 \times 10^{-7}$	$4 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$8 \times 10^{-9}$
Sodium (11)	Na 22	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$6 \times 10^{-9}$
		I	$9 \times 10^{-4}$	$9 \times 10^{-9}$	$3 \times 10^{-5}$	$3 \times 10^{-10}$
	Na 24	S	$6 \times 10^{-3}$	$1 \times 10^{-6}$	$2 \times 10^{-4}$	$4 \times 10^{-8}$
		I	$8 \times 10^{-4}$	$1 \times 10^{-7}$	$3 \times 10^{-5}$	$5 \times 10^{-9}$
Strontium (38)	Sr 85m	S	$2 \times 10^{-1}$	$4 \times 10^{-5}$	$7 \times 10^{-3}$	$1 \times 10^{-6}$
		I	$2 \times 10^{-1}$	$3 \times 10^{-5}$	$7 \times 10^{-3}$	$1 \times 10^{-6}$
	Sr 85	S	$3 \times 10^{-3}$	$2 \times 10^{-7}$	$1 \times 10^{-4}$	$8 \times 10^{-9}$
		I	$5 \times 10^{-3}$	$1 \times 10^{-7}$	$2 \times 10^{-4}$	$4 \times 10^{-9}$
	Sr 89	S	$3 \times 10^{-4}$	$3 \times 10^{-8}$	$1 \times 10^{-5}$	$1 \times 10^{-9}$
		I	$8 \times 10^{-4}$	$4 \times 10^{-8}$	$3 \times 10^{-5}$	$1 \times 10^{-9}$
	Sr 90	S	$4 \times 10^{-6}$	$3 \times 10^{-10}$	$1 \times 10^{-7}$	$1 \times 10^{-11}$
		I	$1 \times 10^{-3}$	$5 \times 10^{-9}$	$4 \times 10^{-5}$	$2 \times 10^{-10}$
	Sr 91	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$7 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$1 \times 10^{-3}$	$3 \times 10^{-7}$	$5 \times 10^{-5}$	$9 \times 10^{-9}$
	Sr 92	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$7 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
Sulphur (16)	S 35	S	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$6 \times 10^{-5}$	$9 \times 10^{-9}$
		I	$8 \times 10^{-3}$	$3 \times 10^{-7}$	$3 \times 10^{-4}$	$9 \times 10^{-9}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).  
m = metastable excited state.

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

-			Radiation workers		Persons other than radiation workers	
Column 1			Column 2	Column 3	Column 4	Column 5
Element (atomic number)	Isotope <sup>1</sup>		Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )
Tantalum (73)	Ta 182	S	$1 \times 10^{-3}$	$4 \times 10^{-8}$	$4 \times 10^{-5}$	$1 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-8}$	$4 \times 10^{-5}$	$7 \times 10^{-10}$
Technetium (43)	Tc 96m	S	$4 \times 10^{-1}$	$8 \times 10^{-5}$	$1 \times 10^{-2}$	$3 \times 10^{-6}$
		I	$3 \times 10^{-1}$	$3 \times 10^{-5}$	$1 \times 10^{-2}$	$1 \times 10^{-6}$
	Tc 96	S	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$5 \times 10^{-5}$	$8 \times 10^{-9}$
	Tc 97m	S	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$4 \times 10^{-4}$	$8 \times 10^{-8}$
		I	$5 \times 10^{-3}$	$2 \times 10^{-7}$	$2 \times 10^{-4}$	$5 \times 10^{-9}$
	Tc 97	S	$5 \times 10^{-2}$	$1 \times 10^{-5}$	$2 \times 10^{-3}$	$4 \times 10^{-7}$
		I	$2 \times 10^{-2}$	$3 \times 10^{-7}$	$8 \times 10^{-4}$	$1 \times 10^{-8}$
	Tc 99m	S	$2 \times 10^{-1}$	$4 \times 10^{-5}$	$6 \times 10^{-3}$	$1 \times 10^{-6}$
		I	$8 \times 10^{-2}$	$1 \times 10^{-5}$	$3 \times 10^{-3}$	$5 \times 10^{-7}$
	Tc 99	S	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$3 \times 10^{-4}$	$7 \times 10^{-8}$
		I	$5 \times 10^{-3}$	$6 \times 10^{-8}$	$2 \times 10^{-4}$	$2 \times 10^{-9}$
Tellurium (52)	Te 125m	S	$5 \times 10^{-3}$	$4 \times 10^{-7}$	$2 \times 10^{-4}$	$1 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$1 \times 10^{-7}$	$1 \times 10^{-4}$	$4 \times 10^{-9}$
	Te 127m	S	$2 \times 10^{-3}$	$1 \times 10^{-7}$	$6 \times 10^{-5}$	$5 \times 10^{-9}$
		I	$2 \times 10^{-3}$	$4 \times 10^{-8}$	$5 \times 10^{-5}$	$1 \times 10^{-9}$
	Te 127	S	$8 \times 10^{-3}$	$2 \times 10^{-6}$	$3 \times 10^{-4}$	$6 \times 10^{-8}$
		I	$5 \times 10^{-3}$	$9 \times 10^{-7}$	$2 \times 10^{-4}$	$3 \times 10^{-8}$
	Te 129m	S	$1 \times 10^{-3}$	$8 \times 10^{-8}$	$3 \times 10^{-5}$	$3 \times 10^{-9}$
		I	$6 \times 10^{-4}$	$3 \times 10^{-8}$	$2 \times 10^{-5}$	$1 \times 10^{-9}$
	Te 129	S	$2 \times 10^{-2}$	$5 \times 10^{-6}$	$8 \times 10^{-4}$	$2 \times 10^{-7}$
		I	$2 \times 10^{-2}$	$4 \times 10^{-6}$	$8 \times 10^{-4}$	$1 \times 10^{-7}$
	Te 131m	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$4 \times 10^{-5}$	$6 \times 10^{-9}$
	Te 132	S	$9 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$7 \times 10^{-9}$
		I	$6 \times 10^{-4}$	$1 \times 10^{-7}$	$2 \times 10^{-5}$	$4 \times 10^{-9}$
Terbium (65)	Tb 160	S	$1 \times 10^{-3}$	$1 \times 10^{-7}$	$4 \times 10^{-5}$	$3 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$3 \times 10^{-8}$	$4 \times 10^{-5}$	$1 \times 10^{-9}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).  
m = metastable excited state.

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

–		Radiation workers		Persons other than radiation workers		
Column 1		Column 2	Column 3	Column 4	Column 5	
Element (atomic number)	Isotope <sup>1</sup>	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	
Thallium (81)	Tl 200	S	$1 \times 10^{-2}$	$3 \times 10^{-6}$	$4 \times 10^{-4}$	$9 \times 10^{-8}$
		I	$7 \times 10^{-3}$	$1 \times 10^{-6}$	$2 \times 10^{-4}$	$4 \times 10^{-8}$
	Tl 201	S	$9 \times 10^{-3}$	$2 \times 10^{-6}$	$3 \times 10^{-4}$	$7 \times 10^{-8}$
		I	$5 \times 10^{-3}$	$9 \times 10^{-7}$	$2 \times 10^{-4}$	$3 \times 10^{-8}$
	Tl 202	S	$4 \times 10^{-3}$	$8 \times 10^{-7}$	$1 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$2 \times 10^{-7}$	$7 \times 10^{-5}$	$8 \times 10^{-9}$
Tl 204	S	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$	
		I	$2 \times 10^{-3}$	$3 \times 10^{-8}$	$6 \times 10^{-5}$	$9 \times 10^{-10}$
Thorium	Th 230	S	$2 \times 10^{-6}$	$9 \times 10^{-11}$	$5 \times 10^{-8}$	$3 \times 10^{-12}$
		I	..	$9 \times 10^{-11}$	..	$3 \times 10^{-12}$
	Th 232	S	$2 \times 10^{-6}$	$9 \times 10^{-11}$	$5 \times 10^{-8}$	$3 \times 10^{-12}$
		I	..	$9 \times 10^{-11}$	..	$3 \times 10^{-12}$
	Th natural	S	$2 \times 10^{-6}$	$9 \times 10^{-11}$	$5 \times 10^{-8}$	$3 \times 10^{-12}$
		I	..	$9 \times 10^{-11}$	..	$3 \times 10^{-12}$
Th 234	S	$6 \times 10^{-4}$	$3 \times 10^{-8}$	$2 \times 10^{-5}$	$1 \times 10^{-9}$	
Thulium (69)	Tm 170	S	$1 \times 10^{-3}$	$2 \times 10^{-7}$	$5 \times 10^{-5}$	$1 \times 10^{-9}$
		I	$1 \times 10^{-3}$	$3 \times 10^{-8}$	$5 \times 10^{-5}$	$1 \times 10^{-9}$
	Tm 171	S	$1 \times 10^{-2}$	$1 \times 10^{-7}$	$5 \times 10^{-4}$	$4 \times 10^{-9}$
		I	$1 \times 10^{-2}$	$2 \times 10^{-7}$	$5 \times 10^{-4}$	$8 \times 10^{-9}$
Tin (50)	Sn 113	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$9 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$5 \times 10^{-8}$	$8 \times 10^{-5}$	$2 \times 10^{-9}$
	Sn 125	S	$5 \times 10^{-4}$	$1 \times 10^{-7}$	$2 \times 10^{-5}$	$4 \times 10^{-9}$
		I	$5 \times 10^{-4}$	$8 \times 10^{-8}$	$2 \times 10^{-5}$	$3 \times 10^{-9}$
Tungsten (Wolfram) (74)	W 181	S	$1 \times 10^{-2}$	$2 \times 10^{-6}$	$4 \times 10^{-4}$	$8 \times 10^{-8}$
		I	$1 \times 10^{-2}$	$1 \times 10^{-7}$	$3 \times 10^{-4}$	$4 \times 10^{-9}$
	W 185	S	$4 \times 10^{-3}$	$8 \times 10^{-7}$	$1 \times 10^{-4}$	$3 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$1 \times 10^{-7}$	$1 \times 10^{-4}$	$4 \times 10^{-9}$
	W 187	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$7 \times 10^{-5}$	$2 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).  
m = metastable excited state.

## Radioactive Substances Regulation 1961

## SCHEDULE 2 (continued)

–			Radiation workers		Persons other than radiation workers	
Column 1			Column 2	Column 3	Column 4	Column 5
Element (atomic number)	Isotope <sup>1</sup>		Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )	Water ( $\mu\text{c/ml}$ )	Air ( $\mu\text{c/ml}$ )
Uranium (92)	U 230	S	$1 \times 10^{-4}$	$3 \times 10^{-10}$	$5 \times 10^{-6}$	$1 \times 10^{-11}$
		I	$1 \times 10^{-4}$	$1 \times 10^{-10}$	$5 \times 10^{-6}$	$4 \times 10^{-12}$
	U 232	S	$8 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$3 \times 10^{-12}$
		I	$8 \times 10^{-4}$	$3 \times 10^{-11}$	$3 \times 10^{-5}$	$9 \times 10^{-13}$
	U 233	S	$9 \times 10^{-4}$	$5 \times 10^{-10}$	$3 \times 10^{-5}$	$2 \times 10^{-11}$
		I	$9 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$4 \times 10^{-12}$
	U 234	S	$9 \times 10^{-4}$	$6 \times 10^{-10}$	$3 \times 10^{-5}$	$2 \times 10^{-11}$
		I	$9 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$4 \times 10^{-12}$
	U 235	S	$8 \times 10^{-4}$	$5 \times 10^{-10}$	$3 \times 10^{-5}$	$2 \times 10^{-11}$
		I	$8 \times 10^{-4}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$4 \times 10^{-12}$
	U 236	S	$1 \times 10^{-3}$	$6 \times 10^{-10}$	$3 \times 10^{-5}$	$2 \times 10^{-11}$
		I	$1 \times 10^{-3}$	$1 \times 10^{-10}$	$3 \times 10^{-5}$	$4 \times 10^{-12}$
	U 238	S	$1 \times 10^{-3}$	$7 \times 10^{-11}$	$4 \times 10^{-5}$	$3 \times 10^{-12}$
		I	$1 \times 10^{-3}$	$1 \times 10^{-10}$	$4 \times 10^{-5}$	$5 \times 10^{-12}$
Vanadium (23)	V 48	S	$9 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$6 \times 10^{-9}$
		I	$8 \times 10^{-4}$	$6 \times 10^{-8}$	$3 \times 10^{-5}$	$2 \times 10^{-9}$
Xenon (54)	Xe 131m	Sub	..	$2 \times 10^{-5}$	..	$4 \times 10^{-7}$
	Xe 133	Sub	..	$1 \times 10^{-5}$	..	$3 \times 10^{-7}$
	Xe 135	Sub	..	$4 \times 10^{-5}$	..	$1 \times 10^{-7}$
Ytterbium (70)	Yb 175	S	$3 \times 10^{-3}$	$7 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
		I	$3 \times 10^{-3}$	$6 \times 10^{-7}$	$1 \times 10^{-4}$	$2 \times 10^{-8}$
	Y 90	S	$6 \times 10^{-4}$	$1 \times 10^{-7}$	$2 \times 10^{-5}$	$4 \times 10^{-9}$
		I	$6 \times 10^{-4}$	$1 \times 10^{-7}$	$2 \times 10^{-5}$	$3 \times 10^{-9}$
	Y 91m	S	$1 \times 10^{-1}$	$2 \times 10^{-5}$	$3 \times 10^{-3}$	$8 \times 10^{-7}$
		I	$1 \times 10^{-1}$	$2 \times 10^{-5}$	$3 \times 10^{-3}$	$6 \times 10^{-7}$
	Y 91	S	$8 \times 10^{-4}$	$4 \times 10^{-8}$	$3 \times 10^{-5}$	$1 \times 10^{-9}$
		I	$8 \times 10^{-4}$	$3 \times 10^{-8}$	$3 \times 10^{-5}$	$1 \times 10^{-9}$
	Y 92	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
	Y 93	S	$8 \times 10^{-4}$	$2 \times 10^{-7}$	$3 \times 10^{-5}$	$6 \times 10^{-9}$
		I	$8 \times 10^{-4}$	$1 \times 10^{-7}$	$3 \times 10^{-5}$	$5 \times 10^{-9}$
Zinc (30)	Zn 65	S	$3 \times 10^{-3}$	$1 \times 10^{-7}$	$1 \times 10^{-4}$	$4 \times 10^{-9}$
		I	$5 \times 10^{-3}$	$6 \times 10^{-8}$	$2 \times 10^{-4}$	$2 \times 10^{-9}$
	Zn 69m	S	$2 \times 10^{-3}$	$4 \times 10^{-7}$	$7 \times 10^{-5}$	$1 \times 10^{-8}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-7}$	$6 \times 10^{-5}$	$1 \times 10^{-8}$
	Zn 69	S	$5 \times 10^{-2}$	$7 \times 10^{-6}$	$2 \times 10^{-3}$	$2 \times 10^{-7}$
		I	$5 \times 10^{-2}$	$9 \times 10^{-6}$	$2 \times 10^{-3}$	$3 \times 10^{-7}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).  
m = metastable excited state.

*Radioactive Substances Regulation 1961***SCHEDULE 2 (continued)**

–		Radiation workers		Persons other than radiation workers		
Column 1		Column 2	Column 3	Column 4	Column 5	
Element (atomic number)	Isotope <sup>1</sup>	Water ( $\mu\text{c}/\text{ml}$ )	Air ( $\mu\text{c}/\text{ml}$ )	Water ( $\mu\text{c}/\text{ml}$ )	Air ( $\mu\text{c}/\text{ml}$ )	
Zirconium (40)	Zr 93	S	$2 \times 10^{-2}$	$1 \times 10^{-7}$	$8 \times 10^{-4}$	$4 \times 10^{-9}$
		I	$2 \times 10^{-2}$	$3 \times 10^{-7}$	$8 \times 10^{-4}$	$1 \times 10^{-8}$
	Zr 95	S	$2 \times 10^{-3}$	$1 \times 10^{-7}$	$6 \times 10^{-5}$	$4 \times 10^{-9}$
		I	$2 \times 10^{-3}$	$3 \times 10^{-8}$	$6 \times 10^{-5}$	$1 \times 10^{-9}$
	Zr 97	S	$5 \times 10^{-4}$	$1 \times 10^{-7}$	$2 \times 10^{-5}$	$4 \times 10^{-9}$
		I	$5 \times 10^{-4}$	$9 \times 10^{-8}$	$2 \times 10^{-5}$	$3 \times 10^{-9}$

<sup>1</sup> Soluble (S); Insoluble (I); Submersion in a cloud of gaseous material (Sub).

**SCHEDULE 3****MAXIMUM QUANTITY PER PACKAGE FOR  
TRANSPORT**

Radioactive substance	Maximum quantity per package
Group 1 substance, not in solid non-friable form, (but not including Caesium 137)	50 curies
Group 1 substance, in solid non-friable form only and including Caesium 137 in solid form only	300 curies
Group 2 substance	50 curies
Group 3 substance	50 curies
Group 3 substance - Krypton 85 and Tritium only	100 curies

**SCHEDULE 4****Table 1**

Table for computing distances to be allowed between packages of radioactive substances and occupied areas or undeveloped film. When package is transported by motor or rail vehicle or placed in depot or store or other place at a stage of the transport of the package.

Total number of radiation units	Minimum distance in feet to area that may be continually occupied by passengers or employees	Minimum distance is feet to nearest undeveloped film for period not exceeding 24 hours
0-2	3	15
3-5	5	15
6-10	7	15
11-20	9	20
21-30	11	25
31-40	13	30

Note—The distance in the table shall be measured from the nearest point of the package or packages.

For periods longer than 24 hours, a proportional adjustment should be made so that the degree of blackening produced on the film is not greater than given in the regulation.

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**SCHEDULE 4 (continued)**
**Table 2**

Table for computing distances to be allowed between packages of radioactive substances and occupied areas or undeveloped film for transport of the package by aircraft.

Total number of radiation units	Minimum distance in feet to area that may be continually occupied by passengers or employees	Minimum distance in feet to nearest undeveloped film for period not exceeding 24 hours
0–10	3	15
11–20	4	20
21–30	5	25
31–40	6	30

Note—The distance in the table shall be measured from the nearest point of the package or packages.

For periods longer than 24 hours, a proportional adjustment should be made so that the degree of blackening produced on the film is not greater than given in the regulation.

SCHEDULE 4 (continued)

Table 3

TABLE III.  
TABLE FOR COMPUTING DISTANCES TO BE ALLOWED BETWEEN PACKAGES OF RADIOACTIVE SUBSTANCES AND OCCUPIED AREAS OR UNDEVELOPED FILM FOR TRANSPORT BY SHIP

Total Number of Radiation Units	Minimum Distance in Feet from Accommodation or Permanent Working Space				Minimum Distance in Feet from Undeveloped Film or Plate																											
					4-day Voyage				9-day Voyage				16-day Voyage				25-day Voyage				36-day Voyage				49-day Voyage							
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D				
Up to 1	10	10	10	15	15	10	10	15	20	15	10	15	30	20	10	15	35	25	10	15	40	25	10	15	50	30	10	15	140	40	10	15
2 to 5	25	10	10	15	35	15	10	15	50	15	10	15	75	25	10	15	95	30	10	15	120	35	10	15	170	50	10	15	200	55	10	15
6 to 10	35	15	10	15	50	15	10	15	80	25	10	15	110	35	10	15	140	40	10	15	170	50	10	15	260	75	15	15	300	90	15	15
11 to 25	60	20	10	15	85	25	10	15	135	40	10	15	180	50	10	15	225	65	10	15	305	90	15	15	355	110	15	15	400	130	20	15
26 to 50	90	30	10	15	125	40	10	15	190	55	10	15	250	75	10	15	305	90	15	15	405	130	20	15	465	160	25	15	520	185	25	15
51 to 100	135	40	10	15	180	50	10	15	265	80	15	15	340	105	15	15	405	130	20	15	525	190	25	15	590	225	30	15	* 260	35	15	
101 to 200	195	55	10	15	250	75	10	15	360	110	15	15	445	150	20	15	600	230	35	15	* 270	40	15		* 310	45	15					
201 to 300	235	70	10	15	300	90	15	15	420	135	20	15	520	185	25	15	* 260	40	15		* 305	45	15									
301 to 400	265	80	15	15	340	105	15	15	465	160	25	15	570	210	30	15																

Column A.—No intervening cargo or bulkheads screening the radioactive material from the living accommodation or undeveloped film or plate.  
 Column B.—The radioactive material to be surrounded by at least two feet of cargo of unit density and at least one steel bulkhead between the radioactive material and the living accommodation or undeveloped film or plate.  
 Column C.—The radioactive material to be surrounded by at least six feet of cargo of unit density and at least two steel bulkheads between the radioactive material and the living accommodation or undeveloped film or plate.  
 Column D.—The radioactive material to be surrounded by at least fourteen feet of cargo of unit density and at least two steel bulkheads between the radioactive material and the living accommodation or undeveloped film or plate.  
 "Cargo of unit density" means cargo stowed at a density of 1 ton per 36 cubic feet. Where the density is less than this, the depth of cargo specified in the notes on Columns B, C, and D, i.e., two feet, six feet, and fourteen feet, must be increased in proportion.  
 "Minimum distance" means the least in any direction, whether vertical or horizontal.

\* Not to be carried unless screening by other cargo and bulkheads can be arranged in accordance with Columns B, C, and D.

**SCHEDULE 5****FEEES**

	section 6
	\$
1. Application for, or renewal of, a licence to possess, use, sell or transport a radioactive substance . . . . .	41.00
2. Application for, or renewal of, a licence to possess or use irradiating apparatus . . . . .	41.00
3. Application for, or renewal of, registration of irradiating apparatus . . . . .	41.00.

**ENDNOTES****1 Index to Endnotes**

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**2 Date to which amendments incorporated**

This is the reprint date mentioned in the Reprints Act 1992, section 5(c). Accordingly, this reprint includes all amendments that commenced operation on or before 23 September 1994. Future amendments of the Radioactive Substances Regulation 1961 may be made in accordance with this reprint under the Reprints Act 1992, section 49.

**3 List of legislation****Radioactive Substances Regulation 1961**

pubd Gaz 25 March 1961 pp 1781–1816

commenced 1 January 1962 (see s 2)

as amended by—

**regulations published Gazette—**

3 June 1961 p 507

commenced on date of publication

7 November 1964 p 829

commenced on date of publication

26 February 1966 p 1357

commenced on date of publication

13 July 1968 p 1320

commenced on date of publication

31 October 1970 p 830  
commenced on date of publication

8 November 1975 p 977  
commenced on date of publication

8 July 1978 p 1209  
commenced on date of publication

20 October 1979 p 786  
commenced on date of publication

20 December 1980 p 1619  
commenced on date of publication

21 November 1981 p 1269  
commenced on date of publication

28 August 1982 pp 2845–6  
commenced on date of publication

27 November 1982 p 1560  
commenced on date of publication

23 April 1983 p 1996  
commenced on date of publication

19 November 1983 p 1247  
commenced on date of publication

22 September 1984 p 418  
commenced on date of publication

1 June 1985 p 1017  
commenced on date of publication

9 November 1985 p 1309  
commenced on date of publication

9 August 1986 p 2502  
commenced on date of publication

11 July 1987 p 2714  
commenced on date of publication

26 September 1987 p 342  
commenced on date of publication

22 October 1988 p 851  
commenced on date of publication

23 September 1989 p 747  
commenced on date of publication

15 September 1990 p 286  
commenced on date of publication

**Department of Health (Variation of Fees) Regulation 1991 SL No. 146 Pts 1, 4**  
 pubd Gaz 30 November 1991 pp 1638–42  
 commenced on date of publication

**Health Legislation Amendment Regulation (No. 1) 1994 SL No. 213 Pts 1, 10**  
 notfd Gaz 24 June 1994 pp 1058–61  
 ss 1–2 commenced on date of notification  
 remaining provisions commenced 1 July 1994 (see s 2(1))

## 4 List of annotations

### Key to abbreviations in list of annotations

amd	=	amended
Ch	=	Chapter
cl	=	clause
def	=	definition
Div	=	Division
hdg	=	heading
ins	=	inserted
om	=	omitted
prec	=	preceding
pres	=	present
prev	=	previous
(prev)	=	previously
prov	=	provision
Pt	=	Part
R1	=	Reprint No. 1
RA	=	Reprints Act 1992
renum	=	renumbered
Sdiv	=	Subdivision
sub	=	substituted

Provisions not included in reprint, or amended by amendments not included in reprint, are underlined

### Short title

- prov hdg** ins 1991 SL No. 146 s 11
- s 1** amd reg pubd Gaz 13 July 1968 p 1320  
 sub 1991 SL No. 146 s 11
- s 3** def **“Chief Health Officer”** ins R1 (see RA ss 23, 23A)  
 def **“council”** ins reg pubd Gaz 31 October 1970 p 830  
 def **“Director-General”** ins reg pubd Gaz 31 October 1970 p 830  
 om R1 (see RA ss 39, 23A and def “Chief Health Officer”)  
 def **“Effective Dose”** om reg pubd Gaz 28 August 1982 pp 2845–6  
 def **“high radiation area”** amd reg pubd Gaz 28 August 1982 pp 2845–6  
 def **“maximum permissible dose”** amd reg pubd Gaz 28 August 1982  
 pp 2845–6  
 def **“Microrem”** om reg pubd Gaz 28 August 1982 pp 2845–6  
 def **“microsievert”** ins reg pubd Gaz 28 August 1982 pp 2845–6  
 def **“Millirem”** om reg pubd Gaz 28 August 1982 pp 2845–6  
 def **“millisievert”** ins reg pubd Gaz 28 August 1982 pp 2845–6

def “**monitoring**” amd reg pubd Gaz 28 August 1982 pp 2845–6  
 def “**radiation area**” amd reg pubd Gaz 28 August 1982 pp 2845–6  
 def “**radiation dose equivalent**” ins reg pubd Gaz 28 August 1982  
 pp 2845–6  
 def “**radiation hazard**” amd reg pubd Gaz 28 August 1982 pp 2845–6  
 def “**radiation unit**” amd reg pubd Gaz 28 August 1982 pp 2845–6  
 def “**radiation worker**” amd reg pubd Gaz 3 June 1961 p 507  
 def “**Relative Biological Effectiveness (RBE)**” om reg pubd Gaz  
 28 August 1982 pp 2845–6  
 def “**Rem**” om reg pubd Gaz 28 August 1982 pp 2845–6  
 def “**sievert**” ins reg pubd Gaz 28 August 1982 pp 2845–6  
 def “**The Act**” om R1 (see RA s 39)  
 def “**These Regulations**” om R1 (see RA s 39)

**s 4** amd reg pubd Gaz 28 August 1982 pp 2845–6

**Forms**

**s 5** sub 1994 SL No. 213 s 51

**Fees**

**s 6** sub 1994 SL No. 213 s 51

**PART 1A—APPLICATION OF REGULATIONS**

**Pt hdg** ins reg pubd Gaz 11 July 1987 p 2714

**s 6A** ins reg pubd Gaz 11 July 1987 p 2714

**s 7** amd reg pubd Gaz 31 October 1970 p 830; 1994 SL No. 213 s 52

**s 8** amd reg pubd Gaz 7 November 1964 p 829

**s 9** amd 1994 SL No. 213 s 53

**s 12** amd 1994 SL No. 213 s 54

**s 17** amd 1994 SL No. 213 s 55

**s 18** amd reg pubd Gaz 26 February 1966 p 1357; 23 April 1983 p 1996;  
 11 July 1987 p 2714

**s 19** om reg pubd Gaz 11 July 1987 p 2714

**s 20** amd reg pubd Gaz 9 November 1985 p 1309

**s 21** amd reg pubd Gaz 28 August 1982 pp 2845–6

**s 24** amd reg pubd Gaz 28 August 1982 pp 2845–6

**s 25** amd 1994 SL No. 213 s 56

**s 29** amd 1994 SL No. 213 s 57

**s 36** amd reg pubd Gaz 28 August 1982 pp 2845–6

**s 41** amd reg pubd Gaz 28 August 1982 pp 2845–6; 1994 SL No. 213 s 58

**s 45** amd 1994 SL No. 213 s 59

**s 56** amd 1994 SL No. 213 s 60

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- s 57      amd 1994 SL No. 213 s 61
- s 60      amd reg pubd Gaz 28 August 1982 pp 2845–6
- s 61      om reg pubd Gaz 1 June 1985 p 1017
- s 62      om reg pubd Gaz 1 June 1985 p 1017
- s 63      om reg pubd Gaz 1 June 1985 p 1017
- s 64      amd reg pubd Gaz 28 August 1982 pp 2845–6  
om reg pubd Gaz 1 June 1985 p 1017
- s 65      om reg pubd Gaz 1 June 1985 p 1017
- s 66      om reg pubd Gaz 1 June 1985 p 1017
- s 67      om reg pubd Gaz 1 June 1985 p 1017
- s 68      om reg pubd Gaz 1 June 1985 p 1017
- s 69      amd reg pubd Gaz 26 February 1966 p 1357; 28 August 1982 pp 2845–6  
om reg pubd Gaz 1 June 1985 p 1017
- s 70      om reg pubd Gaz 1 June 1985 p 1017
- s 71      om reg pubd Gaz 1 June 1985 p 1017
- s 73      amd reg pubd Gaz 28 August 1982 pp 2845–6  
om reg pubd Gaz 1 June 1985 p 1017
- s 74      amd reg pubd Gaz 28 August 1982 pp 2845–6  
om reg pubd Gaz 1 June 1985 p 1017

**PART 14—POWER OF DELEGATION**

**Pt hdg**    ins reg pubd Gaz 13 July 1968 p 1320

s 87      ins reg pubd Gaz 13 July 1966 p 1320

**SCHEDULE 5—FEES**

sub 1994 SL No. 213 s 62

**SCHEDULE VI**

amd reg pubd Gaz 26 February 1966 p 1357; 8 November 1975 p 977;  
8 July 1978 p 1209; 20 October 1979 p 786; 20 December 1980 p 1619;  
21 November 1981 p 1269; 27 November 1982 p 1560; 19 November  
1983 p 1247; 22 September 1984 p 418; 9 November 1985 p 1309;  
9 August 1986 p 2502; 26 September 1987 p 342; 22 October 1988  
p 851; 23 September 1989 p 747; 15 September 1990 p 286; 1991 SL  
No. 146 s 12  
om 1994 SL No. 213 s 62

**SCHEDULE VII**

amd reg pubd Gaz 8 November 1975 p 977; 8 July 1978 p 1209;  
20 October 1979 p 786; 20 December 1980 p 1619; 21 November 1981  
p 1269; 27 November 1982 p 1560; 19 November 1983 p 1247;  
22 September 1984 p 418; 9 November 1985 p 1309; 9 August 1986  
p 2502; 26 September 1987 p 342; 22 October 1988 p 851;

23 September 1989 p 747; 15 September 1990 p 286; 1991 SL No. 146  
s 13  
om 1994 SL No. 213 s 62

## 5 Table of changed names and titles

### TABLE OF CHANGED NAMES AND TITLES under the Reprints Act 1992 ss 23 and 23A

Old	New	Reference provision
Director-General (of Health and Medical Services)	Chief Health Officer (Department of Health)	Health Services Act 1991 s 7.4

## 6 Table of obsolete and redundant provisions

### TABLE OF OBSOLETE AND REDUNDANT PROVISIONS under the Reprints Act 1992 s 39

Omitted provision	Provision making omitted provision obsolete/redundant
def "Act"	Statutory Instruments Act 1992 s 38
definitions to be read in context	Acts Interpretation Act 1954 s 32A (Statutory Instruments Act 1992 s 14)
references included in citation of law	Acts Interpretation Act 1954 s 14H (Statutory Instruments Act 1992 s 14)
references to Queensland implied	Acts Interpretation Act 1954 s 35 (Statutory Instruments Act 1992 s 14)

**7 Table of corrected minor errors**TABLE OF CORRECTED MINOR ERRORS  
under the Reprints Act 1992 s 44

Provision	Description
'license' where it appears as a noun 14(2)	'licence'  om 'For purposes' ins 'For the purposes'

**8 Table of renumbered provisions**TABLE OF RENUMBERED PROVISIONS  
under the Reprints Act 1992 s 43

Previous	Renumbered as
3, def "maximum permissible dose", (b), proviso	3, def "maximum permissible dose", (c)
7(4), 2nd sentence	7(4A)
7(4), 2nd sentence, (i)	7(4A)(a)
7(4), 2nd sentence, (ii)	7(4A)(b)
7(4), 2nd sentence, (iii)	7(4A)(c)
7(4), 2nd sentence, (iv)	7(4A)(d)
7(5)(a)	7(5)
7(5)(a)(i)	7(5)(a)
7(5)(a)(ii)	7(5)(b)
7(5)(b)	7(5A)
7(5)(c)	7(5B)
7(5)(c)(i)	7(5B)(a)
7(5)(c)(ii)	7(5B)(b)
7(5)(c)(iii)	7(5B)(c)
7(5)(c)(iv)	7(5B)(d)
7(5)(c)(v)	7(5B)(e)
14, 1st sentence	14(1)
14, 2nd sentence	14(2)
18(2), proviso	18(2A)
24, 1st sentence	24(1)
24, proviso	24(2)
60, 1st sentence	60(1)
60, proviso	60(2)
78, 1st sentence	78(1)
78, 2nd sentence	78(2)

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83(6), 2nd sentence  
85(1), 2nd sentence  
87(1), 2nd sentence  
87(3), 2nd sentence

83(7)  
85(1A)  
87(1A)  
87(3A)