Nuclear Substances and Devices Regulations

Contents

Nuclear Substances and Radiation Devices Regulations

INTERPRETATION AND APPLICATION

Interpretation - 1

1. The definitions in this section apply in these Regulations.

"Act" means the *Nuclear Safety and Control Act*. (*Loi*)

"bulk quantity" means, in respect of the terms "exemption quantity" and "unconditional clearance level" ,

(*a*) when referred to in section 5, a quantity of material greater than one tonne; and

(*b*) when referred to in section 5.1, a quantity of material greater than one tonne per year per nuclear facility. (*quantité en vrac*)

"certificate" means a document issued by the Commission or by a designated officer authorized under paragraph 37(2)(*a*) or (*b*) of the Act, indicating that prescribed equipment or a person is certified. (*attestation ou homologation*)

"certified" means certified by the Commission under paragraph 21(1)(*h*) or (*i*) of the Act or by a designated officer authorized under paragraph 37(2)(*a*) or (*b*) of the Act. (*homologué*)

"Class II prescribed equipment" has the meaning assigned to that term by section 1 of the *Class II Nuclear Facilities and Prescribed Equipment Regulations*. (*équipement réglementé de catégorie II*)

"conditional clearance level" means an activity concentration that does not result in an

effective dose

(*a*) greater than 1 mSv in a year due to a low probability event referred to in the IAEA Safety Standard RS-G-1.7; or

(*b*) greater than 10 µSv in a year. (*niveau de libération conditionnelle*)

"depleted uranium" means uranium that contains uranium 235 in a concentration that is less than that normally found in nature. (*uranium appauvri*)

"dosimeter" means a device for measuring a dose of radiation that is worn or carried by an individual. (*dosimètre*)

"effective dose" has the meaning assigned to that term by subsection 1(1) of the *Radiation Protection Regulations*. (*dose efficace*)

"exemption quantity" means any of the following:

(*a*) in respect of a radioactive nuclear substance set out in column 1 of Schedule 1,

(i) if the radioactive nuclear substance is uniformly distributed in material and not in bulk quantity, the corresponding activity concentration set out in column 2, or

(ii) the corresponding activity set out in column 3;

(*b*) in respect of a radioactive nuclear substance that is not set out in column 1 of Schedule 1,

(i) if the atomic number of the substance is equal to or less than 81,

(A) 10 Bq/g if the radioactive nuclear substance is uniformly distributed in material and not in bulk quantity, or

(B) 10,000 Bq,

(ii) if the atomic number of the substance is greater than 81 and the substance, or its short-lived radioactive progeny, does not emit alpha radiation,

(A) 10 Bq/g if the radioactive nuclear substance is uniformly distributed in material and not in bulk quantity, or

(B) 10,000 Bq, or

(iii) if the atomic number of the substance is greater than 81 and the substance, or

its short-lived radioactive progeny, emits alpha radiation,

(A) 1 Bq/g if the radioactive nuclear substance is uniformly distributed in material and not in bulk quantity, or

(B) 1,000 Bq; or

(*c*) in respect of more than one radioactive nuclear substance,

(i) if the radioactive nuclear substances are uniformly distributed in material and not in bulk quantity, the quotient obtained by dividing the total activity concentration by the sum of quotients obtained by dividing the activity concentration of each radioactive nuclear substance by its corresponding exemption quantity as referred to in paragraph (*a*) or (*b*), or

(ii) the quotient obtained by dividing the total activity by the corresponding sum of quotients obtained by dividing the activity of each radioactive nuclear substance by its corresponding exemption quantity as referred to in paragraph (*a*) or (*b*). (*quantité d'exemption*)

"exposure device" means a radiation device that is designed for carrying out gamma radiography, and includes any accessory to the device such as a sealed source assembly, a drive mechanism, a sealed source assembly guide tube and an exposure head. (*appareil d'exposition*)

"IAEA Safety Standard RS-G-1.7" means the *IAEA Safety Standards, Safety Guide No. RS-G-1.7 — Application of the Concepts of Exclusion, Exemption and Clearance*, 2004 Edition published by the International Atomic Energy Agency. (*Norme de sûreté RS-G-1.7 de l'AIEA*)

"licensed activity" means an activity described in any of paragraphs 26(*a*) to (*c*) of the Act that a licence authorizes the licensee to carry on in relation to a nuclear substance or a radiation device. (*activité autorisée*)

"licensee" means a person who is licensed to carry on an activity described in any of paragraphs 26(*a*) to (*c*) of the Act in relation to a nuclear substance or a radiation device. (*titulaire de permis*)

"natural uranium" means uranium that contains uranium 235 in a concentration that is normally found in nature. (*uranium naturel*)

"nuclear criticality" means a self-sustaining chain reaction of nuclear fission. (*criticité nucléaire*)

"operate" includes, in respect of an exposure device, coupling the drive mechanism to the exposure device, uncoupling the drive mechanism from the exposure device, locking or unlocking the exposure device, and all activities involving the device that take place while the sealed source assembly is not locked inside the device in the fully shielded position. (*faire fonctionner*)

"prescribed equipment" means the equipment prescribed by section 20 of the *General Nuclear Safety and Control Regulations*. (*équipement réglementé*)

"radiation device" means

(*a*) a device that contains more than the exemption quantity of a nuclear substance and that enables the nuclear substance to be used for its radiation properties; and

(*b*) a device that contains a radium luminous compound. (*appareil à rayonnement*)

"radiation survey meter" means an instrument that is capable of measuring radiation dose rates. (*radiamètre*)

"sealed source" means a radioactive nuclear substance in a sealed capsule or in a cover to which the substance is bonded, where the capsule or cover is strong enough to prevent contact with or the dispersion of the substance under the conditions for which the capsule or cover is designed. (*source scellée*)

"sealed source assembly" means a sealed source that is designed to be used in an exposure device, and includes the components that are permanently attached to the sealed source. (*assemblage de source scellée*)

"servicing" in respect of radiation devices, means any maintenance of a device, including installation, repair, or dismantling, other than maintenance that

(*a*) constitutes routine operating procedures as indicated in the manufacturer's operating manual for the device; or

(*b*) is authorized in the licence issued in respect of the possession or use of the device. (*entretien*)

"specific activity" means the activity per unit mass. (*activité spécifique*)

"unconditional clearance level" , in respect of a bulk quantity of material, except for surface contaminated material, in which the radioactive nuclear substance is uniformly distributed, means an activity concentration that

(*a*) in respect of a radioactive nuclear substance set out in column 1 of Schedule 2, is

the corresponding activity concentration set out in column 2;

(*b*) in respect of a radioactive nuclear substance that is not set out in column 1,

(i) is 1 Bq/g, if the atomic number of the substance is equal to or less than 81,

(ii) is 1 Bq/g, if the atomic number of the substance is greater than 81 and the substance, or its short-lived radioactive progeny, does not emit alpha radiation, and

(iii) is 0.1 Bq/g, if the atomic number of the substance is greater than 81 and the substance, or its short-lived radioactive progeny, emits alpha radiation; or

(*c*) in respect of more than one radioactive nuclear substance — except for Thorium 232, Uranium 235, Uranium 238 and their radioactive progeny mentioned in paragraph 4.3 of the IAEA Safety Standard RS-G-1.7 — is the quotient obtained by dividing the total activity concentration by the sum of quotients obtained by dividing the activity concentration of each radioactive nuclear substance by its corresponding activity concentration as referred to in paragraph (*a*) or (*b*). (*niveau de libération inconditionnelle*)

"unsealed source" means a source other than a sealed source. (*source non scellée*)

"worker" means a person who performs work that is referred to in a licence. (*travailleur*)

SOR/2008-119, s. 17.

Application -2

2. (1) These Regulations apply to all nuclear substances and sealed sources, as well as to all radiation devices that are not included in Class II prescribed equipment.

(2) These Regulations do not apply in respect of the packaging or transport of nuclear substances, sealed sources or radiation devices.

SOR/2008-119, s. 18.

LICENCE APPLICATIONS

General Requirements - 3

3. (1) An application for a licence in respect of a nuclear substance or a radiation device, other than a licence to service a radiation device, shall contain the following information in addition to the information required by section 3 of the *General Nuclear Safety and*

Control Regulations:

(*a*) the methods, procedures and equipment that will be used to carry on the activity to be licensed;

(*b*) the methods, procedures and equipment that will be used while carrying on the activity to be licensed, or during and following an accident, to

(i) monitor the release of any radioactive nuclear substance from the site of the activity to be licensed,

(ii) detect the presence of and record the radiation dose rate and quantity in becquerels of radioactive nuclear substances at the site of the activity to be licensed,

(iii) limit the spread of radioactive contamination within and from the site of the activity to be licensed, and

(iv) decontaminate any person, site or equipment contaminated as a result of the activity to be licensed;

(*c*) a description of the circumstances in which the decontamination referred to in subparagraph (*b*)(iv) will be carried out;

(*d*) the proposed location of the activity to be licensed, including a description of the site;

(*e*) the roles, responsibilities, duties, qualifications and experience of workers;

(*f*) the proposed training program for workers;

(*g*) the proposed instructions for dealing with accidents, including fires and spills, in which the nuclear substance may be involved;

(*h*) the proposed inspection program for the equipment and systems that will be used to carry on the activity to be licensed;

(*i*) the methods, procedures and equipment that will be used to calibrate radiation survey meters in accordance with these Regulations;

(*j*) the methods, procedures and equipment that will be used to calibrate and verify the calibration of dosimeters referred to in paragraphs 30(3)(*d*) and (*e*);

(*k*) the methods, procedures and equipment that will be used to conduct the leak tests and surveys required by these Regulations;

(*l*) where the application is in respect of a nuclear substance that is an unsealed source and that is to be used in a room, the proposed design of the room;

(*m*) if the application is in respect of a nuclear substance that is contained in a radiation device, the brand name and model number of the radiation device, and the quantity of the devices;

(*n*) where the application is in respect of Category I, II or III nuclear material, as defined in section 1 of the *Nuclear Security Regulations*,

(i) the measures that will be taken to prevent nuclear criticality, and

(ii) the information required by section 3 or 4 of the *Nuclear Security Regulations*, as applicable;

(*o*) if the applicant will be manufacturing or distributing radiation devices referred to in paragraph 5(1)(*c*) or section 6 or 7, or check sources mentioned in section 8.1, the proposed procedure for the disposal of each radiation device or check source or for its return to the manufacturer.

(2) Subsection (1) does not apply in respect of an application for a licence to import or export for which the information requirements are prescribed by the *Nuclear Non-proliferation Import and Export Control Regulations*.

SOR/2008-119, s. 19.

Licence to Service Radiation Device - 4

4. An application for a licence to service a radiation device shall contain the following information in addition to the information required by section 3 of the *General Nuclear Safety and Control Regulations*:

(*a*) the brand name and model number of the device or the number of the certificate relating to the device;

(*b*) a description of the nature of the servicing proposed to be carried on;

(*c*) the proposed methods, procedures and equipment for carrying on the servicing;

(*d*) the proposed qualification requirements and training program for workers; and

(*e*) the proposed procedures to be followed after completion of the servicing to confirm that the device is safe to use.

SOR/2008-119, s. 20.

EXEMPTIONS FROM LICENCE REQUIREMENT

General Exempted Activities - 5

5. (1) A person may carry on any of the following activities without a licence:

(*a*) possess, transfer, import, export, use, mine, produce, refine, convert, enrich, process, reprocess, manage or store a radioactive nuclear substance if the activity or the activity concentration of the substance does not, at any one time, exceed

(i) its exemption quantity,

(ii) its conditional clearance level, or

(iii) its unconditional clearance level;

(*b*) possess, transfer, import, export, store, use, abandon, produce or service a sealed source that contains less than the exemption quantity of a radioactive nuclear substance;

(*c*) possess, transfer, import, export, store, use or abandon a radiation device, other than an exposure device, if the quantity of the nuclear substance or substances contained in the device is less than 10 times the exemption quantity;

(*d*) possess, transfer, store, use, abandon, produce, refine, convert, enrich, process, reprocess, manage or dispose of deuterium or a compound containing deuterium, if the quantity of deuterium is less than 10 kg in any calendar year;

(*e*) possess, transfer, store, use or manage depleted uranium, in any quantity, when used as counterweights in aircraft and

(i) each counterweight manufactured after the coming into force of this subparagraph is durably and legibly impressed with the words “DEPLETED URANIUM APPAUVRI” and the words are visible through any plating or other covering,

(ii) each counterweight manufactured after the coming into force of this subparagraph is durably and legibly labelled or impressed with the name of the manufacturer and its unique identification number and the statement “UNAUTHORIZED ALTERATIONS PROHIBITED / MODIFICATIONS INTERDITES SANS AUTORISATION”, and

(iii) no chemical, physical or metallurgical treatment or processing of the counterweights is done other than for the repair or restoration of any plating or

other covering; or

(*f*) possess, transfer, use or abandon material that contains not more than 10 kg of depleted uranium, natural uranium or natural thorium in any calendar year and that is not used for its radiation properties.

(2) Subsection (1) does not apply in respect of Category I, II or III nuclear material, as defined in section 1 of the *Nuclear Security Regulations*.

(3) Paragraphs (1)(*a*) to (*c*) do not apply in respect of the import or export of a nuclear substance, sealed source or radiation device to which the *Nuclear Non-proliferation Import and Export Control Regulations* apply.

(4) [Repealed, SOR/2008-119, s. 21]

SOR/2008-119, s. 21.

Abandonment or Disposal – 5.1

5.1 (1) A person may, without a licence, abandon or dispose of a radioactive nuclear substance if the activity or the activity concentration of the substance does not exceed

(*a*) its exemption quantity;

(*b*) its conditional clearance level; or

(*c*) its unconditional clearance level.

(2) Subsection (1) does not apply in respect of

(*a*) Category I nuclear material, Category II nuclear material or Category III nuclear material, as those terms are defined in section 1 of the *Nuclear Security Regulations*; or

(*b*) discharges of effluents from

(i) Class I nuclear facilities, as defined in section 1 of the *Class I Nuclear Facilities Regulations*, or

(ii) mines or mills, as those terms are defined in section 1 of the *Uranium Mines and Mills Regulations*.

SOR/2008-119, s. 22.

Smoke Detectors - 6

6. A person may, without a licence to carry on that activity, possess, transfer, use or abandon a smoke detector that contains a nuclear substance, if

(*a*) the smoke detector does not contain more than 185 kBq of americium 241 or, where it is in a commercial or industrial facility, more than 740 kBq of americium 241;

(*b*) the radiation dose rate does not exceed 1 µSv per hour at 0.1 m from any of the accessible surfaces of the smoke detector;

(*c*) the design and construction of the smoke detector prevent persons from making direct contact with the nuclear substance that it contains under normal conditions of use;

(*d*) all markings and labels on the smoke detector are legible;

(*e*) the radioactive nuclear substance contained in the smoke detector is a sealed source that, when it is mounted in its holder, conforms to International Standard 2919, *Radiation Protection — Sealed radioactive sources — General requirements and classification* (1999), of the International Organization for Standardization; and

(*f*) the smoke detector meets the tests specified in the annex entitled Prototype Tests of the *Recommendations for ionization chamber smoke detectors in implementation of radiation protection standards* (1977) of the Nuclear Energy Agency of the Organisation for Economic Co-operation and Development.

SOR/2008-119, s. 23.

Tritium Safety Signs - 7

7. A person may, without a licence to carry on that activity, possess, transfer, use or abandon a tritium-activated self-luminous safety sign if

(*a*) the only nuclear substance contained in the safety sign is tritium;

(*b*) the safety sign contains no more than 925 GBq of tritium in gaseous form;

(*c*) the light-emitting component containing the tritium consists of glass tubes that are enclosed in a sturdy metal or plastic frame mounted in a manner that prevents the dismantlement and removal of the glass tubes;

(*d*) the amount of tritium present in the form of oxide does not exceed 1 per cent per volume for each glass tube;

(*e*) the safety sign conforms to ANSI/HPS N43.4-2000, *Classification of Radioactive Self-Luminous Light Sources*, of the American National Standards Institute/Health Physics Society, or to Standard MIL-STD-810F, 2000, *Department of Defense Test*

Method Standard for Environmental Engineering Considerations and Laboratory Tests, of the United States Department of Defense; and

(*f*) the safety sign, if it is manufactured after the coming into force of this paragraph, is marked with the name and quantity in becquerels of the nuclear substance, the manufacturer's recommended expiry date for the sign and the date of manufacture of the sign.

SOR/2008-119, s. 24.

Devices Containing Radium Luminous Compounds - 8

8. A person may, without a licence to carry on that activity, possess, transfer or use a device that contains a nuclear substance, if

(*a*) the only nuclear substance contained in the device is a radium luminous compound;

(*b*) the person does not possess more than 10 such devices; and

(*c*) the device is not disassembled or tampered with.

SOR/2008-119, s. 25(F).

Check Sources – 8.1

8.1 A person may, without a licence to carry on that activity, possess, transfer, store, use or abandon a check source that contains a radioactive nuclear substance and that is designed to verify the response of an instrument when exposed to the radiation output of the check source, if

(*a*) the check source contains

(i) not more than 370 kBq of a nuclear substance and the substance, or its short-lived radioactive progeny, does not emit alpha radiation, or

(ii) not more than 3.7 kBq of a nuclear substance if the atomic number of the substance is greater than 81 and the substance, or its short-lived radioactive progeny, emits alpha radiation;

(*b*) the radiation dose rate does not exceed 1 µSv per hour at 0.1 m from any of the accessible surfaces of the check source;

(*c*) the design and construction of the check source, under normal conditions of use, prevent persons from making direct contact with the nuclear substance that it contains;

(*d*) all markings and labels on the check source or exterior packaging are legible;

(*e*) the radioactive nuclear substance in the check source, when it is mounted in its holder, conforms to International Standard 2919, *Radiation Protection — Sealed radioactive sources — General requirements and classification* (1999), of the International Organization for Standardization; and

(*f*) the check source, if it is a sealed source, meets the tests specified in ANSI/HPS N43.6-1997, *Sealed Radioactive Sources — Classification*, of the American National Standards Institute/Health Physics Society.

SOR/2008-119, s. 26.

Manufacturers and Distributors Not Exempted – 9

9. Sections 6 to 8.1 do not apply to manufacturers or initial distributors in Canada of the devices or check sources referred to in those sections.

SOR/2008-119, s. 27.

10. [Repealed, SOR/2008-119, s. 27]

CERTIFICATION OF RADIATION DEVICES

Certification Requirement - 11

11. (1) No person shall use a radiation device unless

(*a*) it is a certified model; or

(*b*) it is used in accordance with a licence that authorizes its use for development purposes.

(2) No person shall transfer a radiation device for use within Canada unless it is a certified model.

Application for Certification - 12

12. (1) The Commission or a designated officer authorized under paragraph 37(2)(*a*) of the Act may certify a model of a radiation device after receiving an application that includes the following information:

(*a*) the applicant's name and business address;

(*b*) the name and business address of the manufacturer of the device;

(*c*) the brand name and model number of the device;

(*d*) the design of the device and its components, including any standards used in the design;

(*e*) the intended use of the device;

(*f*) the name, quantity in becquerels and form of the nuclear substance to be incorporated into the device;

(*g*) the method of incorporating the nuclear substance into the device;

(*h*) the expected radiation dose rates around the device in all modes of operation, including the method, calculations and measurements used to establish them;

(*i*) instructions for the use, transportation and storage of the device;

(*j*) instructions for conducting leak tests on the device;

(*k*) instructions for dealing with accidents, including fires and spills, in which the device may be involved;

(*l*) a description of the labelling of the device;

(*m*) the quality assurance program that was followed during the design of the device and that will be followed during production of the device; and

(*n*) the recommended inspection and servicing program for the device.

(*o*) [Repealed, SOR/2008-119, s. 28]

(2) The Commission or the designated officer may request any other information that is necessary to enable the Commission or the designated officer to determine whether the model of the device poses an unreasonable risk to the environment, the health and safety of persons or national security and whether certification of the model of the device would be in conformity with measures of control and international obligations to which Canada has agreed.

SOR/2008-119, s. 28.

Refusal to Certify - 13

13. (1) The Commission or a designated officer authorized under paragraph 37(2)(*a*) of the Act shall notify a person who has applied for the certification of a model of a radiation device of a proposed decision not to certify the model, as well as the basis for the proposed decision, at least 30 days before refusing to certify it.

(2) The notice shall include a description of the person's right to be provided with an opportunity to be heard in accordance with the procedure referred to in section 15.

Decertification - 14

14. (1) The Commission or a designated officer authorized under paragraph 37(2)(*a*) of the Act shall notify a person to whom a certificate for a model of a radiation device has been issued, and any licensee who is licensed in respect of that model, of a proposed decision to decertify the model, as well as the basis for the proposed decision, at least 30 days before decertifying it.

(2) The notice shall include a description of the person's and the licensee's right to be provided with an opportunity to be heard in accordance with the procedure referred to in section 15.

Opportunity To Be Heard - 15

15. (1) Where a person referred to in section 13 or 14 or a licensee referred to in section 14 has received a notice and has requested, within 30 days after the date of receipt of the notice, an opportunity to be heard either orally or in writing, the person or the licensee shall be provided with such an opportunity in accordance with the request.

(2) On completion of a hearing held in accordance with subsection (1), every person and licensee who was notified in accordance with section 13 or 14 shall be notified of the decision and the reasons for it.

(3) Where neither a person referred to in section 13 or 14 nor a licensee referred to in section 14 requests an opportunity to be heard within the period referred to in subsection (1), they shall be notified of the decision and the reasons for it.

GENERAL OBLIGATIONS

Medical Supervision - 16

16. No licensee shall use a radioactive nuclear substance or a radiation device on a person except as directed by a medical practitioner who is qualified to give such direction under the applicable provincial legislation.

Radiation Safety Instructions - 17

17. Every licensee shall make available to all workers, at the site of the licensed activity, copies of any instructions referred to in the licence concerning radiation safety and accidents, including fires and spills, in which a nuclear substance may be involved.

Leak Tests - 18

18. (1) Every licensee who possesses, uses or produces either a sealed source containing 50 MBq or more of a nuclear substance or a nuclear substance as shielding shall, at the following times, conduct leak tests on the sealed source or shielding using instruments and procedures that enable the licensee to detect a leakage of 200 Bq or less of the nuclear substance:

(*a*) where the sealed source or shielding is used after being stored for 12 or more consecutive months, immediately before using it;

(*b*) where the sealed source or shielding is being stored, every 24 months;

(*c*) where an event that may have damaged the sealed source or shielding has occurred, immediately after the event; and

(*d*) in all other cases,

(i) where the sealed source or shielding is located in a radiation device, every 12 months, and

(ii) where the sealed source or shielding is not located in a radiation device, every six months.

(2) Subsection (1) does not apply in respect of a sealed source that is

(*a*) gaseous;

(*b*) contained in a static eliminator that has been retained by the licensee for less than 15 months;

(*c*) exempted under section 5, 6, 8 or 8.1; or

(*d*) used or stored underwater in a nuclear facility that is equipped with a device capable of detecting water-borne contamination of 200 Bq or less of a nuclear substance.

(3) Where a licensee, in the course of conducting a leak test on a sealed source or on shielding, detects the leakage of 200 Bq or more of a nuclear substance, the licensee shall

(*a*) discontinue using the sealed source or shielding;

(*b*) discontinue using the radiation device in which the sealed source or shielding is located or may have been located;

(*c*) take measures to limit the spread of radioactive contamination from the sealed source or shielding; and

(*d*) immediately after complying with paragraphs (*a*) to (*c*), notify the Commission that the leakage has been detected.

SOR/2008-119, s. 29.

Transfers - 19

19. (1) Every licensee who transfers a radiation device shall provide the transferee with the instructions referred to in the radiation device certificate for dealing with accidents, including fires and spills.

(2) A licensee who transfers a sealed source or a nuclear substance as shielding shall provide the transferee with a record of the most recent leak test conducted in accordance with section 18.

Radiation Survey Meters - 20

20. No person shall use, for the purpose of the Act, the regulations made under the Act or an order or a licence, a radiation survey meter that has not been calibrated within the 12 months preceding its use.

Accidents - 21

21. Where a radiation device is involved in an accident or is subjected to conditions other than those in which it is designed to operate, the licensee shall discontinue using it until the licensee performs a test or an inspection which establishes that it is functioning properly.

Labelling for Field Operations - 22

22. No person shall use a radiation device in field operations unless the device has securely attached to it a durable, readily visible and legible label that sets out the name or job title and the telephone number of a person who can initiate the accident procedure referred to in the licence that has been issued in respect of the device and who can be contacted 24 hours a day.

Posting of Signs - 23

23. Every licensee who is required under section 21 of the *Radiation Protection Regulations* to post a sign shall

(*a*) post and keep posted, in a visible location at the place where the radioactive nuclear substance is used or stored, a durable and legible sign that indicates the name or job title and the telephone number of a person who can initiate any required

emergency procedure and who can be contacted 24 hours a day; and

(*b*) post and keep posted, in a visible location at every personnel access opening to any equipment fitted with a radiation device, a durable and legible sign that bears

(i) the radiation warning symbol set out in Schedule 3 to the *Radiation Protection Regulations* and the words “RAYONNEMENT — DANGER — RADIATION”, and

(ii) the requirement to follow the personnel entry procedures required by the licence.

SOR/2008-119, s. 30.

EXPOSURE DEVICES

Requirement for Operators - 24

24. No person other than a certified exposure device operator, or a trainee who is acting under the direct supervision and continuous observation of a certified exposure device operator, shall operate an exposure device.

Application for Certification of Operator - 25

25. The Commission or a designated officer authorized under paragraph 37(2)(*b*) of the Act may certify a person as an exposure device operator after receiving an application that includes the following information:

(*a*) the person’s name and business address;

(*b*) the person’s training and experience; and

(*c*) evidence of the successful completion by the person of an examination recognized by the Commission.

SOR/2008-119, s. 31.

Refusal to Certify - 26

26. (1) The Commission or a designated officer authorized under paragraph 37(2)(*b*) of the Act shall notify a person who has applied for certification as an exposure device operator of a proposed decision not to certify the person, as well as the basis for the proposed decision, at least 30 days before refusing to certify the person.

(2) The notice shall include a description of the person’s right to be provided with an opportunity to be heard in accordance with the procedure referred to in section 28.

Decertification - 27

27. (1) The Commission or a designated officer authorized under paragraph 37(2)(*b*) of the Act shall notify a certified exposure device operator of a proposed decision to decertify the operator, as well as the basis for the proposed decision, at least 30 days before decertifying that operator.

(2) The notice shall include a description of the certified exposure device operator's right to be provided with an opportunity to be heard in accordance with the procedure referred to in section 28.

Opportunity To Be Heard - 28

28. (1) Where a person referred to in section 26 or a certified exposure device operator referred to in section 27 has received a notice and has requested, within 30 days after the date of receipt of the notice, an opportunity to be heard either orally or in writing, the person or the operator shall be provided with such an opportunity in accordance with the request.

(2) On completion of a hearing held in accordance with subsection (1), the person or the certified exposure device operator who requested an opportunity to be heard shall be notified of the decision and the reasons for it.

(3) Where neither a person referred to in section 26 nor a certified exposure device operator referred to in section 27 requests an opportunity to be heard within the period referred to in subsection (1), they shall be notified of the decision and the reasons for it.

Surrender of Certificate - 29

29. A certified exposure device operator, on being notified of a decision to decertify in accordance with subsection 28(2) or (3), shall immediately surrender to the Commission the certificate that was issued to the operator.

Obligations of Licensees - 30

30. (1) Every licensee who possesses, uses or produces an exposure device shall

(*a*) ensure that there is affixed securely to the exposure device, by means of metal fasteners, a durable steel or brass tag that is readily visible and legibly inscribed with the name, quantity in becquerels, date of measurement of that quantity and form of the nuclear substance contained in the exposure device;

(*b*) lock the exposure device and keep it locked when it is not being used; and

(*c*) return a dosimeter referred to in paragraph (3)(*c*) to the dosimetry service that issued the dosimeter, within 10 days after the end of the period referred to in subsection 31(2).

(2) Every licensee who becomes aware of any of the following situations shall notify the Commission immediately of the location and circumstances of the situation and of any action that the licensee has taken or proposes to take with respect to it:

(*a*) the exposure device or the sealed source assembly is lost, stolen or damaged to an extent that could impair its normal use;

(*b*) the exposure device has a radiation dose rate of more than 2 mSv per hour on any part of its surface when the sealed source assembly is in the shielded position;

(*c*) the sealed source assembly is separated from the exposure device when the latter is not being serviced; or

(*d*) the sealed source assembly fails to return to the shielded position inside the exposure device.

(3) Every licensee who authorizes a person to operate an exposure device shall provide the person with

(*a*) a radiation survey meter that

(i) is capable of measuring a dose rate of gamma radiation from the sealed source of between 20 µSv and 100 mSv per hour, and

(ii) indicates that the power level of its batteries is sufficient for its operation;

(*b*) if an external sealed source assembly guide tube is to be used,

(i) material that can be used to attenuate, by a factor of at least 100, the radiation from the sealed source,

(ii) tools that can sever from the exposure device the tube and cable to which the sealed source assembly is attached, and

(iii) tongs with a shaft at least 1.5 m long that can handle the sealed source assembly;

(*c*) a dosimeter that

(i) has been issued by a licensed dosimetry service,

(ii) has not been used by another person since its last reading, and

(iii) is designed so that it can be worn on the trunk of the body;

(*d*) a dosimeter that

(i) has direct-reading display capability,

(ii) is of a type suitable for recording any dose of radiation that the person is likely to receive as a result of the operation of the exposure device,

(iii) has been calibrated or had its calibration verified, within the 12-month period prior to being provided, to an accuracy within 20 per cent of the true dose of radiation, and

(iv) is designed so that it can be worn on the trunk of the body;

(*e*) a dosimeter that

(i) is of a type suitable for recording any dose of radiation that the person is likely to receive as a result of the operation of the exposure device,

(ii) emits an audible warning signal when the radiation dose rate reaches or exceeds 5 mSv per hour or when the total dose of radiation reaches or exceeds 2 mSv, or emits an audible warning signal that increases proportionally to the radiation dose rate,

(iii) is designed to prevent an unintentional change in the radiation dose rate or total dose of radiation at which the dosimeter will emit an audible warning signal,

(iv) has been calibrated or had its calibration verified, within the 12-month period prior to being provided, to an accuracy within 20 per cent of the true dose of radiation, and

(v) is designed so that it can be worn on the trunk of the body;

(*f*) a sufficient number of durable and legible signs that bear the radiation warning symbol set out in Schedule 3 to the *Radiation Protection Regulations* and the words “RAYONNEMENT — DANGER — RADIATION” to enable the person to comply with paragraph 31(1)(*k*); and

(*g*) a sufficient number of forms to enable the person to keep the records referred to in paragraph 31(1)(*e*) and section 37.

(4) No licensee shall authorize a person to operate an exposure device that

(*a*) does not appear to be functioning normally; or

(*b*) has a radiation dose rate of more than 2 mSv per hour on any part of its surface.

(5) Every licensee who authorizes a person to remove a sealed source from or insert a

sealed source into an exposure device shall provide the person with a written authorization signed by the licensee.

(6) Every licensee shall limit the dose of radiation received by a person, other than a nuclear energy worker, as a result of the possession or use of an exposure device to 0.1 mSv per week and 0.5 mSv per year.

(7) No licensee shall authorize any person to respond to any of the following situations unless the person has received specialized training in the safety, regulatory and technical requirements for dealing with those situations or has received training in the safety, regulatory and technical requirements for dealing with those situations and is acting under the guidance of a person who has received the specialized training:

(*a*) the exposure device or the sealed source assembly is damaged to an extent that could impair its normal use;

(*b*) the exposure device has a radiation dose rate of more than 2 mSv per hour on any part of its surface when the sealed source assembly is in the shielded position;

(*c*) the sealed source assembly is separated from the exposure device when the latter is not being serviced; or

(*d*) the sealed source assembly fails to return to the shielded position inside the exposure device.

SOR/2008-119, s. 32.

Obligations of Operators - 31

31. (1) Every person who operates an exposure device shall

(*a*) use a radiation survey meter that

(i) is capable of measuring a dose rate of gamma radiation from the sealed source of between 20 µSv and 100 mSv per hour, and

(ii) indicates that the power level of its batteries is sufficient for its operation;

(*b*) when an external sealed source assembly guide tube is being used, have immediately available the following items:

(i) material that can be used to attenuate, by a factor of at least 100, the radiation from the sealed source,

(ii) tools that can sever from the exposure device the tube and cable to which the sealed source assembly is attached, and

(iii) tongs with a shaft at least 1.5 m long that can handle the sealed source assembly;

(*c*) wear on the trunk of the body a dosimeter that

(i) has been issued by a licensed dosimetry service, and

(ii) has not been used by another person since its last reading;

(*d*) wear on the trunk of the body a dosimeter that

(i) has direct-reading display capability,

(ii) is of a type suitable for recording any dose of radiation that the person is likely to receive as a result of the operation of the exposure device, and

(iii) has been calibrated or had its calibration verified within the 12-month period prior to wearing, to an accuracy within 20 per cent of the true dose of radiation;

(*e*) keep a record of the dose of radiation received by the person for each day the person operates the exposure device, as indicated by the dosimeter referred to in paragraph (*d*);

(*f*) wear on the trunk of the body a dosimeter that

(i) is of a type suitable for recording any dose of radiation that the person is likely to receive as a result of the operation of the exposure device,

(ii) emits an audible warning signal when the radiation dose rate reaches or exceeds 5 mSv per hour or when the total dose of radiation reaches or exceeds 2 mSv, or emits an audible warning signal that increases proportionally to the radiation dose rate,

(iii) is designed to prevent an unintentional change in the radiation dose rate or total dose of radiation at which the dosimeter will emit an audible warning signal, and

(iv) has been calibrated or had its calibration verified within the 12-month period prior to wearing, to an accuracy within 20 per cent of the true dose of radiation;

(*g*) examine the sealed source assembly coupling and guide tube, the locking mechanism, the cranking device, the drive cable and the pneumatic pump of the exposure device immediately before operating the device to ensure that the device is functioning within the manufacturer’s specifications;

(*h*) after each attempt to move the sealed source assembly to the shielded position inside the exposure device, use a radiation survey meter to determine that the sealed source assembly is in the shielded position;

(*i*) limit the dose of radiation received by any person, other than a nuclear energy worker, as a result of the possession or use of the exposure device to 0.1 mSv per week and 0.5 mSv per year;

(*j*) place persons or erect barriers to prevent entry into any area within which the radiation dose rate is greater than 0.1 mSv per hour as a result of the possession or use of the exposure device;

(*k*) post a sufficient number of durable and legible signs that bear the radiation warning symbol set out in Schedule 3 to the *Radiation Protection Regulations* and the words “RAYONNEMENT — DANGER — RADIATION”, to prevent entry into any area within which the radiation dose rate is greater than 0.1 mSv per hour as a result of the possession or use of the exposure device;

(*l*) lock the exposure device when it is not being operated; and

(*m*) where the person becomes aware of any of the following situations, immediately report to the licensee the location and circumstances of the situation and any action that the person has taken or proposes to take with respect to it:

(i) the exposure device or the sealed source assembly is lost, stolen or damaged to an extent that could impair its normal use,

(ii) the exposure device has a radiation dose rate of more than 2 mSv per hour on any part of its surface when the sealed source assembly is in the shielded position,

(iii) the sealed source assembly is separated from the exposure device when the latter is not being serviced, or

(iv) a failure to return the sealed source assembly to the shielded position inside the exposure device.

(2) Every person who has been provided with a dosimeter referred to in paragraph 30(3)(*c*) by a licensee shall return the dosimeter to the licensee at the end of the 15-day period beginning on the first day that the person wore the dosimeter.

(3) Every person who keeps a record referred to in paragraph (1)(*e*) shall submit the record to the licensee at the end of each 15-day period, the first of which begins on the first day that the person operated the exposure device.

(4) No person shall operate an exposure device that

(*a*) does not appear to be functioning normally; or

(*b*) has a radiation dose rate of more than 2 mSv per hour on any part of its surface.

(5) Every person operating an exposure device shall, during each work shift, ensure that the dose of radiation accumulated does not exceed 2 mSv, and if the dose exceeds 2 mSv, the person shall stop work immediately and notify the licensee at the earliest opportunity.

(6) No person shall respond to any of the following situations unless the person has received specialized training in the safety, regulatory and technical requirements for dealing with those situations or has received training in the safety, regulatory and technical requirements for dealing with those situations and is acting under the guidance of a person who has received the specialized training:

(*a*) the exposure device or the sealed source assembly is damaged to an extent that could impair its normal use;

(*b*) the exposure device has a radiation dose rate of more than 2 mSv per hour on any part of its surface when the sealed source assembly is in the shielded position;

(*c*) the sealed source assembly is separated from the exposure device when the latter is not being serviced; or

(*d*) the sealed source assembly fails to return to the shielded position inside the exposure device.

SOR/2008-119, s. 33.

Appointment of Supervisors of Trainees - 32

32. (1) A licensee may appoint a certified exposure device operator to supervise a trainee in the operation of an exposure device, if

(*a*) the certified exposure device operator has the qualifications, training and experience necessary to supervise a trainee in the safe operation of the exposure device;

(*b*) the licensee requests the certified exposure device operator, in accordance with subsection (2), to accept the appointment; and

(*c*) the certified exposure device operator accepts the appointment in writing.

(2) A request referred to in paragraph (1)(*b*) shall be made in writing and shall

(*a*) state the name of the trainee;

(*b*) state the brand name and model number of the exposure device;

(*c*) direct the attention of the certified exposure device operator to this section and to section 33; and

(*d*) include a copy of the licence to use the exposure device.

SOR/2008-119, s. 34.

Obligations of Supervisors of Trainees - 33

33. (1) No certified exposure device operator who is supervising a trainee in the operation of an exposure device shall permit the trainee to operate the device unless the trainee has sufficient knowledge to safely operate it.

(2) Every certified exposure device operator who is supervising a trainee in the operation of an exposure device shall directly supervise and continuously observe the trainee while the trainee is operating the device.

Replacement of Sealed Source - 34

34. (1) Every person who removes a sealed source from or inserts a sealed source into an exposure device shall possess a written authorization to do so, signed by the licensee who possesses, uses, produces or services the exposure device.

(2) Immediately after a person removes a sealed source from or inserts a sealed source into an exposure device, the person shall measure

(*a*) the radiation dose rate on each accessible surface of the exposure device; and

(*b*) the dose of radiation received by persons who were exposed to radiation during the removal or insertion, using a dosimeter referred to in paragraph 30(3)(*d*).

(3) Every person who removes a sealed source from or inserts a sealed source into an exposure device shall record the radiation dose rates and doses of radiation referred to in subsection (2) and report them to the licensee who possesses or uses the exposure device.

TRACER STUDIES - 35

35. (1) Every licensee who uses more than 2 GBq of a nuclear substance that is not a sealed source for the purpose of conducting a tracer or subsurface tracer study shall notify the Commission before conducting the study.

(2) Every licensee shall, within 60 days after using a nuclear substance referred to in subsection (1) for the purpose of conducting a tracer or subsurface tracer study, file with the Commission a report that includes

(*a*) the date and location of the study;

(*b*) the name, quantity in becquerels and form of the nuclear substance used in the study;

(*c*) the name of the person for whom the study was conducted;

(*d*) the names of all workers who handled the nuclear substance and the dosimeter readings and bioassay results for those workers;

(*e*) a description of any unusual occurrence;

(*f*) a description of the disposition of any unused nuclear substance; and

(*g*) the specific activity of the nuclear substance upon entering and leaving the system studied and a description of the disposition of the nuclear substance.

RECORDS TO BE KEPT AND RETAINED

Nuclear Substances - 36

36. (1) Every licensee shall keep the following records:

(*a*) a record of the following information in respect of any nuclear substance in the licensee's possession that is referred to in the licence:

(i) the name, quantity, form and location of the nuclear substance,

(ii) where the nuclear substance is a sealed source, the model and serial number of the source,

(iii) where the nuclear substance is contained in a radiation device, the model and serial number of the device,

(iv) the quantity of the nuclear substance used, and

(v) the manner in which the nuclear substance was used;

(*b*) a record of the name of each worker who uses or handles a nuclear substance;

(*c*) a record of any transfer, receipt, disposal or abandonment of a nuclear substance,

including

(i) the date of the transfer, receipt, disposal or abandonment,

(ii) the name and address of the supplier or the recipient,

(iii) the number of the licence of the recipient,

(iv) the name, quantity and form of the nuclear substance transferred, received, disposed of or abandoned,

(v) where the nuclear substance is a sealed source, the model and serial number of the source, and

(vi) where the nuclear substance is contained in a radiation device, the model and serial number of the device;

(*d*) a record of the training received by each worker; and

(*e*) a record of every inspection, measurement, test or servicing performed by the licensee in accordance with the Act, the regulations made under the Act or the licence in respect of any radiation device containing a nuclear substance that the licensee is authorized by the licence to possess.

(1.1) Every licensee who holds a licence to service radiation devices shall keep a record of the following information in respect of each servicing performed on any radiation device containing a nuclear substance that another licensee, by their licence, is authorized to possess, including:

(*a*) the name and address of the client for whom the servicing was performed;

(*b*) the licence number of the client for whom the servicing was performed;

(*c*) the brand name, model number and serial number of the radiation device;

(*d*) the name, quantity and date of measurement of the nuclear substance contained in the radiation device; and

(*e*) a summary of the work and the date on which the servicing was performed.

(2) Every licensee shall retain a record referred to in paragraph (1)(*d*) for the period ending three years after the termination of employment of the worker.

(3) Every person who is required to keep a record referred to in paragraph (1)(*e*) or subsection (1.1) shall retain the record for the period ending three years after the earlier

of the expiry date and the date of revocation, if any, of the licence.

(4) Every licensee shall keep a record of each leak test conducted on a sealed source or on shielding in accordance with section 18 and that person shall retain the record for the period ending three years after the date on which it is conducted.

SOR/2008-119, s. 35.

Exposure Devices - 37

37. Every licensee who possesses an exposure device shall keep a record of the following information in respect of the device:

(*a*) the brand name, model number and serial number of the exposure device;

(*b*) the quantity in becquerels of any nuclear substance contained in the exposure device;

(*c*) the dates on which and the locations where the exposure device is operated;

(*d*) the date of acquisition and, where applicable, the date of disposal of the exposure device and any sealed source assembly;

(*e*) the names of all persons whom the licensee has authorized to possess or use the exposure device or any sealed source assembly;

(*f*) all written authorizations provided by the licensee in accordance with subsection 30(5);

(*g*) all requests made by the licensee in accordance with paragraph 32(1)(*b*) and all appointments accepted in response to those requests;

(*h*) every inspection, measurement, test, servicing or calibration performed in accordance with these Regulations; and

(*i*) the measurements submitted to the licensee in accordance with these Regulations by a person who has operated the exposure device.

SOR/2008-119, s. 36.

REPORTS TO BE MADE BY LICENSEES - 38

38. (1) Every licensee who possesses or uses a nuclear substance or a radiation device and becomes aware of any of the following situations shall notify the Commission

immediately of the location and circumstances of the situation and of any action that the licensee has taken or proposes to take with respect to it:

(*a*) the nuclear substance or the radiation device is lost or stolen;

(*b*) the radiation device is damaged to an extent that could impair its normal use;

(*c*) the sealed source is separated from the radiation device when the latter is not being serviced;

(*d*) the sealed source fails to return to the shielded position inside the radiation device; and

(*e*) there is a spill of

(i) an unsealed radioactive nuclear substance that is set out in column 1 of Schedule 1, that has produced in excess of 100 times the activity set out in column 3, and

(ii) an unsealed radioactive nuclear substance that is not set out in column 1.

(2) Every licensee referred to in subsection (1) or subsection 30(2) who becomes aware of a situation referred to in one of those subsections shall file a full report of the situation with the Commission within 21 days after the day on which the licensee becomes aware of it or within the period specified in the licence, and the report shall contain the following information:

(*a*) a description of the situation, the circumstances and the problem, if any, with the radiation device;

(*b*) the probable cause of the situation;

(*c*) the nuclear substance, and if applicable, the brand name, model number and serial number of the radiation device involved;

(*d*) the date, time and location where the situation occurred or, if unknown, the approximate date, time and location, and the date and time of becoming aware of the situation;

(*e*) the actions that the licensee has taken to re-establish normal operations;

(*f*) the actions that the licensee has taken or proposes to take to prevent a recurrence of the situation;

(*g*) if the situation involved an exposure device, the qualifications of the workers,

including any trainee, who were involved;

(*h*) the effective dose and equivalent dose — as those terms are defined in subsection 1(1) of the *Radiation Protection Regulations* — received by any person as a result of the situation; and

(*i*) the effects on the environment, the health and safety of persons and the maintenance of security that have resulted or may result from the situation.

SOR/2008-119, s. 37.

COMING INTO FORCE - 39

39. These Regulations come into force on the day on which they approved by the Governor in Council.

SCHEDULE 1
(Section 1 and paragraph 38(1)(e))

EXEMPTION QUANTITIES

Column 1	**Column 2**	**Column 3**
Radioactive Nuclear Substance	**Activity Concentration (Bq/g)**	**Activity (Bq)**
Actinium 227	1×10^{-1}	1×10^{3}
Actinium 228	1×10^{1}	1×10^{6}
Americium 241	1×10^{0}	1×10^{4}
Americium 242	1×10^{3}	1×10^{6}
Americium 242m[a]	1×10^{0}	1×10^{4}
Americium 243[a]	1×10^{0}	1×10^{3}
Antimony 122	1×10^{2}	1×10^{4}
Antimony 124	1×10^{1}	1×10^{6}
Antimony 125	1×10^{2}	1×10^{6}
Argon 37	1×10^{6}	1×10^{8}
Argon 41	1×10^{2}	1×10^{9}
Arsenic 73	1×10^{3}	1×10^{7}
Arsenic 74	1×10^{1}	1×10^{6}
Arsenic 76	1×10^{2}	1×10^{5}

Arsenic 77	1×10^{3}	1×10^{6}
Astatine 211	1×10^{3}	1×10^{7}
Barium 131	1×10^{2}	1×10^{6}
Barium 133	1×10^{2}	1×10^{6}
Barium 140[a]	1×10^{1}	1×10^{5}
Berkelium 249	1×10^{3}	1×10^{6}
Beryllium 7	1×10^{3}	1×10^{7}
Bismuth 206	1×10^{1}	1×10^{5}
Bismuth 207	1×10^{1}	1×10^{6}
Bismuth 210	1×10^{3}	1×10^{6}
Bismuth 212[a]	1×10^{1}	1×10^{5}
Bromine 82	1×10^{1}	1×10^{6}
Cadmium 107	1×10^{3}	1×10^{7}
Cadmium 109	1×10^{4}	1×10^{6}
Cadmium 113m	1×10^{3}	1×10^{6}
Cadmium 115	1×10^{2}	1×10^{6}
Cadmium 115m	1×10^{3}	1×10^{6}
Calcium 45	1×10^{4}	1×10^{7}
Calcium 47	1×10^{1}	1×10^{6}
Californium 246	1×10^{3}	1×10^{6}
Californium 248	1×10^{1}	1×10^{4}
Californium 249	1×10^{0}	1×10^{3}
Californium 250	1×10^{1}	1×10^{4}
Californium 251	1×10^{0}	1×10^{3}
Californium 252	1×10^{1}	1×10^{4}
Californium 253	1×10^{2}	1×10^{5}
Californium 254	1×10^{0}	1×10^{3}
Carbon 11	1×10^{1}	1×10^{6}
Carbon 14	1×10^{4}	1×10^{7}
Cerium 139	1×10^{2}	1×10^{6}
Cerium 141	1×10^{2}	1×10^{7}
Cerium 143	1×10^{2}	1×10^{6}
Cerium 144[a]	1×10^{2}	1×10^{5}
Cesium 129	1×10^{2}	1×10^{5}
Cesium 131	1×10^{3}	1×10^{6}
Cesium 132	1×10^{1}	1×10^{5}

Cesium 134	1×10^{1}	1×10^{4}
Cesium 134m	1×10^{3}	1×10^{5}
Cesium 135	1×10^{4}	1×10^{7}
Cesium 136	1×10^{1}	1×10^{5}
Cesium 137[a]	1×10^{1}	1×10^{4}
Cesium 138	1×10^{1}	1×10^{4}
Chlorine 36	1×10^{4}	1×10^{6}
Chlorine 38	1×10^{1}	1×10^{5}
Chromium 49	1×10^{1}	1×10^{6}
Chromium 51	1×10^{3}	1×10^{7}
Cobalt 55	1×10^{1}	1×10^{6}
Cobalt 56	1×10^{1}	1×10^{5}
Cobalt 57	1×10^{2}	1×10^{6}
Cobalt 58	1×10^{1}	1×10^{6}
Cobalt 58m	1×10^{4}	1×10^{7}
Cobalt 60	1×10^{1}	1×10^{5}
Cobalt 60m	1×10^{3}	1×10^{6}
Cobalt 61	1×10^{2}	1×10^{6}
Cobalt 62m	1×10^{1}	1×10^{5}
Copper 60	1×10^{1}	1×10^{5}
Copper 64	1×10^{2}	1×10^{6}
Copper 67	1×10^{2}	1×10^{6}
Curium 242	1×10^{2}	1×10^{5}
Curium 243	1×10^{0}	1×10^{4}
Curium 244	1×10^{1}	1×10^{4}
Curium 245	1×10^{0}	1×10^{3}
Curium 246	1×10^{0}	1×10^{3}
Curium 247	1×10^{0}	1×10^{4}
Curium 248	1×10^{0}	1×10^{3}
Dysprosium 159	1×10^{3}	1×10^{7}
Dysprosium 165	1×10^{3}	1×10^{6}
Dysprosium 166	1×10^{3}	1×10^{6}
Einsteinium 253	1×10^{2}	1×10^{5}
Einsteinium 254	1×10^{1}	1×10^{4}
Einsteinium 254m	1×10^{2}	1×10^{6}
Erbium 169	1×10^{4}	1×10^{7}

Erbium 171	1×10^{2}	1×10^{6}
Europium 152	1×10^{1}	1×10^{6}
Europium 152m	1×10^{2}	1×10^{6}
Europium 154	1×10^{1}	1×10^{6}
Europium 155	1×10^{2}	1×10^{7}
Fermium 254	1×10^{4}	1×10^{7}
Fermium 255	1×10^{3}	1×10^{6}
Fluorine 18	1×10^{1}	1×10^{6}
Gadolinium 153	1×10^{2}	1×10^{7}
Gadolinium 159	1×10^{3}	1×10^{6}
Gallium 67	1×10^{2}	1×10^{6}
Gallium 72	1×10^{1}	1×10^{5}
Germanium 68	1×10^{1}	1×10^{5}
Germanium 71	1×10^{4}	1×10^{8}
Gold 195	1×10^{2}	1×10^{7}
Gold 198	1×10^{2}	1×10^{6}
Gold 199	1×10^{2}	1×10^{6}
Hafnium 181	1×10^{1}	1×10^{6}
Holmium 166	1×10^{3}	1×10^{5}
Hydrogen 3	1×10^{6}	1×10^{9}
Indium 111	1×10^{2}	1×10^{6}
Indium 113m	1×10^{2}	1×10^{6}
Indium 114m	1×10^{2}	1×10^{6}
Indium 115	1×10^{3}	1×10^{5}
Indium 115m	1×10^{2}	1×10^{6}
Iodine 123	1×10^{2}	1×10^{7}
Iodine 125	1×10^{3}	1×10^{6}
Iodine 126	1×10^{2}	1×10^{6}
Iodine 129	1×10^{2}	1×10^{5}
Iodine 130	1×10^{1}	1×10^{6}
Iodine 131	1×10^{2}	1×10^{6}
Iodine 132	1×10^{1}	1×10^{5}
Iodine 133	1×10^{1}	1×10^{6}
Iodine 134	1×10^{1}	1×10^{5}
Iodine 135	1×10^{1}	1×10^{6}
Iridium 190	1×10^{1}	1×10^{6}

Iridium 192	1×10^{1}	1×10^{4}
Iridium 194	1×10^{2}	1×10^{5}
Iron 52	1×10^{1}	1×10^{6}
Iron 55	1×10^{4}	1×10^{6}
Iron 59	1×10^{1}	1×10^{6}
Krypton 74	1×10^{2}	1×10^{9}
Krypton 76	1×10^{2}	1×10^{9}
Krypton 77	1×10^{2}	1×10^{9}
Krypton 79	1×10^{3}	1×10^{5}
Krypton 81	1×10^{4}	1×10^{7}
Krypton 83m	1×10^{5}	1×10^{12}
Krypton 85	1×10^{5}	1×10^{4}
Krypton 85m	1×10^{3}	1×10^{10}
Krypton 87	1×10^{2}	1×10^{9}
Krypton 88	1×10^{2}	1×10^{9}
Lanthanum 140	1×10^{1}	1×10^{5}
Lead 203	1×10^{2}	1×10^{6}
Lead 210[a]	1×10^{1}	1×10^{4}
Lead 212[a]	1×10^{1}	1×10^{5}
Lutetium 177	1×10^{3}	1×10^{7}
Manganese 51	1×10^{1}	1×10^{5}
Manganese 52	1×10^{1}	1×10^{5}
Manganese 52m	1×10^{1}	1×10^{5}
Manganese 53	1×10^{4}	1×10^{9}
Manganese 54	1×10^{1}	1×10^{6}
Manganese 56	1×10^{1}	1×10^{5}
Mercury 197	1×10^{2}	1×10^{7}
Mercury 197m	1×10^{2}	1×10^{6}
Mercury 203	1×10^{2}	1×10^{5}
Molybdenum 90	1×10^{1}	1×10^{6}
Molybdenum 93	1×10^{3}	1×10^{8}
Molybdenum 99	1×10^{2}	1×10^{6}
Molybdenum 101	1×10^{1}	1×10^{6}
Neodymium 147	1×10^{2}	1×10^{6}
Neodymium 149	1×10^{2}	1×10^{6}
Neptunium 237[a]	1×10^{0}	1×10^{3}

Neptunium 239	1×10^{2}	1×10^{7}
Neptunium 240	1×10^{1}	1×10^{6}
Nickel 59	1×10^{4}	1×10^{8}
Nickel 63	1×10^{5}	1×10^{8}
Nickel 65	1×10^{1}	1×10^{6}
Niobium 93m	1×10^{4}	1×10^{7}
Niobium 94	1×10^{1}	1×10^{6}
Niobium 95	1×10^{1}	1×10^{6}
Niobium 97	1×10^{1}	1×10^{6}
Niobium 98	1×10^{1}	1×10^{5}
Nitrogen 13	1×10^{2}	1×10^{9}
Osmium 185	1×10^{1}	1×10^{6}
Osmium 191	1×10^{2}	1×10^{7}
Osmium 191m	1×10^{3}	1×10^{7}
Osmium 193	1×10^{2}	1×10^{6}
Oxygen 15	1×10^{2}	1×10^{9}
Palladium 103	1×10^{3}	1×10^{8}
Palladium 109	1×10^{3}	1×10^{6}
Phosphorous 32	1×10^{3}	1×10^{5}
Phosphorous 33	1×10^{5}	1×10^{8}
Platinum 191	1×10^{2}	1×10^{6}
Platinum 193m	1×10^{3}	1×10^{7}
Platinum 197	1×10^{3}	1×10^{6}
Platinum 197m	1×10^{2}	1×10^{6}
Plutonium 234	1×10^{2}	1×10^{7}
Plutonium 235	1×10^{2}	1×10^{7}
Plutonium 236	1×10^{1}	1×10^{4}
Plutonium 237	1×10^{3}	1×10^{7}
Plutonium 238	1×10^{0}	1×10^{4}
Plutonium 239	1×10^{0}	1×10^{4}
Plutonium 240	1×10^{0}	1×10^{3}
Plutonium 241	1×10^{2}	1×10^{5}
Plutonium 242	1×10^{0}	1×10^{4}
Plutonium 243	1×10^{3}	1×10^{7}
Plutonium 244	1×10^{0}	1×10^{4}
Polonium 203	1×10^{1}	1×10^{6}

Polonium 205	1×10^{1}	1×10^{6}
Polonium 207	1×10^{1}	1×10^{6}
Polonium 210	1×10^{1}	1×10^{4}
Potassium 40	1×10^{2}	1×10^{6}
Potassium 42	1×10^{2}	1×10^{6}
Potassium 43	1×10^{1}	1×10^{6}
Praseodymium 142	1×10^{2}	1×10^{5}
Praseodymium 143	1×10^{4}	1×10^{6}
Promethium 147	1×10^{4}	1×10^{7}
Promethium 149	1×10^{3}	1×10^{6}
Protactinium 230	1×10^{1}	1×10^{6}
Protactinium 231	1×10^{0}	1×10^{3}
Protactinium 233	1×10^{2}	1×10^{7}
Radium 223[a]	1×10^{2}	1×10^{5}
Radium 224[a]	1×10^{1}	1×10^{5}
Radium 225	1×10^{2}	1×10^{5}
Radium 226[a]	1×10^{1}	1×10^{4}
Radium 227	1×10^{2}	1×10^{6}
Radium 228[a]	1×10^{1}	1×10^{5}
Radon 220[a]	1×10^{4}	1×10^{7}
Radon 222[a]	1×10^{1}	1×10^{8}
Rhenium 186	1×10^{3}	1×10^{6}
Rhenium 187	1×10^{6}	1×10^{9}
Rhenium 188	1×10^{2}	1×10^{5}
Rhodium 103m	1×10^{4}	1×10^{8}
Rhodium 105	1×10^{2}	1×10^{7}
Rubidium 86	1×10^{2}	1×10^{5}
Ruthenium 97	1×10^{2}	1×10^{7}
Ruthenium 103	1×10^{2}	1×10^{6}
Ruthenium 105	1×10^{1}	1×10^{6}
Ruthenium 106[a]	1×10^{2}	1×10^{5}
Samarium 151	1×10^{4}	1×10^{8}
Samarium 153	1×10^{2}	1×10^{6}
Scandium 46	1×10^{1}	1×10^{6}
Scandium 47	1×10^{2}	1×10^{6}
Scandium 48	1×10^{1}	1×10^{5}

Selenium 75	1×10^{2}	1×10^{6}
Selenium 79	1×10^{4}	1×10^{7}
Silicon 31	1×10^{3}	1×10^{6}
Silver 105	1×10^{2}	1×10^{6}
Silver 110m	1×10^{1}	1×10^{6}
Silver 111	1×10^{3}	1×10^{6}
Sodium 22	1×10^{1}	1×10^{6}
Sodium 24	1×10^{1}	1×10^{5}
Strontium 85	1×10^{2}	1×10^{6}
Strontium 85m	1×10^{2}	1×10^{7}
Strontium 87m	1×10^{2}	1×10^{6}
Strontium 89	1×10^{3}	1×10^{6}
Strontium 90[a]	1×10^{2}	1×10^{4}
Strontium 91	1×10^{1}	1×10^{5}
Strontium 92	1×10^{1}	1×10^{6}
Sulphur 35	1×10^{5}	1×10^{8}
Tantalum 182	1×10^{1}	1×10^{4}
Technetium 96	1×10^{1}	1×10^{6}
Technetium 96m	1×10^{3}	1×10^{7}
Technetium 97	1×10^{3}	1×10^{8}
Technetium 97m	1×10^{3}	1×10^{7}
Technetium 99	1×10^{4}	1×10^{7}
Technetium 99m	1×10^{2}	1×10^{7}
Tellurium 123m	1×10^{2}	1×10^{7}
Tellurium 125m	1×10^{3}	1×10^{7}
Tellurium 127	1×10^{3}	1×10^{6}
Tellurium 127m	1×10^{3}	1×10^{7}
Tellurium 129	1×10^{2}	1×10^{6}
Tellurium 129m	1×10^{3}	1×10^{6}
Tellurium 131	1×10^{2}	1×10^{5}
Tellurium 131m	1×10^{1}	1×10^{6}
Tellurium 132	1×10^{2}	1×10^{7}
Tellurium 133	1×10^{1}	1×10^{5}
Tellurium 133m	1×10^{1}	1×10^{5}
Tellurium 134	1×10^{1}	1×10^{6}
Terbium 160	1×10^{1}	1×10^{6}

Thallium 200	1×10^{1}	1×10^{6}
Thallium 201	1×10^{2}	1×10^{6}
Thallium 202	1×10^{2}	1×10^{6}
Thallium 204	1×10^{4}	1×10^{4}
Thorium 226[a]	1×10^{3}	1×10^{7}
Thorium 227	1×10^{1}	1×10^{4}
Thorium 228[a]	1×10^{0}	1×10^{4}
Thorium 229[a]	1×10^{0}	1×10^{3}
Thorium 230	1×10^{0}	1×10^{4}
Thorium 231	1×10^{3}	1×10^{7}
Thorium 232	1×10^{1}	1×10^{4}
Thorium 234[a]	1×10^{3}	1×10^{5}
Thorium natural[a]	1×10^{0}	1×10^{3}
Thulium 170	1×10^{3}	1×10^{6}
Thulium 171	1×10^{4}	1×10^{8}
Tin 113	1×10^{3}	1×10^{7}
Tin 125	1×10^{2}	1×10^{5}
Tungsten 181	1×10^{3}	1×10^{7}
Tungsten 185	1×10^{4}	1×10^{7}
Tungsten 187	1×10^{2}	1×10^{6}
Uranium 230[a]	1×10^{1}	1×10^{5}
Uranium 231	1×10^{2}	1×10^{7}
Uranium 232[a]	1×10^{0}	1×10^{3}
Uranium 233	1×10^{1}	1×10^{4}
Uranium 234	1×10^{1}	1×10^{4}
Uranium 235[a]	1×10^{1}	1×10^{4}
Uranium 236	1×10^{1}	1×10^{4}
Uranium 237	1×10^{2}	1×10^{6}
Uranium 238[a]	1×10^{1}	1×10^{4}
Uranium 239	1×10^{2}	1×10^{6}
Uranium 240	1×10^{3}	1×10^{7}
Uranium 240[a]	1×10^{1}	1×10^{6}
Uranium natural[a]	1×10^{0}	1×10^{3}
Vanadium 48	1×10^{1}	1×10^{5}
Xenon 123	1×10^{2}	1×10^{9}
Xenon 129m	1×10^{3}	1×10^{4}

Xenon 131m	1×10^{4}	1×10^{4}
Xenon 133	1×10^{3}	1×10^{4}
Xenon 135	1×10^{3}	1×10^{10}
Ytterbium 169	1×10^{2}	1×10^{7}
Ytterbium 175	1×10^{3}	1×10^{7}
Yttrium 90	1×10^{3}	1×10^{5}
Yttrium 91	1×10^{3}	1×10^{6}
Yttrium 91m	1×10^{2}	1×10^{6}
Yttrium 92	1×10^{2}	1×10^{5}
Yttrium 93	1×10^{2}	1×10^{5}
Zinc 65	1×10^{1}	1×10^{6}
Zinc 69	1×10^{4}	1×10^{6}
Zinc 69m	1×10^{2}	1×10^{6}
Zirconium 93[a]	1×10^{3}	1×10^{7}
Zirconium 95	1×10^{1}	1×10^{6}
Zirconium 97[a]	1×10^{1}	1×10^{5}

[a] Parent nuclides and their progeny included in secular equilibrium are listed in the following:

Am-242m	Am-242
Am-243	Np-239
Ba-140	La-140
Bi-212	Tl-208 (0.36), Po-212 (0.64)
Ce-144	Pr-144
Cs-137	Ba-137m
Np-237	Pa-233
Pb-210	Bi-210, Po-210
Pb-212	Bi-212, Tl-208 (0.36), Po-212 (0.64)
Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Tl-207
Ra-224	Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Ra-226	Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
Ra-228	Ac-228
Rn-220	Po-216
Rn-222	Po-218, Pb-214, Bi-214, Po-214

Ru-106	Rh-106
Sr-90	Y-90
Th-226	Ra-222, Rn-218, Po-214
Th-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Th-229	Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209
Th-234	Pa-234m
Th-nat	Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
U-230	Th-226, Ra-222, Rn-218, Po-214
U-232	Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
U-235	Th-231
U-238	Th-234, Pa-234m
U-240	Np-240m
U-nat	Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
Zr-93	Nb-93m
Zr-97	Nb-97

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SCHEDULE 2
(Section 1)

UNCONDITIONAL CLEARANCE LEVELS

Column 1 **Radioactive Nuclear Substance**	**Column 2** **Activity Concentration (Bq/g)**
Actinium 227	1×10^{0}
Americium 241	1×10^{-1}
Americium 242	1×10^{3}
Americium 242m[a]	1×10^{-1}
Americium 243[a]	1×10^{-1}
Antimony 122	1×10^{1}
Antimony 124	1×10^{0}

Antimony 125	1×10^{-1}
Arsenic 73	1×10^{3}
Arsenic 74	1×10^{1}
Arsenic 76	1×10^{1}
Arsenic 77	1×10^{3}
Astatine 211	1×10^{3}
Barium 131	1×10^{1}
Barium 140[a]	1×10^{0}
Berkelium 249	1×10^{2}
Beryllium 7	1×10^{1}
Bismuth 206	1×10^{0}
Bismuth 207	1×10^{-1}
Bromine 82	1×10^{0}
Cadmium 109	1×10^{0}
Cadmium 115	1×10^{1}
Cadmium 115m	1×10^{2}
Calcium 45	1×10^{2}
Calcium 47	1×10^{1}
Californium 246	1×10^{3}
Californium 248	1×10^{0}
Californium 249	1×10^{-1}
Californium 250	1×10^{0}
Californium 251	1×10^{-1}
Californium 252	1×10^{0}
Californium 253	1×10^{2}
Californium 254	1×10^{0}
Carbon 14	1×10^{0}
Cerium 139	1×10^{0}
Cerium 141	1×10^{2}
Cerium 143	1×10^{1}
Cerium 144[a]	1×10^{1}
Cesium 129	1×10^{1}
Cesium 131	1×10^{3}
Cesium 132	1×10^{1}
Cesium 134	1×10^{-1}
Cesium 134m	1×10^{3}

Cesium 135	1×10^{2}
Cesium 136	1×10^{0}
Cesium 137[a]	1×10^{-1}
Cesium 138	1×10^{1}
Chlorine 36	1×10^{0}
Chlorine 38	1×10^{1}
Chromium 51	1×10^{2}
Cobalt 55	1×10^{1}
Cobalt 56	1×10^{-1}
Cobalt 57	1×10^{0}
Cobalt 58	1×10^{0}
Cobalt 58m	1×10^{4}
Cobalt 60	1×10^{-1}
Cobalt 60m	1×10^{3}
Cobalt 61	1×10^{2}
Cobalt 62m	1×10^{1}
Copper 64	1×10^{2}
Curium 242	1×10^{1}
Curium 243	1×10^{0}
Curium 244	1×10^{0}
Curium 245	1×10^{-1}
Curium 246	1×10^{-1}
Curium 247	1×10^{-1}
Curium 248	1×10^{-1}
Dysprosium 165	1×10^{3}
Dysprosium 166	1×10^{2}
Einsteinium 253	1×10^{2}
Einsteinium 254	1×10^{-1}
Einsteinium 254m	1×10^{1}
Erbium 169	1×10^{3}
Erbium 171	1×10^{2}
Europium 152	1×10^{-1}
Europium 152m	1×10^{2}
Europium 154	1×10^{-1}
Europium 155	1×10^{0}
Fermium 254	1×10^{4}

Fermium 255	1×10^{2}
Fluorine 18	1×10^{1}
Gadolinium 153	1×10^{1}
Gadolinium 159	1×10^{2}
Gallium 72	1×10^{1}
Germanium 71	1×10^{4}
Gold 198	1×10^{1}
Gold 199	1×10^{2}
Hafnium 181	1×10^{0}
Holmium 166	1×10^{2}
Hydrogen 3	1×10^{2}
Indium 111	1×10^{1}
Indium 113m	1×10^{2}
Indium 114m	1×10^{1}
Indium 115m	1×10^{2}
Iodine 123	1×10^{2}
Iodine 125	1×10^{2}
Iodine 126	1×10^{1}
Iodine 129	1×10^{-2}
Iodine 130	1×10^{1}
Iodine 131	1×10^{1}
Iodine 132	1×10^{1}
Iodine 133	1×10^{1}
Iodine 134	1×10^{1}
Iodine 135	1×10^{1}
Iridium 190	1×10^{0}
Iridium 192	1×10^{0}
Iridium 194	1×10^{2}
Iron 52	1×10^{1}
Iron 55	1×10^{3}
Iron 59	1×10^{0}
Lanthanum 140	1×10^{0}
Lead 203	1×10^{1}
Lead 210[a]	1×10^{0}
Lutetium 177	1×10^{2}
Manganese 51	1×10^{1}

Manganese 52	1×10^{0}
Manganese 52m	1×10^{1}
Manganese 53	1×10^{2}
Manganese 54	1×10^{-1}
Manganese 56	1×10^{1}
Mercury 197	1×10^{2}
Mercury 197m	1×10^{2}
Mercury 203	1×10^{1}
Molybdenum 90	1×10^{1}
Molybdenum 93	1×10^{1}
Molybdenum 99	1×10^{1}
Molybdenum 101	1×10^{1}
Neodymium 147	1×10^{2}
Neodymium 149	1×10^{2}
Neptunium 237[a]	1×10^{0}
Neptunium 239	1×10^{2}
Neptunium 240	1×10^{1}
Nickel 59	1×10^{2}
Nickel 63	1×10^{2}
Nickel 65	1×10^{1}
Niobium 93m	1×10^{1}
Niobium 94	1×10^{-1}
Niobium 95	1×10^{0}
Niobium 97	1×10^{1}
Niobium 98	1×10^{1}
Osmium 185	1×10^{0}
Osmium 191	1×10^{2}
Osmium 191m	1×10^{3}
Osmium 193	1×10^{2}
Palladium 103	1×10^{3}
Palladium 109	1×10^{2}
Phosphorous 32	1×10^{3}
Phosphorous 33	1×10^{3}
Platinum 191	1×10^{1}
Platinum 193m	1×10^{3}
Platinum 197	1×10^{3}

Platinum 197m	1×10^{2}
Plutonium 234	1×10^{2}
Plutonium 235	1×10^{2}
Plutonium 236	1×10^{0}
Plutonium 237	1×10^{2}
Plutonium 238	1×10^{-1}
Plutonium 239	1×10^{-1}
Plutonium 240	1×10^{-1}
Plutonium 241	1×10^{1}
Plutonium 242	1×10^{-1}
Plutonium 243	1×10^{3}
Plutonium 244	1×10^{-1}
Polonium 203	1×10^{1}
Polonium 205	1×10^{1}
Polonium 207	1×10^{1}
Polonium 210	1×10^{0}
Potassium 40	1×10^{1}
Potassium 42	1×10^{2}
Potassium 43	1×10^{1}
Praseodymium 142	1×10^{2}
Praseodymium 143	1×10^{3}
Promethium 147	1×10^{3}
Promethium 149	1×10^{3}
Protactinium 230	1×10^{1}
Protactinium 231	1×10^{0}
Protactinium 233	1×10^{1}
Radium 223[a]	1×10^{0}
Radium 224[a]	1×10^{0}
Radium 225	1×10^{1}
Radium 226[a]	1×10^{0}
Radium 227	1×10^{2}
Radium 228[a]	1×10^{0}
Rhenium 186	1×10^{3}
Rhenium 188	1×10^{2}
Rhodium 103m	1×10^{4}
Rhodium 105	1×10^{2}

Rubidium 86	1×10^{2}
Ruthenium 97	1×10^{1}
Ruthenium 103	1×10^{0}
Ruthenium 105	1×10^{1}
Ruthenium 106[a]	1×10^{-1}
Samarium 151	1×10^{3}
Samarium 153	1×10^{2}
Scandium 46	1×10^{-1}
Scandium 47	1×10^{2}
Scandium 48	1×10^{0}
Selenium 75	1×10^{0}
Silicon 31	1×10^{3}
Silver 105	1×10^{0}
Silver 110m	1×10^{-1}
Silver 111	1×10^{2}
Sodium 22	1×10^{-1}
Sodium 24	1×10^{0}
Strontium 85	1×10^{0}
Strontium 85m	1×10^{2}
Strontium 87m	1×10^{2}
Strontium 89	1×10^{3}
Strontium 90[a]	1×10^{0}
Strontium 91	1×10^{1}
Strontium 92	1×10^{1}
Sulphur 35	1×10^{2}
Tantalum 182	1×10^{-1}
Technetium 96	1×10^{0}
Technetium 96m	1×10^{3}
Technetium 97	1×10^{1}
Technetium 97m	1×10^{2}
Technetium 99	1×10^{0}
Technetium 99m	1×10^{2}
Tellurium 123m	1×10^{0}
Tellurium 125m	1×10^{3}
Tellurium 127	1×10^{3}
Tellurium 127m	1×10^{1}

Tellurium 129	1×10^{2}
Tellurium 129m	1×10^{1}
Tellurium 131	1×10^{2}
Tellurium 131m	1×10^{1}
Tellurium 132	1×10^{0}
Tellurium 133	1×10^{1}
Tellurium 133m	1×10^{1}
Tellurium 134	1×10^{1}
Terbium 160	1×10^{0}
Thallium 200	1×10^{1}
Thallium 201	1×10^{2}
Thallium 202	1×10^{1}
Thallium 204	1×10^{0}
Thorium 226[a]	1×10^{3}
Thorium 227	1×10^{0}
Thorium 228[a]	1×10^{0}
Thorium 229[a]	1×10^{-1}
Thorium 230	1×10^{0}
Thorium 232	1×10^{0}
Thorium 234[a]	1×10^{0}
Thorium natural[a]	1×10^{0}
Thulium 170	1×10^{2}
Thulium 171	1×10^{3}
Tin 113	1×10^{0}
Tin 125	1×10^{1}
Tungsten 181	1×10^{1}
Tungsten 185	1×10^{3}
Tungsten 187	1×10^{1}
Uranium 230[a]	1×10^{1}
Uranium 231	1×10^{2}
Uranium 232[a]	1×10^{-1}
Uranium 233	1×10^{0}
Uranium 234	1×10^{0}
Uranium 235[a]	1×10^{0}
Uranium 236	1×10^{1}
Uranium 237	1×10^{2}

Uranium 238[a]	1×10^{0}
Uranium 239	1×10^{2}
Uranium 240[a]	1×10^{2}
Uranium natural[a]	1×10^{0}
Vanadium 48	1×10^{0}
Ytterbium 175	1×10^{2}
Yttrium 90	1×10^{3}
Yttrium 91	1×10^{2}
Yttrium 91m	1×10^{2}
Yttrium 92	1×10^{2}
Yttrium 93	1×10^{2}
Zinc 65	1×10^{-1}
Zinc 69	1×10^{3}
Zinc 69m	1×10^{1}
Zirconium 93[a]	1×10^{1}
Zirconium 95	1×10^{0}
Zirconium 97[a]	1×10^{1}

[a] Parent nuclides and their progeny included in secular equilibrium are listed in the following:

Am-242m	Am-242
Am-243	Np-239
Ba-140	La-140
Ce-144	Pr-144
Cs-137	Ba-137m
Np-237	Pa-233
Pb-210	Bi-210
Ra-223	Rn-219, Po-215, Pb-211, Bi-211, Tl-207
Ra-224	Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Ra-226	Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
Ra-228	Ac-228
Ru-106	Rh-106
Sr-90	Y-90
Th-226	Ra-222, Rn-218, Po-214

Th-228	Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
Th-229	Ra-225, Ac-225, Fr-221, At-217, Bi-213, Po-213, Pb-209
Th-234	Pa-234m
Th-nat	Ra-228, Ac-228, Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
U-230	Th-226, Ra-222, Rn-218, Po-214
U-232	Th-228, Ra-224, Rn-220, Po-216, Pb-212, Bi-212, Tl-208 (0.36), Po-212 (0.64)
U-235	Th-231
U-238	Th-234, Pa-234m
U-240	Np-240m
U-nat	Th-234, Pa-234m, U-234, Th-230, Ra-226, Rn-222, Po-218, Pb-214, Bi-214, Po-214, Pb-210, Bi-210, Po-210
Zr-93	Nb-93m
Zr-97	Nb-97

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