…

DECREE
of …,

amending Decree No 422/2016 on radiation protection and security of radionuclide sources

Pursuant to § 236 of Act No 263/2016, the Atomic Act, as amended by Act No 83/2025, in order to implement § 9(2)(c) and (j), § 17(3)(a) and (b), § 24(7), § 25(2)(a) to (d), § 60(4), § 61(6), § 63(6), § 66(6), § 67(4), § 68(2)(a) to (i) and (k), § 69(2), § 70(2)(b) and (c), § 71(2), § 72(5), § 73(3), § 74(4), § 75(5)(a), § 76(6), § 77(2), § 78(3), § 81(3), § 83(7), § 85(5), § 86(3), § 87(5), § 88(6), § 89(2), § 93(5), § 95(6), § 96(3), § 98(4), § 99(5), § 100(3), § 101(4), § 104(9) and § 164(2), the State Office for Nuclear Safety lays down the following:

Decree No 422/2016 on radiation protection and security of radionuclide sources is amended as follows:

Article I

Decree No 422/2016 on radiation protection and security of radionuclide sources is amended as follows:

1. In the introductory sentence, the words ‘§ 68(2)(a) to (i)’ are replaced by the words ‘§ 68(2)(a) to (i) and (k)’.
2. In the introductory sentence, the words ‘§ 84(6)’ are deleted.
3. In the introductory sentence, the words ‘§ 93(4)’ are replaced by the words ‘§ 93(5)’.
4. In the introductory sentence, the words ‘, § 159a(5)’ are inserted after ‘9’.
5. In the introductory sentence, the words ‘§ 85(4)’ are replaced by the words ‘§ 85(5)’.
6. § 2(q) reads as follows:

> ‘q) conversion factor for radionuclide intake means a coefficient indicating the committed effective dose per unit intake of a radionuclide; the conventional values of conversion factors for radionuclide intake are set out in Annex 3 to this Decree;’.

7. In § 2(v), the semicolon at the end is replaced by the word ‘and’.
8. In § 2(w) the word ‘; and’ is replaced by a full stop.

9. § 2(x) is deleted.
10. In § 5(1), the words ‘or registrant’ are inserted after the words ‘permit’.
11. In the introductory part of § 6(4), the words ‘paragraph (6)’ are replaced by the words ‘paragraphs (6), (7) and (8)’.
12. § 6(5) reads as follows:

‘(5) For the calculation pursuant to paragraph (4), the conversion factor for the unidentified form and properties of a radionuclide shall be that recommended in Annex 3 to this Decree for all unspecified forms of a radionuclide.’.

13. § 6(6) reads as follows:

‘(6) The derived limit corresponding to a committed effective dose of 20 mSv for exposure to mixtures of long-lived alpha-emitting radionuclides of the uranium–radium series is an intake by inhalation of 1 600 Bq per calendar year.’.

14. The following § 6(7) is added:

‘(7) The derived limit corresponding to a committed effective dose of 20 mSv from exposure to radon decay products is an intake of latent energy of
a) 8 mJ per calendar year in underground workplaces with forced ventilation,
b) 4 mJ per calendar year in underground workplaces with natural ventilation.’.

15. The following § 6(8) is added:

‘(8) If an exposed worker is simultaneously subjected to external and internal exposure to radon decay products and to mixtures of long-lived alpha-emitting radionuclides of the uranium-radium series, the limit for exposed workers shall be considered not to have been exceeded if the following conditions are met:
$E_{ext} + E_{int,\,Rn} + E_{int,dl.alfa} \leq 0.02$ Sv,
where
E_{ext} (Sv) is the effective dose from external gamma radiation exposure
$E_{int,Rn}$ (Sv) is the committed effective dose from internal exposure to radon decay products
$E_{int,dl.alpha}$ (Sv) is the committed effective dose from internal exposure by inhalation of a mixture of long-lived alpha-emitting radionuclides of the uranium-radium series.’.

16. In § 8, the reference reads as follows:

‘[Regarding § 24(7) and § 66(6)(c) of the Atomic Act]’.

17. In the introductory part of § 8(5), the word ‘Documentation’ is replaced by the word ‘Procedures’.
18. In § 10(1), the words ‘used by a person’ are replaced by the word ‘that’.
19. At the end of § 10(1), the words ‘are handled’ are added.
20. § 15(a) reads as follows:

‘(a) a radiation generator intended for medical exposure, except for X-ray bone densitometers, dental intra-oral X-ray equipment and dental panoramic X-ray equipment;’.

21. At the end of § 15(b), the words ‘with energy above 1 MeV’ are added.
22. In § 15(e), the words ‘tissue, blood and’ are inserted after the word ‘irradiation’.
23. In § 15(e), the semicolon is deleted.
24. In § 15(f), the word ‘or’ is deleted.
25. In § 15(g), the full stop at the end is replaced by the word ‘; or’.
26. The following § 15(h) is added:

‘h) a radiation generator used in veterinary radiotherapy for treatment purposes.’.

27. In § 18(1), the words ‘are collected’ are replaced by the words ‘are simultaneously present in multiple quantities’.
28. In § 19(1)(a), the words ‘of a type not approved by the Office,’ are deleted.
29. In § 19(1)(c), the words ‘with veterinary or’ are replaced by the word ‘with’.
30. In § 19(1)(e), the word ‘and’ is deleted.
31. In § 19(1)(f), the full stop at the end is replaced by the word ‘; and’.
32. The following § 19(1)(g) is added:

‘g) workplaces with X-ray equipment used in veterinary medicine, except for radiotherapy for treatment purposes.’.

33. § 19(2)(b) reads as follows:

‘b) workplaces with X-ray equipment intended for medical exposure in radiodiagnostics or radiotherapy, with the exception of bone densitometers or dental X-ray equipment;’.

34. In § 19(2)(f), the word ‘and’ is deleted.
35. In § 19(2)(g), the full stop at the end is replaced by the word ‘and’.
36. The following § 19(2)(h) is added:

‘h) a workplace with X-ray equipment used in veterinary radiotherapy for treatment purposes.’.

37. At the end of § 19(3)(a), the words ‘with energy above 1 MeV’ are added.
38. In § 21(2)(d), the words ‘, including software and artificial intelligence tools’ are inserted after the word ‘accessories’.
39. In § 21(2)(l), the words ‘preventive medical’ are replaced by the words ‘occupational medical’.
40. § 26 reads as follows:

‘§ 26

Acceptance test

[Regarding § 68(2)(a) and (k) and § 69(2)(c) and (g) of the Atomic Act]

(1) An acceptance test must be carried out after installation of a source of ionising radiation, prior to commencement of its use

a) for a newly manufactured source of ionising radiation;
b) after complete refurbishment of a source of ionising radiation under which most of its characteristics or accessories change significantly;
c) after relocation of a stationary source of ionising radiation;
d) after relocation of a mobile source of ionising radiation to another address;
e) after a change in the holder of the permit for its use and, at the same time, the address of the workplace in the case of a portable radiation generator used for medical exposure or in veterinary medicine;
f) after any other change that may significantly affect the functionality of the source of ionising radiation.

(2) The acceptance test must be carried out when the source of ionising radiation and the site where it is located are fit for performing the test.

(3) The acceptance test must include the tests specified in Annex 12 to this Decree.

(4) Restricted operation in the event of unsatisfactory acceptance test results may only be imposed in the case of a source of ionising radiation used by a holder of a permit for medical exposure, if the unsatisfactory results relate to a specific restricted regime of use of the source of ionising radiation, provided that there is another restricted operating regime that is fully adequate and free of defects for the specific purpose of its use. In such a case:

a) the person in charge of the acceptance test, in cooperation with the clinical medical physics expert at the site where the source is used, may decide that the test is successful for this specific restricted regime and, at the same time, lay down an operating restriction corresponding to the established facts;
b) the person conducting the acceptance test, together with the clinical medical physics expert, shall record the operating restriction and the reasons for it in writing and shall immediately forward this record to the permit holder or registrant who will be using the source of ionising radiation;
c) the person conducting the acceptance test shall state the reasons for the operating restriction in the acceptance test report.

(5) Following subsequent remedial action, an acceptance test for which a restricted scope was stipulated may be supplemented by a partial acceptance test which, if successful, will amend or lift the operating restriction to which the initial acceptance test related.

(6) The person who carries out the acceptance test must adapt the scope of the test to the specific purpose of use and to the specific characteristics of the source of ionising radiation and its accessories that have an impact on radiation protection.

(7) The permit holder who performed the acceptance test is obliged to submit the acceptance test report to the permit holder or registrant who uses the source of ionising radiation within one month of the date on which the test was performed.’.

41. In § 27(1)(f), the word ‘and’ is deleted.
42. In § 27(1)(g), the full stop at the end is replaced by the words ‘, except for minor defects with no impact on radiation protection, for which it was stated in the report of the long-term stability test in which the defect was first identified that its rectification can be confirmed by an operational stability test;’.

43. The following § 27(1)(h) is added:

‘h) if the reason for restricted operation pursuant to § 30(3) is eliminated and’.

44. The following § 27(1)(i) is added:

‘i) if there is a significant change in the manner of use of the source of ionising radiation that affects the parameters tested in the long-term stability test.

45. § 28(1) reads as follows:

‘(1) The content of the long-term stability test is laid down in Annex 12 to this Decree.’.

46. In § 29(1)(e), the word ‘and’ is deleted.

47. § 29(1)(f) reads as follows:

‘f) § 27(1)(g) it has been verified as to whether

1. the defect found in the previous long-term stability test has been rectified; and
2. no other defect has arisen as a result of the rectification of that defect;’.

48. The following § 29(1)(g) is added:

‘g) § 27(1)(h) it has been verified that the reason for restricted operation pursuant to § 30 has been eliminated; and’.

49. The following § 29(1)(h) is added:

‘h) § 27(1)(i), it has been verified that the equipment also meets the requirements of the long-term stability test within the scope of the newly introduced manner of use.’.

50. § 30 reads as follows:

‘§ 30

Evaluation of the long-term stability test and the elimination of defects

[Regarding § 68(2)(g) and § 69(2)(g) of the Atomic Act]

(1) The rules for the categorisation of very serious and minor defects detected during the long-term stability test are set out in Annex 12 to this Decree.

(2) The long-term stability test report must be submitted by the permit holder who performed the test to the permit holder or registrant who uses the source of ionising radiation within one month of the date on which the test was performed.

(3) Restricted operation in the event of unsatisfactory results in the long-term stability test may only be imposed in the case of a source of ionising radiation used by a permit holder for medical exposure, if the unsatisfactory results relate only to the specific restricted regime of use of the source of ionising radiation, provided that another restricted operating regime exists that is fully adequate and free of defects for the specific purpose of its use. In this case, the person conducting the long-term stability test, in cooperation with the clinical medical physics expert at the workplace where the source is used, may decide that the test is successful for that specific restricted regime and, at the same time, lay down an operating restrictions corresponding to the established facts.

(4) The operating restriction and the reasons for it must be recorded in writing by the person directing the long-term stability test together with the clinical medical physics expert and this record must be transmitted without delay to the permit holder or registrant using the source of ionising radiation. The operating restriction and its reasons must also be stated in the long-term stability test report.

(5) If the partial long-term stability test pursuant to § 29(1)(g) proves that the reason for the restricted operation has been eliminated, the operating restriction shall be lifted.

(6) If a very serious defect is detected during the long-term stability test, the permit holder conducting the test must immediately notify in writing the permit holder or registrant who uses the source of ionising radiation and their clinical medical physics expert, if the availability of that expert is required by other legislation, and must include this information in the long-term stability test report.

(7) As regards the time limit for eliminating a minor defect and the operating restrictions resulting from this defect, the permit holder conducting the long-term stability test must,

a) immediately upon becoming aware of the defect, notify the licence holder or registrant who uses the source of ionising radiation and their clinical medical physics expert, if the availability of that expert is required under other legislation; and
b) indicate them in the long-term stability test report.

(8) When stipulating the time limit for the elimination of a minor defect pursuant to paragraph (7), account must be taken of the nature of the minor defect detected and of the manner of normal use of the source of ionising radiation and its accessories that has an impact on radiation protection.

(9) The time limit for the elimination of a minor defect must not exceed 3 months and shall begin on the date of the long-term stability test in which the defect was first detected.’.

51. The following § 30a is inserted after § 30:

‘§ 30a

Scope and method of performing the activities of persons directing

and carrying out the evaluation of the properties of a source of ionising radiation

[Regarding § 69(2)(f) of the Atomic Act]

(1) A person directing the evaluation of the properties of a source of ionising radiation

a) provides methodological guidance to persons evaluating the properties of a source of ionising radiation, or persons assisting them, and ensures their initial and ongoing professional training in this field;
b) ensures the maintenance of good practice in the evaluation of the properties of a source of ionising radiation, particularly with regard to the current state of scientific knowledge and technological development;
c) establishes and updates the methodologies, model protocols and concept for ensuring the measurement of quantities and keeps them in accordance with the requirements of good practice, the actual conduct of the activity and the requirements of the Atomic Act;
d) is responsible for the metrological assurance of the activity carried out and for the availability and suitability of measuring instruments;
e) in the event of the occurrence or suspected occurrence of defects in a source of ionising radiation not used in radiodiagnostics, interventional radiology or non-medical exposure, decides on their classification into a category, on the stipulation of a time limit for their elimination, and, where applicable, imposes operating restrictions resulting from a minor defect;
f) in the event of the occurrence or suspected occurrence of very serious defects or atypical minor defects in a source of ionising radiation used in radiodiagnostics, interventional radiology or non-medical exposure, decides on their classification into a category, stipulates a time limit for their elimination, and, where applicable, imposes operating restrictions resulting from a minor defect;
g) decides on the test procedure in the case of an atypical source of ionising radiation or its accessories, or in the case of atypical findings during the test;
h) in the case of an acceptance test, or in the case of a long-term stability test in which the unsuitability of the current scope or frequency of operational stability tests has been identified, draws up a proposal for their amendment or a new proposal;
i) assesses whether the workplace and the source of ionising radiation are technically suitable for commencing the test;
j) if necessary, personally participates in the test and evaluates the properties of the source of ionising radiation, including the evaluation of the results;
k) in the case of the evaluation of the properties of a source of ionising radiation not used in radiodiagnostics, interventional radiology or non-medical exposure, evaluates the test results;
l) in cooperation with the clinical medical physics expert at the workplace that uses the source of ionising radiation, lays down operating restrictions pursuant to § 26(4) and § 30(3).

(2) A person performing the evaluation of the properties of a source of ionising radiation

a) evaluates the properties of the source of ionising radiation under standard conditions and records the measured values;
b) in the case of the evaluation of the properties of a source of ionising radiation used in radiodiagnostics, interventional radiology or non-medical exposure, evaluates the test results;
c) in the case of an acceptance test or a long-term stability test during which the unsuitability of the current scope or frequency of operational stability tests has been detected, provides to the person directing the evaluation of the properties of the source of ionising radiation the supporting materials for drawing up a proposal for the amendment or for a new proposal;
d) in the event of the occurrence or suspected occurrence of common minor defects in a source of ionising radiation used in radiodiagnostics, interventional radiology or non-medical exposure, decides on their classification, sets a time limit for their elimination and, where applicable, imposes operating restrictions resulting from the minor defect; in other cases, the person shall request guidance from the person directing the evaluation of the properties of the source of ionising radiation;
e) in the case of an atypical source of ionising radiation or its accessories, or atypical findings during the test, shall request methodological guidance from the person directing the evaluation of the properties of the source of ionising radiation at the site of measurement.'.

52. In § 31(2)(b)(4), the word 'and' is deleted.
53. In § 31(2)(c)(4), the full stop at the end is replaced by the word 'and'.
54. The following § 31(2) is added:

'd) in the case of a source of ionising radiation used in radiography or mammography, analysis of repeated images every 12 months.'.

55. In § 32, the reference reads as follows:

'[Regarding § 68(2)(c) to (f) of the Atomic Act]'.

56. § 32(1)(a)(2) reads as follows:

'2. a health professional who, in clinical practice, uses a source of ionising radiation in the case of an operational stability test of a computed tomography scanner, including a computed tomography scanner used in nuclear medicine and radiotherapy;'.

57. In § 32(1)(b)(2), the words 'radiology assistant' are replaced by the words 'health professional'.
58. In § 32(1)(b)(2), after the words 'uses a source of ionising radiation', the words 'or, if required by operating conditions, a medical physics expert or radiological technician' are inserted.

59. In the introductory part of § 32(2), the words ‘obliged to ensure the verification of the properties of the source of ionising radiation by means of’ are replaced by the word ‘directing’.
60. In the introductory part of § 32(2), the words ‘, the continuous evaluation of the results of this test and, in the case of unsatisfactory results, the implementation of corrective measures’ are deleted.
61. § 32(3) is deleted.

Paragraphs (4) and (5) become paragraphs (3) and (4).

62. After § 32(2), the following new paragraph (3) is inserted:

‘(3) A person directing operational stability tests

a) is responsible for the operation of the operational stability test system, the training of personnel carrying out operational stability tests and identification of the equipment needed to conduct them;
b) is responsible for the system for transmitting information on the results and corrective actions pursuant to paragraphs (4) and (5);
c) selects the appropriate method for their implementation and recording, stipulates the scope and frequency of operational stability tests for a permit holder.’.

Paragraphs (3) and (4) become paragraphs (4) and (5).

63. In § 32(4)(b), the word ‘and’ is replaced by a semicolon.
64. § 32(4)(c) reads as follows:

‘c) be available to the person directing the operational stability tests and’.

65. The following § 32(4)(d) is added:

‘d) immediately forwarded to the person in charge of operational stability tests, if the results are unsatisfactory.’

66. In § 32(5), the word ‘immediately’ is inserted after the word ‘measures’.
67. In the introductory part of § 33(3), the words ‘or voluntarily assist a natural person undergoing medical exposure in a controlled area’ are deleted.
68. In § 33(3)(c), the words ‘or another unique identifier;’ are added at the end.
69. In § 33(5), the words ‘Personal doses’ are replaced by the words ‘Data on personal doses’.
70. In § 33(7), the words ‘according to its requirements’ are inserted after the word ‘format’.
71. At the end of § 33(7),, the words ‘, through the holder of a permit to perform personal dosimetry’ are added.
72. In § 35(4), the word ‘Model’ is replaced by ‘Content particulars’.
73. In § 38(2)(k), the words ‘the Atomic Act’ are replaced by the words ‘this Decree’.
74. In § 38(3), the words ‘and a record of the operating restriction pursuant to § 26(4)’ are inserted after the word ‘test’.
75. In § 38(3), the words ‘be kept’ are replaced by the words ‘be kept by the permit holder or registrant using the source of ionising radiation’.
76. In § 38(4), the words ‘must be kept’ are replaced by the words ‘the permit holder or registrant using the source of ionising radiation must keep’.

77. In § 38(4), the second sentence, the words ‘by the permit holder or registrant who uses the source of ionising radiation’ are inserted after the word ‘stability’.
78. At the end of § 38(4), the following words are added: ‘The record of the operating restriction pursuant to § 30(3) must be kept by the licence holder or registrant using the source of ionising radiation for the entire duration of this restriction’.
79. In § 39, the reference reads as follows:

‘[Regarding § 25(1)(h) and (2)(d) of the Atomic Act]’.

80. In § 39(3), the words ‘, the holder of a permit to add a radioactive substance to a consumer product during its manufacture or preparation, or to import and export such a consumer product’ are inserted after the word ‘radiation’.
81. In § 43(3)(l), the words ‘the test’ are replaced by the words ‘directing the test’.
82. The following § 43(4) is added:

‘(4) The number of workplaces under continuous supervision by a supervisor is considered excessive for the purpose of effectively ensuring radiation protection if, in total, these workplaces contain more than 75 generators and devices with sealed radionuclide sources, or if they are workplaces of more than 25 permit holders. This restriction does not apply to the provision of continuous supervision by a supervisor for permit holders pursuant to § 9(2)(f)(6) and (i) of the Atomic Act.’.

83. The following § 43(5) is added:

‘(5) A supervisor shall cooperate with the clinical medical physics expert if other legislation requires availability of the expert.’.

84. § 46(7) reads as follows:

‘(7) In a controlled area, only a category A exposed worker may perform work related to the radiation activity for which the controlled area has been designated. Another natural person may enter the controlled area only in justified cases and carry out the necessary or incidental activity there for the time strictly necessary and under the supervision of a category A exposed worker designated by the operator of the controlled area, or, in the case of a category B exposed worker, activity consisting in providing assistance to a natural person undergoing medical exposure.’.

85. At the end of § 46(8), the words ‘for the purposes of carrying out administrative and supervision activities’ are added.
86. In § 47(e), the words ‘, except for persons undergoing medical exposure or non-medical exposure’ are inserted after the words ‘ may be entered’.
87. In § 47(e), the words ‘the controlled area’ are inserted after the word ‘leaving’.
88. In § 47(h), the words ‘, except for persons undergoing medical exposure or non-medical exposure’ are inserted after the word ‘area’.
89. In § 48, the reference reads as follows:

‘(Regarding § 24(7) and § 73(3) of the Atomic Act)’.

90. In the introductory part of § 48(1), the words ‘licensed activity that is’ are deleted.
91. In the introductory part of § 48(1), the comma is replaced by the words ‘when carrying out a licensed activity’.
92. In § 48(2)(d), the words ‘and conditions’ are inserted after the word ‘instructions’.
93. In § 48(2)(a), the words ‘and the conditions for entry into the controlled area’ are deleted.
94. § 49(3)(b) reads as follows:

‘b) for a natural person who is not an exposed worker, who enters a supervised area, is not undergoing medical or non-medical exposure in the area and whose presence in the supervised area could result in exceeding the dose optimisation limit for members of the public, the operator of the supervised area must set operational levels in the monitoring programme to ensure that this limit is not exceeded;’.

95. In § 49(3)(c), the word ‘and’ is deleted.
96. In § 49(3)(d), the full stop at the end is replaced by the word ‘; and’.
97. The following § 49(3)(e) is added:

‘e) the regime in the supervised area of a workplace with an open radionuclide source must be organised so as to limit the spread of radioactive substances outside the area, in accordance with the optimisation procedures pursuant to § 66 of the Atomic Act.’.

98. § 50(5) reads as follows:

‘(5) The permit holder must verify the exposed worker’s knowledge and competence to perform radiation activities safely prior to the commencement of work and, in addition, on a regular basis, at least once per calendar year, by means of a test, for which a record must be made. If the exposed worker fails the test, the permit holder must establish corrective measures.’.

99. § 50(7) reads as follows:

‘(7) Verification pursuant to paragraph (5) is not required for an exposed worker who performs the function of a supervisor for the relevant permit holder.’

100. In § 52(a)(4), the word ‘and’ is replaced by a semicolon.
101. In § 52(a)(5), the semicolon at the end is replaced by the word ‘and’.
102. The following § 52(a)(6) is added:

‘6. a description of the monitoring of servicing interventions on the source of ionising radiation and its accessories that have an impact on radiation protection;’.

103. In § 52(c)(2), the word ‘and’ is deleted.
104. In § 52(g)(3), the word ‘and’ is replaced by a semicolon.
105. In § 52(h)(3), the full stop at the end is replaced by the word ‘and’.
106. The following § 52(i) is added:

‘i) installation, repair and servicing of a source of ionising radiation

1. a description of how the user of the source of ionising radiation will be familiarised with the documentation for the licensed activity;
2. a description of how the permit holder or the registrant using the source of ionising radiation will be informed of any servicing interventions carried out on the source that have an impact on radiation protection;
3. a description of how the personnel performing the activities will be trained in the manufacturer's servicing procedures for the source of ionising radiation;
4. a description of the assessment of the readiness of the source of ionising radiation and the workplace where it is located for further operation after completion of the installation, repair or servicing of a source of ionising radiation intended for radiotherapy treatment;
5. work procedures for monitoring the workplace or measuring secondary radiation in the case of the installation of a source of ionising radiation intended for radiotherapy treatment; and
6. a list of equipment used for measurement purposes during the installation of a source of ionising radiation intended for radiotherapy treatment;
7. a description of how the provision of occupational health services to exposed workers is ensured;
8. principles for the use of personal protective equipment and devices, their characteristics and a description of the system for their allocation.'.

107. § 53 reads as follows:

'§ 53

Other documentation

[Regarding § 24(7) of the Atomic Act]

(1) The specification of the source of ionising radiation to be handled, its type and accessories, and the activities to be performed with it, must include information on whether the source of ionising radiation will be used for medical or non-medical exposure, or in veterinary medicine.
(2) Annex 19 to this Decree shall specify the content of other selected documentation.

108. § 54(1)(i) reads as follows:

'i) statistics on radiological incidents and potential radiological incidents;'.

109. In § 54(1)(j), the words 'overview of revisions of local' are replaced by the words 'typical values of quantities used to assess optimisation by means of'.
110. In § 56(7), the words 'Annex 10, point 2' are replaced by the words 'Annex 10, point 2.2'.
111. At the end of § 63(c), the words 'for the use of sources of ionising radiation' are added.
112. In § 63(e), the words 'operational stability tests of sources of ionising radiation and participation in them' are replaced by the words 'transmission of information to persons who perform them'.
113. In § 63(f), the words 'for the safe handling of a source' are replaced by the words 'to ensure radiation protection by the registrant when using a source'.
114. In § 63(g), the word 'and' is replaced by a semicolon.

115. In § 63(h), the full stop at the end is replaced by the word ‘; and’.
116. The following § 63(i) is added:

‘I) directing operational stability tests of a source of ionising radiation.’.

117. In the heading of § 65 of the introductory part of the provision, the words ‘for the use of a source of ionising radiation’ are added at the end.
118. In the introductory part of § 65(1), the words ‘for the use of a source of ionising radiation’ are inserted after the word ‘activity’.
119. After § 65(1), the following new paragraph (2) is inserted:

‘(2) Documentation for the registered activity for the use of a source of ionising radiation also includes

a) in the case of the use of portable intra-oral X-ray equipment for medical exposure, justification of the clinical need for its use and a description of the monitoring of exposed workers;
b) in the case of the use of a bone densitometer for non-medical exposure, justification of the intended purpose of use.’.

Paragraph (2) becomes paragraph (3).

120. In § 66(2)(i), the word ‘and’ is deleted.
121. In § 66(2)(j), the full stop at the end is replaced by the word ‘and’.
122. The following § 66(2)(k) is added:

‘k) a list of specified measuring instruments for the verification of which the permit holder is responsible and their classification under the items on the list of types of specified measuring instruments in accordance with the Decree laying down measuring instruments subject to mandatory verification and measuring instruments subject to type-approval.’.

123. The following § 66(4) is added:

‘(4) The monitoring programme for a Category IV workplace that includes a nuclear reactor must contain an overview of intervention levels, exceedance of which indicates an operational occurrence, including the classification of the operational occurrence in the appropriate category.’

124. § 67(1) reads as follows:

‘(1) Where the intake activities of radionuclides are converted to committed effective dose, conversion factors must be used. In the case of unidentified radionuclides and chemical forms or properties of the inhaled aerosol, the conversion factor specified in Annex 3 to this Decree for all unspecified forms of a radionuclide shall be used for exposed workers, and for members of the public, the highest conversion factor specified in Annex 3 to this Decree for inhalation intake by an individual of the given age category.’.

125. In § 67(5), the word ‘average’ is replaced by the words ‘exposure of a member of the public’.
126. In § 67(5), the word ‘activities’ is replaced by the word ‘activity’.

127. 127. In § 67(5), the words ‘dispersed in the atmosphere’ are replaced by the words ‘in the air’.
128. § 68(2) is deleted.

Paragraphs (3) to (6) become paragraphs (2) to (5).

129. After § 68(1), the following new paragraph (2) is inserted:

‘(2) The recording levels must be set at the level of the smallest detectable value of the measured quantity.’.

Paragraphs (2) to (5) become paragraphs (3) to (6).

130. In the introductory part of § 68(3), the words ‘so as to serve to detect possible deviations from the normal state, usually’ are inserted after the word ‘stipulated’.
131. § 70(2) reads as follows:

‘(2) Personal monitoring of external exposure and, where provided for by law, of internal exposure with a personal dosimeter must be ensured for a category A exposed worker for whom the evaluation period for the personal dosimeter is one calendar month.’.

132. In § 70(5), the following words are inserted at the end of the first sentence: ‘otherwise, the permit holder or registrant for the relevant dosimeter must have an approved and validated method of deriving doses for another type of radiation’.
133. § 70(6) reads as follows:

‘(6) An exposed worker who performs an activity that is carried out and controlled by means of a source of ionising radiation, and who is physically present near that source of ionising radiation in circumstances where their exposure could, under normal working procedures, exceed 10 mSv effective dose per year, and who is equipped with a protective shielding apron in accordance with the monitoring programme, must be assigned two personal dosimeters, one to be worn on the apron and the other underneath it. The supervisor must determine the attenuation coefficient of the protective shielding apron used and the effective dose received by the exposed worker, taking into account the exposure of unshielded parts of the body.’.

134. In § 72, the reference reads as follows:

[Re § 78(3)(a) and (f) of the Atomic Act]

135. In § 73(2)(a), the words ‘released during the stipulated period’ are inserted after the word ‘radionuclides’.
136. In § 73(2)(a), the words ‘, released during the stipulated period’ are deleted.
137. At the end of § 74(3), the words ‘, unless otherwise provided by this Decree’ are added.
138. The following § 74(5) is added:

‘(5) If liquid radioactive substances are released from the workplace into surface waters, monitoring of the area surrounding the workplace must include both surface waters unaffected by the discharge and surface waters affected, or potentially affected, by the discharge. Surface water sampling points shall be determined

a) in waters unaffected by the discharge, in the watercourse upstream of the discharge point; in the case of discharge into a water reservoir, in the watercourse upstream of the impounded water level of the reservoir;
b) in waters affected, or potentially affected, by the discharge
    1. in locations where sufficient mixing of the discharge in the watercourse can be expected, i.e. at a sufficient distance downstream of the discharge point; in the case of discharge into a reservoir, usually downstream of the outlet from the reservoir;
    2. in the case of a discharge from a workplace with a nuclear power installation, additionally within the water source protection zone at each point of abstraction of water for drinking water treatment, if such a point is situated within 30 river kilometres downstream of the discharge, or at the nearest downstream point of abstraction of water for drinking water treatment.'.

139. The following § 74(6) is added:

'(6) Monitoring of surface waters into which radioactive substances are released must include all released radionuclides that contribute significantly to the exposure of the population, namely
a) in the case of a discharge from a workplace with a nuclear power installation
    1. in waters unaffected by discharges in the watercourse upstream of the discharge point, at least tritium and radionuclides emitting gamma radiation with quarterly frequency;
    2. in waters affected, or potentially affected, by discharges, at least tritium and gamma-emitting radionuclides with monthly frequency, in the case of ^{90}Sr with annual frequency;
b) in the case of a discharge from a workplace with a nuclear power installation;
c) in the case of a discharge from another workplace, at least once a year at the time of discharge or at most 24 hours after the end of the discharge.'.

140. The following § 74(7) is added:

'(7) The investigation level in waters affected, or potentially affected, by discharges must be determined according to the radionuclides being discharged
a) in the case of discharge from a workplace with a nuclear power installation, at the point of abstraction of water for drinking water treatment
    1. for tritium at 100 Bq/l; if this is exceeded, it must be assessed whether discharge procedures have been breached and whether the investigation level for ^{137}Cs has been exceeded;
    2. for ^{137}Cs at 0.5 Bq/l; if this is exceeded, the operator abstracting water for drinking water treatment must be informed of the results of the determination of the activity concentration of artificial radionuclides;

b) in the case of a discharge from a workplace associated with the extraction of radioactive minerals, 0.3 mg/l for Unat and 0.4 Bq/l for 226Ra; if the investigation level is exceeded, the causes must be investigated and, where appropriate, preventive measures must be established;
c) in the case of a discharge from another workplace, one tenth of the release level pursuant to § 104(1)(b); if the investigation level is exceeded, the cause must be investigated and, where appropriate, preventive measures must be established. The intervention level in waters affected, or potentially affected, by discharges from a workplace with a nuclear power installation must be set at 1 000 Bq/l for tritium; if that level is exceeded, it must be assessed whether discharge procedures have been breached and, where appropriate, corrective or preventive measures must be established in order not to exceed the annual average tritium activity concentration of 1 000 Bq/l and a maximum permissible tritium activity concentration of 3 500 Bq/l.'.

141. § 75(1)(c)(2) reads as follows:

'2. 'localisation device for displaying the irradiated area;'.

142. § 75(4) reads as follows:

'(4) Workplaces with a source of ionising radiation intended for medical exposure must be equipped with aids for conducting operational stability tests as follows:
a) radiotherapy facilities with closed radionuclide sources or particle accelerators, nuclear medicine facilities and registrants' facilities with aids for conducting all operational stability tests;
b) other facilities with aids for conducting operational stability tests at least once a month.

143. § 76 reads as follows:

'§ 76

[Regarding § 86(3)(a) of the Atomic Act]

A source of ionising radiation used in medical exposure
a) intended for the purposes of planning, management and verification in radiotherapy installed after 1 January 2017 must be equipped with an apparatus or equivalent means to provide quantitative information on patient exposure; where technically feasible, this information must be automatically transferred to the patient's examination record;
b) a source of ionising radiation used in interventional radiology must

1. indicate the kerma–area product and the cumulative reference air kerma, if it is radiographic–fluoroscopic or fluoroscopic; this information must be automatically transferred to the patient examination record;

2. provide structured radiation dose reports that are automatically transferred to the patient's examination record; and
3. during the examination, inform the person performing the examination of the cumulative radiation dose to the patient; and

c) a source of ionising radiation that is a computed tomography scanner, including a computed tomography scanner used for imaging in radiotherapy and nuclear medicine, must

1. be equipped with automatic current modulation if it is a stationary source of ionising radiation;
2. have examination protocols that are adapted to the examination of children, where it is used to image children;
3. provide information on the kerma–length product ; this information must be automatically transferred to the patient's examination record;
4. provide information on the volumetric kerma index for computed tomography; this information must be automatically transferred to the patient's examination record; and
5. provide structured radiation dose reports that are automatically transferred to the patient's examination record, unless the CT scanner is a CT simulator.'.

144. § 77 reads as follows:

'§ 77

[Regarding § 86(3)(a) of the Atomic Act]

(1) A source of ionising radiation used in medical exposure

a) that is radiographic

1. must not allow imaging from the shield;
2. that is stationary with a digital image receptor, with the exception of equipment intended exclusively for imaging limbs, must be equipped with automatic exposure control;
3. must not be equipped with a film image receptor;
4. that is stationary, with the exception of equipment intended exclusively for limb imaging, must be equipped with automatic exposure control and organ presets;
5. must provide information on the kerma–area product; devices installed after 1 February 2026 must automatically transfer this information to the patient's examination record;

b) that is fluoroscopic

1. must not permit direct fluoroscopic imaging;
2. must be equipped with automatic regulation of the dose rate;
3. must automatically adjust the size of the X-ray beam according to the selected magnification;
4. must be equipped with an audible signal after 5 minutes of cumulative fluoroscopic time;

5. must be equipped with a function that holds the last image on the monitor after the end of exposure;
6. installed after 1 February 2026, must provide structured radiation dose reports; and
7. must provide information on the kerma–area product; devices installed after 1 February 2026 must automatically transfer this information to the patient's examination record;

c) that is mammographic

1. must be equipped with automatic exposure control;
2. must not be equipped with an image film receptor or indirect digitalisation;
3. must provide information on the compression force and the post-compression thickness;
4. that is equipped with multiple filters, must be equipped with an automatic filter replacement function depending on the post-compression thickness;
5. must allow for the creation of an image with dimensions of at least 23 cm x 29 cm, unless it is intended solely for stereotaxy;
6. installed after 1 February 2026, must block exposure in clinical operation in the absence of collimation;
7. installed after 1 February 2026, must block exposure in clinical operation where collimation is incorrect in relation to the size of the compression paddle used;
8. must provide quantitative information about the patient's exposure, which must be automatically transferred to the patient's examination record;
9. must provide images from which the signal-to-noise ratio and the contrast-to-noise ratio can be determined from linearised data; and
10. must block exposure in clinical operation if the image is not being stored;

d) that is intra-oral dental

1. must not be equipped with a film image receptor or indirect digitisation; and
2. installed after 1 January 2017, must provide quantitative information on patient exposure, or must have values specified in the documentation for the source of ionising radiation from which this information can be calculated for all exposure settings.

(2) A source of ionising radiation used in medical exposure that is a dental computed tomography scanner or bone densitometer installed after 1 January 2017 must provide quantitative information on the patient's exposure.'.

145. In § 78(3), the words 'and, in the event of such contamination, decontaminated or disposed of as radioactive waste' are deleted.
146. In § 78(6), the words 'before performing medical exposure' are inserted after the word 'report'.
147. In § 78(6), the words 'before performing medical exposure' are deleted.
148. § 79 reads as follows:

‘§ 79

Contents of the notification of the submission of an application for authorisation of a clinical trial of radiopharmaceuticals

[Regarding § 85(5) of the Atomic Act]

The notification of the submission of an application for authorisation of a clinical trial of radiopharmaceuticals contains information relating to that trial that is important from the point of view of radiation protection, in particular

a) a summary of the clinical trial protocol;
b) the specification of the radiopharmaceutical;
c) information for the patient, including instructions on protecting other person;
d) the patient’s informed consent form;
e) information for persons living in the same household as the clinical trial participant; and
f) a list of facilities at which the clinical trial will be conducted.’.

149. § 80(1) reads as follows:

‘(1) Patient exposure that is considered to be erroneous for the purposes of defining a radiological incident is

a) exposure arising from

1. unintended medical exposure events involving human error or instrument failure; or
2. other events during medical exposure, the consequences of which cannot be disregarded from the point of view of radiation protection;

b) in radiotherapy

1. exposure of the wrong patient;
2. therapeutic exposure of a tissue or organ other than that planned;
3. application of a total dose or fractional dose that differs significantly from the indicated dose;
4. application of an incorrectly prescribed dose;
5. irradiation that causes the radiobiological effect of the treatment to differ from that originally planned, due to an interruption or premature termination of the planned treatment that is not caused by the patient’s state of health; or
6. unintentional exposure of the embryo or foetus during a procedure performed on a pregnant woman;

c) in nuclear medicine

1. administration of a radiopharmaceutical other than planned;

2. application of activity significantly different from the prescribed activity;
3. exposure of the wrong patient;
4. administration of an activity or radiopharmaceutical that was incorrectly prescribed;
5. unintentional exposure of the embryo or foetus during a procedure performed on a pregnant woman; or
6. unintentional exposure of the child during a procedure performed on a breastfeeding woman;

d) in radiodiagnostics

1. exposure that is multiple times greater than necessary;
2. exposure of the wrong patient;
3. irradiation of an organ or tissue other than that planned; or
4. during a procedure performed on a pregnant woman, unintentional exposure of the embryo or foetus to a direct beam that was not indicated; and

e) in interventional radiology

1. exposure that is multiple times greater than necessary;
2. exposure of the wrong patient;
3. irradiation of an organ or tissue other than that planned;
4. during a procedure performed on a pregnant woman, unintentional exposure of the embryo or foetus to a direct beam that was not indicated; or
5. a case where a tissue reaction occurs due to incorrect performance of the procedure.'.

150. § 81 reads as follows:

'§ 81

Radiological incidents

[Regarding § 87(5) of the Atomic Act]

(1) A Category A radiological incident is a serious radiological incident.

(2) Annex 23 to this Decree lays down

a) the criteria for classifying a radiological incident as category A, B or C;
b) the procedure to be followed in the event of a radiological incident or a potential radiological incident;
c) the content and retention period of the records of the investigation of a radiological incident or of a potential radiological incident; and
d) the scope and time limits for the provision of information on a serious radiological incident and potential radiological incident.'.

151. In the heading at the beginning of § 83, the word 'medical' is deleted.
152. In the heading of § 83, the word 'equipment' is replaced by 'device'.

153. In the introductory part of § 83, the word ‘medical’ is deleted.
154. In the introductory part of § 83, the word ‘equipment’ is replaced by ‘device’.
155. In § 83(e), the semicolon at the end is replaced by the word ‘and’.
156. § 83(f) is deleted.

Subparagraph (g) becomes subparagraph (f).

157. In the heading of § 87, the reference reads as follows:

‘[Regarding § 93(5)(a) of the Atomic Act]’.

158. In § 87(p), the words ‘release level’ are replaced by the words ‘~~release level~~ one of the release levels set out in § 105’.
159. At the end of § 87(q), the words ‘underground’ are added.
160. In the heading of § 88, the reference reads as follows:

‘[Regarding § 93(5)(b) of the Atomic Act]’.

161. § 88(3) is deleted.

Paragraphs (4) and (5) become paragraphs (3) and (4).

162. § 88(3) is deleted.

Paragraph (4) becomes paragraph (3).

163. After § 88(2), the following new paragraph (3) is inserted:

‘(3) At facilities with material with increased content of a natural radionuclide where the level pursuant to paragraph (2) has not been found to have been exceeded, employees’ personal doses do not need to be determined unless there is a change in working conditions, production processes or raw materials. ’.

Paragraph (3) becomes paragraph (4).

164. After § 88(3), the following new paragraph (4) is inserted:

‘(4) At a workplace with material with an increased content of a natural radionuclide, where it has been established that the level pursuant to paragraph (2) has been exceeded, optimisation of radiation protection must be carried out and, after optimisation, measurements must be made in order to determine the personal dose of the worker during their presence in the workplace.’.

Paragraph (4) becomes paragraph (5).

165. § 88(5) reads as follows:

‘(5) If, following the optimisation of radiation protection, an worker’s exposure at the workplace may exceed an effective dose of 6 mSv per year, the worker’s personal dose at the workplace must be determined repeatedly in each calendar year.’.

166. The following § 88(6) is added:

‘(6) The determination of an worker’s personal doses does not need to be repeated in each calendar year at a workplace with material with an increased content of a natural radionuclide, provided that there has been no a change in working

conditions, production processes or raw materials and provided that the measurements pursuant to paragraph (4) have not identified the possibility of exceeding

a) 6 mSv per year for the effective dose; or
b) 1/3 of the limits for a calendar year set out in § 4(1)(a) to (d).

167. The following § 88(7) is added:

‘(7) In the case of work at multiple workplaces with material with an increased natural radionuclide content, the worker's effective doses must be aggregated.’.

168. The following § 88(8) is added:

‘(8) The dose conversion factors for determining the effective dose are set out in Annex 30 to this Decree.’.

169. In the heading of § 89, the reference reads as follows:

‘[Regarding § 93(5)(b) and (c) of the Atomic Act]’.

170. In § 89(2), the words ‘(4)(b)’ are replaced by ‘(5)(b)’.
171. At the end of § 89(2), the words ‘, through the permit holder pursuant to § 9(2)(h)(2) of the Atomic Act’ are added.
172. In the heading of § 90, the reference reads as follows:

‘[Regarding § 66(6)(c) and § 93(5)(d) of the Atomic Act]’.

173. In § 90(1), the following words are added at the end: ‘As part of optimisation, an optimisation analysis containing alternative solutions must be prepared and the most appropriate alternative must be selected and implemented to reduce exposure from a natural radiation source.’.
174. After § 91(2), the following new paragraph (3) is inserted:

‘(3) If the measurement results do not exceed the release levels set out in § 105 in five consecutive years, the measurements and evaluations pursuant to paragraph (1) must continue to be carried out at least every five years, unless there is a change that could affect the radionuclide content of the radioactive substance.’.

Paragraphs (3) to (5) become paragraphs (4) to (6).

175. In § 91(5), the word ‘their’ is inserted after the word ‘from’.
176. In § 91(5), the words ‘directly or through a permit holder pursuant to § 9(2)(h)(7) of the Atomic Act’ are deleted.
177. In § 93(1), the word ‘for’ is replaced by the word ‘for’.
178. In § 93(1), the words ‘during the worker’s presence at the workplace’ are deleted.
179. In § 93(1), the words ‘2 000 hours in 12 months. In the event of a different period’ are replaced by the word ‘period’.
180. In § 93(1), the words ‘the time integral of the radon activity concentration corresponding to the period of presence must be used’ are deleted.
181. § 93(2) reads as follows:

‘(2) At a workplace with potentially increased exposure from radon, where it has been established that the reference level pursuant to paragraph (1) has been exceeded, radiation protection optimisation and, after optimisation, measurement must be carried out in order to determine the worker’s effective dose.’.

182. In § 93(3), in the introductory part of the provision, the words ‘during repeated measurement’ are replaced by the words ‘by measurement after optimisation’.
183. In § 93(4), the words ‘upon repeated measurement’ are replaced by the words ‘by measurement after optimisation’.
184. In § 93(4), the word ‘repeatedly’ is inserted after the word ‘performed’.
185. The following § 93(5) is added:

‘(5) The dose conversion factors for determining an worker’s effective dose are specified in Annex 30 to this Decree.’.

186. In § 94(2), the word ‘acquisition’ is replaced by the words ‘acquisition through a permit holder pursuant to § 9(2)(h)(2) of the Atomic Act’.
187. In § 95(1), the following words are added at the end: ‘As part of the optimisation of radiation protection, an optimisation analysis containing alternative solutions must be prepared and the most suitable alternative measure to reduce the activity concentration of radon must be selected and applied, which must meet these requirements’.
188. The following § 95(1)(a) is added:

‘(a) their implementation can ensure a reduction in the activity concentration of radon;’.

189. The following § 95(1)(b) is added:

‘(b) can be implemented at the workplace; and’.

190. The following § 95(1)(c) is added:

‘(c) cannot impair the structural and technical condition of the workplace.’.

191. § 95(2) reads as follows:

‘(2) The measures for implementing the optimisation of radiation protection pursuant to paragraph (1) are, in particular,
a) structural and technical measures;
b) increased air exchange; and
c) a change in the organisation or arrangement of work.’.

192. In the heading above § 98, the word ‘natural’ is deleted.
193. In § 98(1), the words ‘and tritium’ are inserted after the word ‘radon’.
194. In § 98(2), the word ‘natural’ is deleted.
195. In § 98(3), the word ‘natural’ is deleted.
196. After § 98(4), the following new paragraph (5) is inserted:

‘(5) Systematic measurement and evaluation of the content of artificial radionuclides in water must be carried out when water from a surface or groundwater source

affected by a discharge from a workplace with an energy nuclear power installation has been used for the production of drinking water.'.

Paragraphs (5) to (7) become paragraphs (6) to (8).

197. In § 98(7), the words ', investigation levels of ^{137}Cs activity concentration' are inserted after the word 'alpha activity concentration'.
198. In § 98(8), the words 'paragraph (6)' are replaced by the words 'paragraphs (6) and (7)'.
199. In § 98(8), the words 'in the case of natural radionuclides' are inserted after the word 'be'.
200. In § 99(1), the words '§ 98(6)' are replaced by '§ 98(6) and § 98(7)'.
201. In the introductory part of § 99(5), the words 'Compliance with the values pursuant to § 98(1) and (2)' are replaced by the words 'Systematic measurement'.
202. In the introductory part of § 99(5), the number '6' is replaced by the words 'evaluation of radionuclide content in drinking water'.
203. In the introductory part of § 99(5), the word 'assessed' is replaced by 'performed'.
204. In the introductory part of § 99(6), the word 'natural' is deleted.
205. The following § 99(7) is added:

'(7) If it is established that the indicator of tritium activity concentration in water exceeds 100 Bq/l, the activity concentration of gamma-emitting radionuclides must be measured.'.

206. In the heading at the beginning of § 100, the word 'natural' is deleted.
207. In the introductory part of § 100(1), the word 'natural' is deleted.
208. At the end of § 100(1)(c), the words 'and the operational records identification number' are added.
209. In the introductory part of § 100(2), the word 'natural' is deleted.
210. § 100(4)(b) reads as follows:

'b) for each change in recorded data.'.

211. § 100(5) is deleted.

Paragraph (6) becomes paragraph (5).

212. In § 101(b), the word 'natural' is deleted.
213. In § 101(b), the word 'or' is deleted.
214. In § 101(c), the full stop at the end is replaced by the word '; or'.
215. The following § 101(d) is added:

'd) mixing water from several sources.'.

216. In the final part of § 102(3), the word '228Th' is replaced by '232Th'.
217. In § 102(6), the word '228Th' is replaced by '232Th'.
218. In the introductory part of § 103(3), the words 'paragraph (1)' are replaced by the words '~~paragraph (1)~~ paragraph (1)(a) to (f)'.
219. § 103(3)(b) reads as follows:

'b) for each change in recorded data.'.

220. § 103(4) is deleted.

Paragraph (5) becomes paragraph (4).

221. At the end of § 104(1)(c), the following words are added: ‘; in the case of continuous discharge, the average daily activity concentration and, in the case of one-off discharge, the average activity concentration relative to the total discharged volume, are assessed’.
222. In the introductory part of § 105(3), the words ‘waters and mining’ are inserted after the word ‘waste’.
223. In the introductory part of § 105(5), the words ‘waters and mining’ are inserted after the word ‘waste’.
224. in § 105(6), the word ‘or’ is replaced by the word ‘and’;
225. In § 107(3)(b)(2), the word ‘or’ is deleted.
226. In § 107(3)(c), the words ‘for 7 days’ are inserted after the word ‘evacuation’.
227. In § 107(3)(c), the words ‘for the first 7 days’ are replaced by a semicolon.
228. The following § 107(3)(d) is added:

‘d) a ban on the consumption and distribution of locally produced or unprotected food in areas affected by a radiological accident, for the period strictly necessary to determine the specific conditions for its consumption and distribution in the given accident situation, or’.

229. The following § 107(3)(e) is added:

‘(e) a ban on the distribution and placing on the market of products located in the areas affected by a radiological accident for the period strictly necessary to determine the specific conditions for their distribution and placing on the market in a given accident situation.’.

230. In § 107(4)(a), after the word ‘mSv’, the following words shall be inserted: ‘, provided that, if the areas affected by the radiological accident in which, based on an assessment of the radiological situation, individuals may continue to reside under specified conditions can be supplied with uncontaminated food, water and feed, that option shall be given priority’.
231. The following § 114a is inserted after § 114:

‘§ 114a

Scope and method of ensuring, continuously developing, maintaining and regularly evaluating the security culture of a radionuclide source

[Regarding § 159a of the Atomic Act]

As part of the security culture of the radionuclide source, the permit holder must ensure that

a) responsibility for compliance with established safety principles and practices has been assigned;
b) the documentation related to the security of the radionuclide source is clear and unambiguous for all responsible and affected persons;

c) a systematic approach is implemented for the training and qualification of responsible and affected persons from the perspective of security of the radionuclide source;
d) responsible and affected persons are informed about threats and the importance of securing the radionuclide source;
e) the effectiveness of the radionuclide source security system is regularly verified and evaluated;
f) the current results of the verification of the effectiveness of the radionuclide source security system are provided to the responsible and affected persons and, if the verification of the effectiveness of security does not fully meet the objectives, corrective measures are taken to remedy this situation;
g) the integrity of the security system is not compromised and pre-planned procedures are followed in the event of foreseeable events;
h) compensatory measures are applied during regular maintenance and inspection of the radionuclide source security system, where this could compromise its effectiveness;
i) a self-assessment process is in place to confirm that the level of the radionuclide source security culture is appropriate;
j) communication and involvement of responsible and affected persons, as well as other persons, in the risk assessment process and in identifying shortcomings in the radionuclide source security, including the submission of proposals for its improvement, are supported;
k) the security culture is supported and encouraged, with a focus on teamwork, openness and trust between responsible and affected persons.

232. § 116(2) is deleted.

Paragraphs (3) to (5) become paragraphs (2) to (4).

233. § 116(2) is deleted.

Paragraphs (3) and (4) become paragraphs (2) and (3).

234. In § 117(a), the words ‘§ 77(1)(b)(4)’ is replaced by ‘§ 77(1)(b)(1)’.

235. In Annex 2, the table entitled ‘**Quality factors Q**’ reads as follows:

‘Quality factors Q

Linear energy transfer L [keV/µm]	Quality factor Q (L)
less than 10	1
10 to 100	0.32 L – 2.2
greater than 100	$\frac{300}{\sqrt{L}}$

“.

236. Annex 3 reads as follows:

Conversion factors

Conversion factors for calculating the effective dose rate for a member of the public due to immersion in a cloud of artificial radioactive noble gases

Nuclide	$T_{½}$	Conversion factor ($nSv \cdot h^{-1} \cdot Bq^{-1} \cdot m^3$)					
		newborn	1 year	5 years	10 years	15 years	adult
Ne-19	17.22 s	1.94E-01	1.84E-01	1.77E-01	1.67E-01	1.60E-01	1.56E-01
Ne-24	3.38 min	1.04E-01	9.88E-02	9.52E-02	8.99E-02	8.64E-02	8.38E-02
Ar-37	35.04 d	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ar-39	269 y	3.43E-04	3.55E-04	3.53E-04	3.54E-04	3.57E-04	3.56E-04
Ar-41	109.61 min	2.61E-01	2.47E-01	2.41E-01	2.31E-01	2.30E-01	2.19E-01
Ar-42	32.9 y	3.78E-04	3.88E-04	3.87E-04	3.89E-04	3.92E-04	3.93E-04
Ar-43	5.37 min	3.29E-01	3.10E-01	3.00E-01	2.87E-01	2.81E-01	2.70E-01
Ar-44	11.87 min	3.94E-01	3.74E-01	3.66E-01	3.52E-01	3.50E-01	3.35E-01
Kr-74	11.50 min	1.93E-01	1.84E-01	1.78E-01	1.67E-01	1.61E-01	1.56E-01
Kr-75	4.29 min	2.56E-01	2.41E-01	2.29E-01	2.17E-01	2.05E-01	1.99E-01
Kr-76	14.8 h	7.48E-02	7.15E-02	6.98E-02	6.55E-02	6.33E-02	6.03E-02
Kr-77	74.4 min	1.90E-01	1.81E-01	1.75E-01	1.64E-01	1.58E-01	1.53E-01
Kr-79	35.04 h	4.55E-02	4.35E-02	4.23E-02	3.99E-02	3.86E-02	3.71E-02
Kr-81	2.29E+5 y	1.85E-04	1.62E-04	1.56E-04	1.45E-04	1.40E-04	1.34E-04
Kr-81m	13.10 s	2.22E-02	2.11E-02	2.06E-02	1.93E-02	1.87E-02	1.75E-02
Kr-83m	1.83 h	1.54E-05	9.96E-06	8.18E-06	7.14E-06	6.73E-06	6.69E-06
Kr-85	10.756 y	8.40E-04	8.24E-04	8.11E-04	7.94E-04	7.83E-04	7.78E-04
Kr-85m	4.480 h	2.70E-02	2.57E-02	2.49E-02	2.35E-02	2.26E-02	2.13E-02
Kr-87	76.3 min	1.76E-01	1.65E-01	1.59E-01	1.52E-01	1.47E-01	1.42E-01
Kr-88	2.84 h	4.01E-01	3.82E-01	3.76E-01	3.61E-01	3.59E-01	3.45E-01
Kr-89	3.15 min	4.08E-01	3.86E-01	3.76E-01	3.60E-01	3.53E-01	3.40E-01
Xe-	40 min	6.91E-02	6.55E-02	6.32E-02	5.95E-02	5.80E-02	5.56E-02

Nuclide 120	$T_{½}$	Conversion factor ($nSv \cdot h^{-1} \cdot Bq^{-1} \cdot m^3$)					
		newborn	1 year	5 years	10 years	15 years	adult
Xe-121	40.1 min	2.89E-01	2.75E-01	2,68E-01	2.55E-01	2.50E-01	2.41E-01
Xe-122	20.1 h	9.48E-03	8.76E-03	8.49E-03	7.84E-03	7.50E-03	7.09E-03
Xe-123	2.08 h	1.18E-01	1.12E-01	1.09E-01	1.03E-01	1.01E-01	9.68E-02
Xe-125	16.9 h	4.46E-02	4.22E-02	4.10E-02	3.84E-02	3.71E-02	3.50E-02
Xe-127	36.4 d	4.59E-02	4.35E-02	4.24E-02	3.96E-02	3.82E-02	3.60E-02
Xe-127m	69.2 s	2.61E-02	2.46E-02	2.35E-02	2.20E-02	2.09E-02	1.97E-02
Xe-129m	8.88 d	4.91E-03	4.07E-03	3.86E-03	3.36E-03	3.12E-03	2.84E-03
Xe-131m	11.84 d	1.90E-03	1.56E-03	1.47E-03	1.28E-03	1.19E-03	1.07E-03
Xe-133	5.243 d	5.90E-03	5.53E-03	5.11E-03	4.60E-03	4.38E-03	4.03E-03
Xe-133m	2.19 d	5.61E-03	5.12E-03	4.98E-03	4.56E-03	4.37E-03	4.08E-03
Xe-135	9.14 h	4.44E-02	4.24E-02	4.16E-02	3.90E-02	3.78E-02	3.57E-02
Xe-135m	15.29 min	7.73E-02	7.39E-02	7.17E-02	6.76E-02	6.52E-02	6.32E-02
Xe-137	3.818 min	6.36E-02	5.66E-02	4.98E-02	4.81E-02	4.09E-02	4.01E-02
Xe-138	14.08 min	2.29E-01	2.17E-01	2.12E-01	2.03E-01	2.01E-01	1.93E-01

Explanatory notes:

$T_{½}$: Radioactive decay half-life

Conversion factors for calculating the 50-year committed effective dose for intake by ingestion, inhalation and direct entry into the blood for an exposed worker

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
H-3	12.32 y	direct entry into the blood						2.00E-11
		ingestion			biogenic forms	0.99		5.10E-11
		ingestion			relatively insoluble forms	0.1		2.00E-12
		ingestion			soluble forms	0.99		1.90E-11
		inhalation	aerosol	F	tritium in alloys with lanthanum, nickel and aluminium	0.99	1	8.60E-12
		inhalation	aerosol	F	tritium in alloys with lanthanum, nickel and aluminium	0.99	5	1.30E-11
		inhalation	aerosol	M	all unspecified compounds, glass fragments, luminous paints, titanium tritide, zirconium tritide	0.2	1	4.30E-11
		inhalation	aerosol	M	all unspecified compounds, glass fragments, luminous paints, titanium tritide, zirconium tritide	0.2	5	2.40E-11
		inhalation	aerosol	S	tritiated carbon, hafnium tritide	1E-2	1	5.20E-10
		inhalation	aerosol	S	tritiated carbon, hafnium tritide	1E-2	5	2.60E-10
		inhalation	aerosol		biogenic organic compounds	0.99	1	2.30E-11
		inhalation	aerosol		biogenic organic compounds	0.99	5	3.50E-11
		inhalation	gases and vapours	V	tritiated methane			5.90E-14

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	gases and vapours	V	tritiated water (HTO)			2.00E-11
		inhalation	gases and vapours	V	elemental tritium (HT)			2.00E-15
		inhalation	gases and vapours	F	unspecified gases and vapours	0.99		2.00E-11
Be-7	53.22 d	direct entry into the blood						2.10E-10
		ingestion			all compounds	5E-3		2.10E-11
		inhalation	aerosol	F		5E-3	1	4.90E-11
		inhalation	aerosol	F		5E-3	5	5.70E-11
		inhalation	aerosol	M		1E-3	1	6.60E-11
		inhalation	aerosol	M		1E-3	5	4.30E-11
		inhalation	aerosol	S		5E-5	1	8.70E-11
		inhalation	aerosol	S		5E-5	5	5.30E-11
C-14	5.70E+3 y	direct entry into the blood						1.60E-10
		ingestion			all chemical forms	0.99		1.60E-10
		inhalation	aerosol	F		0.99	1	7.30E-11
		inhalation	aerosol	F		0.99	5	1.10E-10
		inhalation	aerosol	M	all unspecified forms	0.2	1	9.00E-10
		inhalation	aerosol	M	all unspecified forms	0.2	5	5.80E-10
		inhalation	aerosol	S	elemental carbon, tritiated carbon	1E-2	1	1.20E-08

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	S	elemental carbon, tritiated carbon	1E-2	5	6.70E-09
		inhalation	aerosol		barium carbonate	0.99	1	8.30E-12
		inhalation	aerosol		barium carbonate	0.99	5	1.30E-11
		inhalation	gases and vapours	V	methane			5.10E-14
		inhalation	gases and vapours	V	carbon dioxide			1.30E-11
		inhalation	gases and vapours	V	carbon monoxide:			1.80E-12
		inhalation	gases and vapours	F	unspecified gases and vapours	0.99		1.70E-10
F-18	109.77 min	direct entry into the blood						1.50E-11
		ingestion			all forms	0.99		4.80E-11
		inhalation	aerosol	F		0.99	1	2.00E-11
		inhalation	aerosol	F		0.99	5	3.10E-11
		inhalation	aerosol	M		0.2	1	3.60E-11
		inhalation	aerosol	M		0.2	5	5.00E-11
		inhalation	aerosol	S		1E-2	1	3.70E-11
		inhalation	aerosol	S		1E-2	5	5.10E-11
		inhalation	gases and vapours	F	unspecified gases and vapours	0.99		7.80E-11
Na-24	14.9590 h	direct entry into the blood						3.40E-10

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		ingestion			all forms	0.99		4.80E-10
		inhalation	aerosol	F		0.99	1	1.90E-10
		inhalation	aerosol	F		0.99	5	3.00E-10
		inhalation	aerosol	M		0.2	1	3.70E-10
		inhalation	aerosol	M		0.2	5	4.90E-10
		inhalation	aerosol	S		1E-2	1	4.00E-10
		inhalation	aerosol	S		1E-2	5	5.20E-10
K-42	12.360 h	direct entry into the blood						1.60E-10
		ingestion			all forms	0.99		4.20E-10
		inhalation	aerosol	F		0.99	1	1.30E-10
		inhalation	aerosol	F		0.99	5	2.20E-10
		inhalation	aerosol	M		0.2	1	3.40E-10
		inhalation	aerosol	M		0.2	5	4.00E-10
		inhalation	aerosol	S		1E-2	1	3.70E-10
		inhalation	aerosol	S		1E-2	5	4.30E-10
Cr-51	27.7025 d	direct entry into the blood						9.70E-11
		ingestion			trivalent chromium	1E-2		1.30E-11
		inhalation	aerosol	F		1E-2	1	2.30E-11
		inhalation	aerosol	F		1E-2	5	2.80E-11
		inhalation	aerosol	M		2E-3	1	3.50E-11
		inhalation	aerosol	M		2E-3	5	2.40E-11

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	S		1E-4	1	4.40E-11
		inhalation	aerosol	S		1E-4	5	2.80E-11
Mn-54	312.12 d	direct entry into the blood						3.90E-09
		ingestion			all forms	5E-2		5.00E-10
		inhalation	aerosol	F		5E-2	1	9.30E-10
		inhalation	aerosol	F		5E-2	5	1.10E-09
		inhalation	aerosol	M		1E-2	1	2.10E-09
		inhalation	aerosol	M		1E-2	5	1.30E-09
		inhalation	aerosol	S		5E-4	1	5.20E-09
		inhalation	aerosol	S		5E-4	5	2.80E-09
Fe-59	44.495 d	direct entry into the blood						1.30E-08
		ingestion			all unspecified forms	0.1		1.70E-09
		inhalation	aerosol	F		0.1	1	4.10E-09
		inhalation	aerosol	F		0.1	5	5.60E-09
		inhalation	aerosol	M	ferric chloride, ferric oxide, all unspecified forms	2E-2	1	2.40E-09
		inhalation	aerosol	M	ferric chloride, ferric oxide, all unspecified forms	2E-2	5	1.70E-09
		inhalation	aerosol	S	corrosion products	1E-3	1	2.60E-09
		inhalation	aerosol	S	corrosion products	1E-3	5	1.70E-09
Co-57	271.74 d	direct entry into the blood						7.40E-10

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		ingestion			all chemical forms	0.1		1.20E-10
		ingestion			insoluble oxides	5E-2		8.80E-11
		inhalation	aerosol	F	nitrate, chloride	0.1	1	1.70E-10
		inhalation	aerosol	F	nitrate, chloride	0.1	5	1.50E-10
		inhalation	aerosol	M	all unspecified forms	2E-2	1	5.20E-10
		inhalation	aerosol	M	all unspecified forms	2E-2	5	3.00E-10
		inhalation	aerosol	S	oxide, cobalt in aluminosilicate melt, cobalt-labelled polystyrene	1E-3	1	1.20E-09
		inhalation	aerosol	S	oxide, cobalt in aluminosilicate melt, cobalt-labelled polystyrene	1E-3	5	6.40E-10
Co-58	70.86 d	direct entry into the blood						2.00E-09
		ingestion			all chemical forms	0.1		5.40E-10
		ingestion			insoluble oxides	5E-2		4.60E-10
		inhalation	aerosol	F	nitrate, chloride	0.1	1	5.20E-10
		inhalation	aerosol	F	nitrate, chloride	0.1	5	5.30E-10
		inhalation	aerosol	M	all unspecified forms	2E-2	1	1.60E-09
		inhalation	aerosol	M	all unspecified forms	2E-2	5	1.00E-09
		inhalation	aerosol	S	oxide, cobalt in aluminosilicate melt, cobalt-labelled polystyrene	1E-3	1	2.40E-09

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	S	oxide, cobalt in aluminosilicate melt, cobalt-labelled polystyrene	1E-3	5	1.40E-09
Co-60	5.2713 y	direct entry into the blood						2.40E-08
		ingestion			all chemical forms	0.1		3.20E-09
		ingestion			insoluble oxides	5E-2		2.10E-09
		inhalation	aerosol	F	nitrate, chloride	0.1	1	5.00E-09
		inhalation	aerosol	F	nitrate, chloride	0.1	5	4.20E-09
		inhalation	aerosol	M	all unspecified forms	2E-2	1	1.10E-08
		inhalation	aerosol	M	all unspecified forms	2E-2	5	6.20E-09
		inhalation	aerosol	S	oxide, cobalt in aluminosilicate melt, cobalt-labelled polystyrene	1E-3	1	5.90E-08
		inhalation	aerosol	S	oxide, cobalt in aluminosilicate melt, cobalt-labelled polystyrene	1E-3	5	3.10E-08
Se-75	119.779 d	direct entry into the blood						3.10E-09
		ingestion			selenide and elemental selenium	5E-2		3.10E-10
		ingestion			all other forms	0.8		2.50E-09
		inhalation	aerosol	F	selenium dioxide, selenic acid, elemental selenium, all unspecified forms	0.8	1	1.20E-09

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	F	selenium dioxide, selenic acid, elemental selenium, all unspecified forms	0.8	5	1.80E-09
		inhalation	aerosol	M		0.16	1	1.20E-09
		inhalation	aerosol	M		0.16	5	8.90E-10
		inhalation	aerosol	S		8E-3	1	1.60E-09
		inhalation	aerosol	S		8E-3	5	9.10E-10
Sr-85	64.84 d	direct entry into the blood						9.00E-10
		ingestion			titanate	1E-2		2.10E-10
		ingestion			all other chemical forms	0.25		3.80E-10
		inhalation	aerosol	F	chloride, sulphate and carbonate	0.25	1	2.80E-10
		inhalation	aerosol	F	chloride, sulphate and carbonate	0.25	5	3.80E-10
		inhalation	aerosol	M	fuel fragments, all unspecified forms	5E-2	1	7.50E-10
		inhalation	aerosol	M	fuel fragments, all unspecified forms	5E-2	5	5.00E-10
		inhalation	aerosol	S	strontium in aluminosilicate melt, strontium-labelled polystyrene	2.5E-3	1	1.10E-09
		inhalation	aerosol	S	strontium in aluminosilicate melt, strontium-labelled polystyrene	2.5E-3	5	6.70E-10
Sr-89	50.53 d	direct entry into the blood						2.30E-09

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		ingestion			titanate	1E-2		4.00E-10
		ingestion			all other chemical forms	0.25		8.90E-10
		inhalation	aerosol	F	chloride, sulphate and carbonate	0.25	1	7.10E-10
		inhalation	aerosol	F	chloride, sulphate and carbonate	0.25	5	9.60E-10
		inhalation	aerosol	M	fuel fragments, all unspecified forms	5E-2	1	3.80E-09
		inhalation	aerosol	M	fuel fragments, all unspecified forms	5E-2	5	2.20E-09
		inhalation	aerosol	S	strontium in aluminosilicate melt, strontium-labelled polystyrene	2.5E-3	1	5.70E-09
		inhalation	aerosol	S	strontium in aluminosilicate melt, strontium-labelled polystyrene	2.5E-3	5	3.20E-09
Sr-90	28.79 y	direct entry into the blood						9.50E-08
		ingestion			titanate	1E-2		1.10E-09
		ingestion			all other chemical forms	0.25		2.40E-08
		inhalation	aerosol	F	chloride, sulphate and carbonate	0.25	1	2.50E-08
		inhalation	aerosol	F	chloride, sulphate and carbonate	0.25	5	3.20E-08
		inhalation	aerosol	M	fuel fragments, all unspecified forms	5E-2	1	3.00E-08

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	M	fuel fragments, all unspecified forms	5E-2	5	1.80E-08
		inhalation	aerosol	S	strontium in aluminosilicate melt, strontium-labelled polystyrene	2.5E-3	1	3.80E-07
		inhalation	aerosol	S	strontium in aluminosilicate melt, strontium-labelled polystyrene	2.5E-3	5	2.00E-07
Zr-95	64.032 d	direct entry into the blood						1.20E-08
		ingestion			all chemical forms	2E-3		3.20E-10
		inhalation	aerosol	F		2E-3	1	2.60E-09
		inhalation	aerosol	F		2E-3	5	2.90E-09
		inhalation	aerosol	M	oxalate, all unspecified forms	4E-4	1	3.20E-09
		inhalation	aerosol	M	oxalate, all unspecified forms	4E-4	5	1.90E-09
		inhalation	aerosol	S	carbonate, oxide, tritid	2E-5	1	4.50E-09
		inhalation	aerosol	S	carbonate, oxide, tritid	2E-5	5	2.60E-09
Nb-95	34.991 d	direct entry into the blood						1.90E-09
		ingestion			all forms	1E-2		3.00E-10
		inhalation	aerosol	F		1E-2	1	4.60E-10
		inhalation	aerosol	F		1E-2	5	5.60E-10
		inhalation	aerosol	M	oxalate, all unspecified forms	2E-3	1	9.90E-10
		inhalation	aerosol	M	oxalate, all unspecified forms	2E-3	5	6.90E-10
		inhalation	aerosol	S	carbonate, oxide	1E-4	1	1.30E-09

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	S	carbonate, oxide	1E-4	5	8.50E-10
Mo-99	65.94 h	direct entry into the blood						3.90E-10
		ingestion			sulphide	5E-2		2.60E-10
		ingestion			all other forms	0.9		4.40E-10
		inhalation	aerosol	F	ammonium chloride and ammonium molybdate	0.9	1	2.00E-10
		inhalation	aerosol	F	ammonium chloride and ammonium molybdate	0.9	5	3.10E-10
		inhalation	aerosol	M	oxide and all unspecified forms	0.18	1	4.20E-10
		inhalation	aerosol	M	oxide and all unspecified forms	0.18	5	4.00E-10
		inhalation	aerosol	S		9E-3	1	4.70E-10
		inhalation	aerosol	S		9E-3	5	4.10E-10
Tc-99	2.111E+5 y	direct entry into the blood						2.90E-10
		ingestion			all forms	0.9		2.70E-10
		inhalation	aerosol	F	pertechnetate, Tc-DTPA	0.9	1	1.30E-10
		inhalation	aerosol	F	pertechnetate, Tc-DTPA	0.9	5	2.00E-10
		inhalation	aerosol	M	all unspecified forms	0.18	1	1.80E-09
		inhalation	aerosol	M	all unspecified forms	0.18	5	1.10E-09
		inhalation	aerosol	S		9E-3	1	2.90E-08
		inhalation	aerosol	S		9E-3	5	1.60E-08
Tc-99m	6.015 h	direct entry into the blood						1.30E-11

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		ingestion			all forms	0.9		1.40E-11
		inhalation	aerosol	F	pertechnetate, Tc-DTPA	0.9	1	5.70E-12
		inhalation	aerosol	F	pertechnetate, Tc-DTPA	0.9	5	8.60E-12
		inhalation	aerosol	M	all unspecified forms	0.18	1	9.70E-12
		inhalation	aerosol	M	all unspecified forms	0.18	5	1.30E-11
		inhalation	aerosol	S		9E-3	1	1.00E-11
		inhalation	aerosol	S		9E-3	5	1.30E-11
Ru-106	373.59 d	direct entry into the blood						2.80E-08
		ingestion			all chemical forms	5E-2		2.60E-09
		inhalation	aerosol	F	chloride, oxalate	5E-2	1	6.70E-09
		inhalation	aerosol	F	chloride, oxalate	5E-2	5	7.70E-09
		inhalation	aerosol	M	citrate, all unspecified forms	1E-2	1	2.40E-08
		inhalation	aerosol	M	citrate, all unspecified forms	1E-2	5	1.30E-08
		inhalation	aerosol	S	dioxide	5E-4	1	6.90E-08
		inhalation	aerosol	S	dioxide	5E-4	5	3.60E-08
		inhalation	gases and vapours	F	ruthenium tetroxide	1E-2		7.00E-09
Ag-110m	249.76 d	direct entry into the blood						2.50E-08
		ingestion			all forms	5E-2		2.30E-09
		inhalation	aerosol	F	silver nitrate	5E-2	1	4.00E-09
		inhalation	aerosol	F	silver nitrate	5E-2	5	3.30E-09

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	M	silver iodide, all unspecified forms	1E-2	1	8.40E-09
		inhalation	aerosol	M	silver iodide, all unspecified forms	1E-2	5	5.00E-09
		inhalation	aerosol	S		5E-4	1	1.70E-08
		inhalation	aerosol	S		5E-4	5	9.30E-09
Sb-122	2.7238 d	direct entry into the blood						7.30E-10
		ingestion			all chemical forms	5E-2		4.50E-10
		inhalation	aerosol	F	chloride, tartrate	5E-2	1	2.70E-10
		inhalation	aerosol	F	chloride, tartrate	5E-2	5	3.90E-10
		inhalation	aerosol	M	antimony trioxide, all unspecified forms	1E-2	1	5.50E-10
		inhalation	aerosol	M	antimony trioxide, all unspecified forms	1E-2	5	5.20E-10
		inhalation	aerosol	S		5E-4	1	6.20E-10
		inhalation	aerosol	S		5E-4	5	5.60E-10
Sb-124	60.20 d	direct entry into the blood						5.60E-09
		ingestion			all chemical forms	5E-2		1.10E-09
		inhalation	aerosol	F	chloride, tartrate	5E-2	1	1.40E-09
		inhalation	aerosol	F	chloride, tartrate	5E-2	5	1.80E-09
		inhalation	aerosol	M	antimony trioxide, all unspecified forms	1E-2	1	4.90E-09

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	M	antimony trioxide, all unspecified forms	1E-2	5	3.00E-09
		inhalation	aerosol	S		5E-4	1	7.40E-09
		inhalation	aerosol	S		5E-4	5	4.30E-09
Sb-125	2.75856 y	direct entry into the blood						3.60E-09
		ingestion			all chemical forms	5E-2		3.70E-10
		inhalation	aerosol	F	chloride, tartrate	5E-2	1	8.30E-10
		inhalation	aerosol	F	chloride, tartrate	5E-2	5	9.70E-10
		inhalation	aerosol	M	antimony trioxide, all unspecified forms	1E-2	1	3.30E-09
		inhalation	aerosol	M	antimony trioxide, all unspecified forms	1E-2	5	1.90E-09
		inhalation	aerosol	S		5E-4	1	1.50E-08
		inhalation	aerosol	S		5E-4	5	8.40E-09
Te-132	3.204 d	direct entry into the blood						3.60E-09
		ingestion			all forms	0.3		1.90E-09
		inhalation	aerosol	F	chloride, tellurium dioxide	0.3	1	1.30E-09
		inhalation	aerosol	F	chloride, tellurium dioxide	0.3	5	1.80E-09
		inhalation	aerosol	M	elemental tellurium, cadmium telluride, all unspecified forms	6E-2	1	1.20E-09
		inhalation	aerosol	M	elemental tellurium, cadmium telluride, all unspecified forms	6E-2	5	1.20E-09
		inhalation	aerosol	S		3E-3	1	1.20E-09

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	S		3E-3	5	1.20E-09
		inhalation	gases and vapours	F	unspecified gases and vapours	0.3		3.40E-09
I-125	59 400 d	direct entry into the blood						1.30E-08
		ingestion			all unspecified forms	0.99		1.30E-08
		inhalation	aerosol	F	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms	0.99	1	5.60E-09
		inhalation	aerosol	F	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms	0.99	5	8.60E-09
		inhalation	aerosol	M		0.2	1	1.70E-09
		inhalation	aerosol	M		0.2	5	2.10E-09
		inhalation	aerosol	S		1E-2	1	4.10E-10
		inhalation	aerosol	S		1E-2	5	3.00E-10
		inhalation	gases and vapours	V	methyl iodide, ethyl iodide			8.90E-09
		inhalation	gases and vapours	F	elemental iodine and unspecified forms	0.99		1.30E-08
I-129	1.57E+7 y	direct entry into the blood						9.50E-08
		ingestion				0.99		9.40E-08
		inhalation	aerosol	F	all unspecified forms	0.99	1	4.20E-08

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	F	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms	0.99	5	6.40E-08
		inhalation	aerosol	M	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms	0.2	1	1.70E-08
		inhalation	aerosol	M		0.2	5	1.70E-08
		inhalation	aerosol	S		1E-2	1	2.50E-08
		inhalation	aerosol	S		1E-2	5	1.40E-08
		inhalation	gases and vapours	V				6.60E-08
		inhalation	gases and vapours	F	methyl iodide, ethyl iodide	0.99		9.40E-08
I-131	8.02070 d	direct entry into the blood						1.70E-08
		ingestion			all unspecified forms	0.99		1.60E-08
		inhalation	aerosol	F	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms	0.99	1	7.20E-09
		inhalation	aerosol	F	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms	0.99	5	1.10E-08
		inhalation	aerosol	M		0.2	1	2.10E-09
		inhalation	aerosol	M		0.2	5	2.70E-09
		inhalation	aerosol	S		1E-2	1	7.10E-10
		inhalation	aerosol	S		1E-2	5	6.00E-10

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	gases and vapours	V	methyl iodide, ethyl iodide			1.20E-08
		inhalation	gases and vapours	F	elemental iodine and unspecified forms	0.99		1.70E-08
I-132	2.295 h	direct entry into the blood						2.50E-10
		ingestion			all unspecified forms	0.99		2.80E-10
		inhalation	aerosol	F	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms	0.99	1	8.60E-11
		inhalation	aerosol	F	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms	0.99	5	1.20E-10
		inhalation	aerosol	M		0.2	1	7.20E-11
		inhalation	aerosol	M		0.2	5	1.00E-10
		inhalation	aerosol	S		1E-2	1	7.00E-11
		inhalation	aerosol	S		1E-2	5	9.70E-11
		inhalation	gases and vapours	V	methyl iodide, ethyl iodide			1.80E-10
		inhalation	gases and vapours	F	elemental iodine and unspecified forms	0.99		3.30E-10
Cs-134	2.0648 y	direct entry into the blood						1.40E-08
		ingestion			relatively insoluble forms, fragments of irradiated fuel	0.1		2.00E-09
		ingestion			chloride, nitrate, sulphate, all unspecified compounds	0.99		1.40E-08

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	F	chloride, nitrate, sulphate	0.99	1	6.20E-09
		inhalation	aerosol	F	chloride, nitrate, sulphate	0.99	5	9.50E-09
		inhalation	aerosol	M	fragments of irradiated fuel, all unspecified forms	0.2	1	8.40E-09
		inhalation	aerosol	M	fragments of irradiated fuel, all unspecified forms	0.2	5	6.00E-09
		inhalation	aerosol	S		1E-2	1	2.80E-08
		inhalation	aerosol	S		1E-2	5	1.50E-08
Cs-137	30.1671 y	direct entry into the blood						1.40E-08
		ingestion			relatively insoluble forms, fragments of irradiated fuel	0.1		1.60E-09
		ingestion			chloride, nitrate, sulphate, all unspecified compounds	0.99		1.40E-08
		inhalation	aerosol	F	chloride, nitrate, sulphate	0.99	1	6.00E-09
		inhalation	aerosol	F	chloride, nitrate, sulphate	0.99	5	9.30E-09
		inhalation	aerosol	M	fragments of irradiated fuel, all unspecified forms	0.2	1	7.90E-09
		inhalation	aerosol	M	fragments of irradiated fuel, all unspecified forms	0.2	5	5.60E-09
		inhalation	aerosol	S		1E-2	1	9.70E-08
		inhalation	aerosol	S		1E-2	5	5.10E-08
Ba-140	12.752 d	direct entry into the blood						1.40E-09

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		ingestion			insoluble forms: sulphate, titanate	1E-4		5.30E-10
		ingestion			soluble forms	0.2		7.10E-10
		inhalation	aerosol	F		0.2	1	4.90E-10
		inhalation	aerosol	F		0.2	5	6.90E-10
		inhalation	aerosol	M		4E-2	1	2.70E-09
		inhalation	aerosol	M		4E-2	5	1.80E-09
		inhalation	aerosol	S		2E-3	1	3.50E-09
		inhalation	aerosol	S		2E-3	5	2.20E-09
Ce-144	284.91 d	direct entry into the blood						1.20E-07
		ingestion			all compounds	5E-4		9.80E-10
		inhalation	aerosol	F		5E-4	1	1.60E-08
		inhalation	aerosol	F		5E-4	5	9.40E-09
		inhalation	aerosol	M	chloride, citrate, fluoride, hydroxide	1E-4	1	2.70E-08
		inhalation	aerosol	M	chloride, citrate, fluoride, hydroxide	1E-4	5	1.40E-08
		inhalation	aerosol	S	fragments of irradiated fuel	5E-6	1	5.10E-08
		inhalation	aerosol	S	fragments of irradiated fuel	5E-6	5	2.70E-08
		inhalation	aerosol		cerium oxide	5E-7	1	4.30E-08
		inhalation	aerosol		cerium oxide	5E-7	5	2.30E-08

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol		water-soluble forms, including chloride and citrate	2.5E-4	1	2.80E-08
		inhalation	aerosol		water-soluble forms, including chloride and citrate	2.5E-4	5	1.50E-08
Eu-152	13.537 y	direct entry into the blood						3.30E-07
		ingestion			all compounds	5E-4		6.50E-10
		inhalation	aerosol	F		5E-4	1	4.10E-08
		inhalation	aerosol	F		5E-4	5	2.40E-08
		inhalation	aerosol	M	nitrate, oxide	1E-4	1	3.50E-08
		inhalation	aerosol	M	nitrate, oxide	1E-4	5	1.80E-08
		inhalation	aerosol	S		5E-6	1	7.50E-08
		inhalation	aerosol	S		5E-6	5	3.90E-08
		inhalation	aerosol		dioxide	5E-7	1	3.60E-08
		inhalation	aerosol		dioxide	5E-7	5	1.90E-08
		inhalation	aerosol		water-soluble forms, including chloride and citrate	2.5E-4	1	3.70E-08
		inhalation	aerosol		water-soluble forms, including chloride and citrate	2.5E-4	5	2.10E-08
Gd-153	240.4 d	direct entry into the blood						5.50E-09
		ingestion			all compounds	5E-4		7.00E-11
		inhalation	aerosol	F	chloride, citrate	5E-4	1	7.90E-10
		inhalation	aerosol	F	chloride, citrate	5E-4	5	5.10E-10

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	M	oxide	1E-4	1	1.30E-09
		inhalation	aerosol	M	oxide	1E-4	5	7.70E-10
		inhalation	aerosol	S		5E-6	1	2.10E-09
		inhalation	aerosol	S		5E-6	5	1.30E-09
		inhalation	aerosol		dioxide	5E-7	1	1.90E-09
		inhalation	aerosol		dioxide	5E-7	5	1.10E-09
		inhalation	aerosol		water-soluble forms, including chloride and citrate	2.5E-4	1	1.30E-09
		inhalation	aerosol		water-soluble forms, including chloride and citrate	2.5E-4	5	7.90E-10
Ho-166	26.80 h	direct entry into the blood						1.90E-10
		ingestion			all compounds	5E-4		3.00E-10
		inhalation	aerosol	F		5E-4	1	2.40E-10
		inhalation	aerosol	F		5E-4	5	2.90E-10
		inhalation	aerosol	M		1E-4	1	3.40E-10
		inhalation	aerosol	M		1E-4	5	3.50E-10
		inhalation	aerosol	S	fragments of irradiated fuel	5E-6	1	3.70E-10
		inhalation	aerosol	S	fragments of irradiated fuel	5E-6	5	3.60E-10
		inhalation	aerosol		dioxide	5E-7	1	3.70E-10
		inhalation	aerosol		dioxide	5E-7	5	3.60E-10
		inhalation	aerosol		water-soluble forms, including chloride and citrate	2.5E-4	1	3.00E-10

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol		water-soluble forms, including chloride and citrate	2.5E-4	5	3.20E-10
W-187	23.72 h	direct entry into the blood						5.80E-11
		ingestion			tungstic acid	1E-2		1.80E-10
		ingestion			all other forms	0.5		1.40E-10
		inhalation	aerosol	F		0.5	1	6.10E-11
		inhalation	aerosol	F		0.5	5	1.00E-10
		inhalation	aerosol	M		0.1	1	2.00E-10
		inhalation	aerosol	M		0.1	5	2.10E-10
		inhalation	aerosol	S		5E-3	1	2.20E-10
		inhalation	aerosol	S		5E-3	5	2.30E-10
Ir-192	73.827 d	direct entry into the blood						6.80E-09
		ingestion			all unspecified forms	1E-2		4.50E-10
		inhalation	aerosol	F	chloride	1E-2	1	1.50E-09
		inhalation	aerosol	F	chloride	1E-2	5	1.70E-09
		inhalation	aerosol	M	all unspecified forms	2E-3	1	3.00E-09
		inhalation	aerosol	M	all unspecified forms	2E-3	5	1.90E-09
		inhalation	aerosol	S	metallic iridium	1E-4	1	4.50E-09
		inhalation	aerosol	S	metallic iridium	1E-4	5	2.70E-09
Ra-226	1600 y	direct entry into the blood						6.30E-07
		ingestion			all forms	0.2		1.30E-07

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	F	nitrate	0.2	1	1.50E-07
		inhalation	aerosol	F	nitrate	0.2	5	1.60E-07
		inhalation	aerosol	M	all unspecified forms	4E-2	1	2.10E-06
		inhalation	aerosol	M	all unspecified forms	4E-2	5	1.40E-06
		inhalation	aerosol	S		2E-3	1	2.30E-05
		inhalation	aerosol	S		2E-3	5	1.30E-05
U-234	2.455E+5 y	direct entry into the blood						1.70E-06
		ingestion			soluble forms	2E-2		3.50E-08
		ingestion			relatively insoluble forms	2E-3		3.50E-09
		inhalation	aerosol	F	uranium hexafluoride, uranyl tributyl phosphate	2E-2	1	3.00E-07
		inhalation	aerosol	F	uranium hexafluoride, uranyl tributyl phosphate	2E-2	5	2.50E-07
		inhalation	aerosol	M	uranium acetylacetonate, depleted uranium aerosols from uranium munitions, vaporised metallic uranium, all unspecified compounds	4E-3	1	2.20E-06
		inhalation	aerosol	M	uranium acetylacetonate, depleted uranium aerosols from uranium munitions, vaporised metallic uranium, all unspecified compounds	4E-3	5	1.40E-06
		inhalation	aerosol	S		2E-4	1	2.30E-05
		inhalation	aerosol	S		2E-4	5	1.30E-05

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	F/M	uranium nitrate, hydrated uranium peroxide, ammonium diuranate, uranium oxide	1.6E-2	1	6.40E-07
		inhalation	aerosol	F/M	uranium nitrate, hydrated uranium peroxide, ammonium diuranate, uranium oxide	1.6E-2	5	4.10E-07
		inhalation	aerosol	M/S	mixed uranium dioxide and trioxide, uranium dioxide	6E-4	1	8.50E-06
		inhalation	aerosol	M/S	mixed uranium dioxide and trioxide, uranium dioxide	6E-4	5	5.50E-06
		inhalation	aerosol		uranium aluminide	2E-3	1	4.60E-06
		inhalation	aerosol		uranium aluminide	2E-3	5	3.00E-06
U-235	7.04E+8 y	direct entry into the blood						1.60E-06
		ingestion			soluble forms	2E-2		3.20E-08
		ingestion			relatively insoluble forms	2E-3		3.30E-09
		inhalation	aerosol	F	uranium hexafluoride, uranyl tributyl phosphate	2E-2	1	2.70E-07
		inhalation	aerosol	F	uranium hexafluoride, uranyl tributyl phosphate	2E-2	5	2.30E-07
		inhalation	aerosol	M	uranium acetylacetonate, depleted uranium aerosols from uranium munitions, vaporised metallic uranium, all unspecified compounds	4E-3	1	2.00E-06

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	M	uranium acetylacetonate, depleted uranium aerosols from uranium munitions, vaporised metallic uranium, all unspecified compounds	4E-3	5	1.30E-06
		inhalation	aerosol	S		2E-4	1	2.10E-05
		inhalation	aerosol	S		2E-4	5	1.20E-05
		inhalation	aerosol	F/M	uranium nitrate, hydrated uranium peroxide, ammonium diuranate, uranium oxide	1.6E-2	1	5.80E-07
		inhalation	aerosol	F/M	uranium nitrate, hydrated uranium peroxide, ammonium diuranate, uranium oxide	1.6E-2	5	3.80E-07
		inhalation	aerosol	M/S	mixed uranium dioxide and trioxide, uranium dioxide	6E-4	1	7.80E-06
		inhalation	aerosol	M/S	mixed uranium dioxide and trioxide, uranium dioxide	6E-4	5	5.10E-06
		inhalation	aerosol		uranium aluminide	2E-3	1	4.20E-06
		inhalation	aerosol		uranium aluminide	2E-3	5	2.80E-06
U-238	4.468E+9 y	direct entry into the blood						1.50E-06
		ingestion			soluble forms	2E-2		3.10E-08
		ingestion			relatively insoluble forms	2E-3		3.10E-09
		inhalation	aerosol	F	uranium hexafluoride, uranyl tributyl phosphate	2E-2	1	2.60E-07

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	F	uranium hexafluoride, uranyl tributyl phosphate	2E-2	5	2.20E-07
		inhalation	aerosol	M	uranium acetylacetonate, depleted uranium aerosols from uranium munitions, vaporised metallic uranium, all unspecified compounds	4E-3	1	1.90E-06
		inhalation	aerosol	M	uranium acetylacetonate, depleted uranium aerosols from uranium munitions, vaporised metallic uranium, all unspecified compounds	4E-3	5	1.20E-06
		inhalation	aerosol	S		2E-4	1	2.00E-05
		inhalation	aerosol	S		2E-4	5	1.20E-05
		inhalation	aerosol	F/M	uranium nitrate, hydrated uranium peroxide, ammonium diuranate, uranium oxide	1.6E-2	1	5.50E-07
		inhalation	aerosol	F/M	uranium nitrate, hydrated uranium peroxide, ammonium diuranate, uranium oxide	1.6E-2	5	3.60E-07
		inhalation	aerosol	M/S	mixed uranium dioxide and trioxide, uranium dioxide	6E-4	1	7.40E-06
		inhalation	aerosol	M/S	mixed uranium dioxide and trioxide, uranium dioxide	6E-4	5	4.80E-06
		inhalation	aerosol		uranium aluminide	2E-3	1	4.00E-06
		inhalation	aerosol		uranium aluminide	2E-3	5	2.60E-06

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
Pu-238	87.7 y	direct entry into the blood						2.20E-04
		ingestion			insoluble forms: oxides	1E-5		2.20E-09
		ingestion			soluble forms: nitrate, chloride, bicarbonates, all other unidentified chemical forms	5E-4		1.10E-07
		inhalation	aerosol	F		5E-4	1	3.00E-05
		inhalation	aerosol	F		5E-4	5	1.80E-05
		inhalation	aerosol	M	citrate, plutonium tributyl phosphate, chloride	1E-4	1	2.30E-05
		inhalation	aerosol	M	citrate, plutonium tributyl phosphate, chloride	1E-4	5	1.20E-05
		inhalation	aerosol	S		5E-6	1	2.90E-05
		inhalation	aerosol	S		5E-6	5	1.70E-05
		inhalation	aerosol		plutonium dioxide (^{238}Pu) in a ceramic matrix	5E-8	1	1.90E-05
		inhalation	aerosol		plutonium dioxide (^{238}Pu) in a ceramic matrix	5E-8	5	1.10E-05
		inhalation	aerosol		in a $^{239}PuO_2$ matrix and in a mixture of oxides (MOX)	2E-6	1	4.10E-05
		inhalation	aerosol		in a $^{239}PuO_2$ matrix and in a mixture of oxides (MOX)	2E-6	5	2.30E-05
		inhalation	aerosol		plutonium dioxide (1 nm nanoparticles)	3.5E-4	1	2.80E-05
		inhalation	aerosol		plutonium dioxide (1 nm nanoparticles)	3.5E-4	5	1.60E-05

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol		nitrate	1E-4	1	2.10E-05
		inhalation	aerosol		nitrate	1E-4	5	1.20E-05
		inhalation	aerosol		plutonium dioxide (^{238}Pu) in a non-ceramic matrix	1E-5	1	1.90E-05
		inhalation	aerosol		plutonium dioxide (^{238}Pu) in a non-ceramic matrix	1E-5	5	1.10E-05
Pu-239	2.411E+4 y	direct entry into the blood						2.40E-04
		ingestion			insoluble forms: oxides	1E-5		2.40E-09
		ingestion			soluble forms: nitrate, chloride, bicarbonates, all other unidentified chemical forms	5E-4		1.20E-07
		inhalation	aerosol	F		5E-4	1	3.40E-05
		inhalation	aerosol	F		5E-4	5	1.90E-05
		inhalation	aerosol	M	citrate, plutonium tributyl phosphate, chloride	1E-4	1	2.50E-05
		inhalation	aerosol	M	citrate, plutonium tributyl phosphate, chloride	1E-4	5	1.40E-05
		inhalation	aerosol	S		5E-6	1	3.10E-05
		inhalation	aerosol	S		5E-6	5	1.70E-05
		inhalation	aerosol		as plutonium dioxide ($^{239}PuO_2$) and in a mixture of oxides (MOX)	2E-6	1	4.50E-05
		inhalation	aerosol		as plutonium dioxide ($^{239}PuO_2$) and in a mixture of oxides (MOX)	2E-6	5	2.50E-05

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol		plutonium dioxide (1 nm nanoparticles)	3.5E-4	1	3.00E-05
		inhalation	aerosol		plutonium dioxide (1 nm nanoparticles)	3.5E-4	5	1.70E-05
		inhalation	aerosol		nitrate	1E-4	1	2.30E-05
		inhalation	aerosol		nitrate	1E-4	5	1.30E-05
Pu-240	6564 y	direct entry into the blood						2.40E-04
		ingestion			insoluble forms: oxides	1E-5		2.40E-09
		ingestion			soluble forms, nitrate, chloride, bicarbonates, all other unidentified chemical forms	5E-4		1.20E-07
		inhalation	aerosol	F		5E-4	1	3.40E-05
		inhalation	aerosol	F		5E-4	5	1.90E-05
		inhalation	aerosol	M	citrate, plutonium tributyl phosphate, chloride	1E-4	1	2.50E-05
		inhalation	aerosol	M	citrate, plutonium tributyl phosphate, chloride	1E-4	5	1.40E-05
		inhalation	aerosol	S		5E-6	1	3.10E-05
		inhalation	aerosol	S		5E-6	5	1.80E-05
		inhalation	aerosol		in a $^{239}PuO_2$ matrix and in a mixture of oxides (MOX)	2E-6	1	4.50E-05
		inhalation	aerosol		in a $^{239}PuO_2$ matrix and in a mixture of oxides (MOX)	2E-6	5	2.50E-05

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol		plutonium dioxide (1 nm nanoparticles)	3.5E-4	1	3.00E-05
		inhalation	aerosol		plutonium dioxide (1 nm nanoparticles)	3.5E-4	5	1.70E-05
		inhalation	aerosol		nitrate	1E-4	1	2.30E-05
		inhalation	aerosol		nitrate	1E-4	5	1.30E-05
Am-241	432.2 y	direct entry into the blood						1.20E-04
		ingestion			all compounds	5E-4		5.90E-08
		inhalation	aerosol	F	citrate	5E-4	1	1.90E-05
		inhalation	aerosol	F	citrate	5E-4	5	1.10E-05
		inhalation	aerosol	M	oxide, chloride	1E-4	1	1.40E-05
		inhalation	aerosol	M	oxide, chloride	1E-4	5	8.00E-06
		inhalation	aerosol	S	americium bound to plutonium oxide	5E-6	1	2.90E-05
		inhalation	aerosol	S	americium bound to plutonium oxide	5E-6	5	1.70E-05
		inhalation	aerosol		nitrate	3E-4	1	1.60E-05
		inhalation	aerosol		nitrate	3E-4	5	9.70E-06
Cm-242	162.8 d	direct entry into the blood						7.00E-06
		ingestion			all compounds	5E-4		3.50E-09
		inhalation	aerosol	F	citrate	5E-4	1	1.20E-06
		inhalation	aerosol	F	citrate	5E-4	5	7.00E-07

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A	AMAD (µm)	e(50) ($Sv \cdot Bq^{-1}$)
		inhalation	aerosol	M		1E-4	1	2.30E-06
		inhalation	aerosol	M		1E-4	5	1.40E-06
		inhalation	aerosol	S		5E-6	1	3.60E-06
		inhalation	aerosol	S		5E-6	5	2.30E-06
		inhalation	aerosol		oxide, nitrate and chloride	2.5E-4	1	1.70E-06
		inhalation	aerosol		oxide, nitrate and chloride	2.5E-4	5	1.00E-06

Explanatory notes:

$T_{½}$: Radioactive decay half-life

Type: Classification of the material according to the rate of its absorption from the respiratory tract into the blood (S slow, M medium, F fast and V very fast absorption into the blood)

f_A: Proportion of the activity that is absorbed into the blood after entry into the digestive tract

AMAD: Activity Median Aerodynamic Diameter of the aerosol

e(50): Conversion factor for calculating the 50-year committed effective dose following intake of a unit activity of the radionuclide via a given route. According to the route of intake, these are h_{ing} (ingestion), h_{inh} (inhalation) or a factor for direct entry into the blood.

In the case of radionuclides not listed in the table, the values recommended by the European Commission – COMMISSION RECOMMENDATION (Euratom) 2024/440 of 2 February 2024 on the use of dose coefficients for the estimation of the effective dose and equivalent dose for the purposes of Council Directive 2013/59/Euratom shall apply.

Conversion factors for calculating the committed effective dose for radionuclide intake by ingestion and inhalation by a member of the public

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
H-3	12.32 y	ingestion			tritiated water and other soluble forms (assigned type F for inhalation)	1	1.1E-10	1	7.2E-11	3.6E-11	2.7E-11	2.0E-11	1.9E-11	
		ingestion			relatively insoluble forms (types M and S)	0.2	2.2E-11	1E-01	7.2E-12	3.6E-12	2.7E-12	2.1E-12	2.0E-12	
		ingestion			biogenic organic compounds (OBT)	1	1.9E-10	1	1.5E-10	7.8E-11	5.8E-11	5.1E-11	5.1E-11	
		inhalation	gases or vapours		tritiated water (HTO)		1.1E-10		7.2E-11	3.6E-11	2.7E-11	2.1E-11	2.0E-11	
		inhalation	gases or vapours		elemental tritium (HT)		1.1E-14		7.2E-15	3.6E-15	2.7E-15	2.1E-15	2.0E-15	
		inhalation	gases or vapours		tritiated methane ($CH_{4-x}T_x$)		3.3E-13		2.2E-13	1.1E-13	8.2E-14	6.2E-14	5.9E-14	
		inhalation	gases or vapours		unspecified gases and vapours (including unspecified organic vapours)		1.1E-10		7.2E-11	3.6E-11	2.7E-11	2.1E-11	2.0E-11	
		inhalation	aerosol	F	biogenic organic compounds (OBT)		9.6E-11		8.0E-11	3.6E-11	2.7E-11	2.1E-11	2.2E-11	
		inhalation	aerosol	F	tritide in alloys with lanthanum, nickel and aluminium ($LaNi_{4,25}Al_{0,75}$)		5.5E-11		3.7E-11	1.6E-11	1.2E-11	8.3E-12	8.2E-12	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	M	fragments of glass, luminous paint, titanium tritide, zirconium tritide, all unspecified compounds		2.6E-10		2.2E-10	1.2E-10	7.1E-11	5.0E-11	4.6E-11	
		inhalation	aerosol	S	tritiated carbon, hafnium tritide		1.4E-09		1.4E-09	9.0E-10	6.1E-10	5.4E-10	5.6E-10	
C-14	5.70E+3 y	ingestion			all chemical forms	1	5.1E-10	1	4.7E-10	2.5E-10	1.8E-10	1.6E-10	1.6E-10	
		ingestion			bicarbonate		4.8E-11	1	4.8E-11	2.3E-11	1.5E-11	1.5E-11	1.3E-11	
		inhalation	gases or vapours		carbon monoxide (CO)		1.9E-11		1.2E-11	5.8E-12	3.5E-12	2.1E-12	1.8E-12	
		inhalation	gases or vapours		carbon dioxide (CO_2)		4.6E-11		4.6E-11	2.1E-11	1.4E-11	1.5E-11	1.3E-11	
		inhalation	gases or vapours		methane (CH_4)		4.6E-13		3.1E-13	1.6E-13	9.8E-14	5.9E-14	5.1E-14	
		inhalation	gases or vapours		unspecified gases and vapours		5.4E-10		5.0E-10	2.6E-10	1.9E-10	1.7E-10	1.7E-10	
		inhalation	aerosol	F	barium carbonate (model CO_2)		4.2E-11		3.8E-11	1.6E-11	1.0E-11	8.9E-12	8.0E-12	
		inhalation	aerosol	F			2.8E-10		2.6E-10	1.2E-10	8.4E-11	6.7E-11	7.0E-11	
		inhalation	aerosol	M	all unspecified forms		4.0E-09		3.5E-09	2.0E-09	1.3E-09	1.0E-09	9.7E-10	
		inhalation	aerosol	S	elemental carbon, tritiated carbon		2.5E-08		2.4E-08	1.8E-08	1.3E-08	1.3E-08	1.3E-08	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
P-32	14.263 d	ingestion			all forms	1	2.4E-08	9E-01*	1.3E-08	6.2E-09	3.5E-09	2.9E-09	1.7E-09	* Adult 0.8
		inhalation	aerosol	F	sodium phosphate		1.3E-08		7.3E-09	3.1E-09	1.9E-09	1.4E-09	9.2E-10	
		inhalation	aerosol	M	yttrium phosphate, stannous phosphate and zinc phosphate, all unspecified forms		1.1E-08		8.4E-09	4.5E-09	3.0E-09	2.3E-09	2.1E-09	
		inhalation	aerosol	S			1.1E-08		9.2E-09	5.1E-09	3.5E-09	2.6E-09	2.5E-09	
S-35	87.51 d	ingestion			dietary sulphur and all soluble forms	1	1.9E-10	1	1.3E-10	5.8E-11	3.3E-11	2.0E-11	2.7E-11	
		ingestion			most forms of inorganic sulphur	1		1						
		ingestion			elemental sulphur and thiosulphate	0.2	4.1E-11	0.1	1.5E-11	7.5E-12	4.6E-12	2.9E-12	3.1E-12	
		inhalation	gases and vapours		sulphur dioxide, carbon disulphide, hydrogen sulphide, carbonyl sulphide, unspecified inorganic gases and vapours	1	2.9E-10	1	2.1E-10	1.1E-10	7.0E-11	4.9E-11	5.5E-11	
		inhalation	gases and vapours		other organic sulphur	1	9.6E-09	1	7.1E-09	3.7E-09	2.2E-09	1.3E-09	1.2E-09	
		inhalation	aerosol	F	sulphates of caesium, nickel, strontium and thorium		1.2E-10		8.6E-11	3.6E-11	2.2E-11	1.4E-11	1.6E-11	
		inhalation	aerosol	M	barium sulphate; all unspecified forms		2.3E-09		1.9E-09	1.1E-09	7.0E-10	5.6E-10	5.2E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	S			3.6E-09		3.1E-09	1.8E-09	1.2E-09	9.1E-10	8.5E-10	
Ca-45	162.67 d	ingestion			all forms	0.6	7.2E-09	0.5*	3.5E-09	1.4E-09	7.7E-10	7.3E-10	2.7E-10	* Adult 0.4
		inhalation	aerosol	F	chloride		5.0E-09		2.8E-09	9.7E-10	5.6E-10	4.8E-10	2.2E-10	
		inhalation	aerosol	M	all unspecified forms		5.3E-09		4.2E-09	2.3E-09	1.5E-09	1.2E-09	1.0E-09	
		inhalation	aerosol	S			8.0E-09		7.0E-09	4.0E-09	2.6E-09	2.1E-09	1.9E-09	
Fe-59	44.495 d	ingestion			all forms	0.6	4.6E-08	0.2*	1.2E-08	6.3E-09	4.6E-09	3.2E-09	1.7E-09	* Adult 0.1
		inhalation	aerosol	F			3.3E-08		2.0E-08	9.1E-09	6.6E-09	4.3E-09	4.0E-09	
		inhalation	aerosol	M	ferric chloride, ferric oxide, all unspecified forms		1.4E-08		9.3E-09	5.1E-09	3.5E-09	2.6E-09	2.6E-09	
		inhalation	aerosol	S	corrosion products		1.1E-08		9.1E-09	5.2E-09	3.5E-09	2.7E-09	2.8E-09	
Co-57	271.74 d	ingestion			dietary cobalt and soluble forms	0.6	2.2E-09	0.2*	6.9E-10	4.1E-10	2.8E-10	2.0E-10	1.2E-10	* Adult 0.1
		ingestion			oxides	0.3	1.2E-09	0.1*	4.4E-10	2.6E-10	1.8E-10	1.3E-10	8.8E-11	* Adult 0.05
		inhalation	aerosol	F	nitrate, chloride		1.4E-09		7.1E-10	4.0E-10	2.7E-10	1.9E-10	1.8E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	M	all unspecified forms		2.2E-09		1.9E-09	1.0E-09	7.1E-10	5.2E-10	5.6E-10	
		inhalation	aerosol	S	oxide, cobalt in aluminosilicate melt, cobalt-labelled polystyrene		4.3E-09		3.9E-09	2.3E-09	1.5E-09	1.2E-09	1.3E-09	
Co-58	70.86 d	ingestion			dietary cobalt and soluble forms	0.6	6.1E-09	0.2*	2.5E-09	1.5E-09	1.0E-09	7.1E-10	5.4E-10	* Adult 0.1
		ingestion			oxides	0.3	3.8E-09	0.1*	1.9E-09	1.1E-09	7.9E-10	5.5E-10	4.6E-10	* Adult 0.05
		inhalation	aerosol	F	nitrate, chloride		3.9E-09		2.1E-09	1.2E-09	8.0E-10	5.5E-10	5.3E-10	
		inhalation	aerosol	M	all unspecified forms		6.3E-09		5.1E-09	3.0E-09	2.0E-09	1.5E-09	1.7E-09	
		inhalation	aerosol	S	oxide, cobalt in aluminosilicate melt, cobalt-labelled polystyrene		8.7E-09		7.5E-09	4.4E-09	3.0E-09	2.2E-09	2.6E-09	
Co-60	5.2713 y	ingestion			dietary cobalt and soluble forms	0.6	4.7E-08	0.2*	1.5E-08	9.8E-09	6.8E-09	5.4E-09	3.2E-09	* Adult 0.1
		ingestion			oxides	0.3	2.5E-08	0.1*	9.1E-09	5.8E-09	4.1E-09	3.2E-09	2.1E-09	* Adult 0.05
		inhalation	aerosol	F	nitrate, chloride		3.0E-08		1.6E-08	9.7E-09	6.7E-09	5.3E-09	5.2E-09	
		inhalation	aerosol	M	all unspecified forms		3.7E-08		3.1E-08	1.9E-08	1.3E-08	1.0E-08	1.1E-08	
		inhalation	aerosol	S	oxide, cobalt in aluminosilicate melt, cobalt-labelled polystyrene		1.2E-07		1.2E-07	8.2E-08	5.9E-08	5.6E-08	6.3E-08	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Ni-59	1.01E+5 y	ingestion			dietary nickel, soluble and unspecified forms	0.5	6.1E-10	0.05	5.5E-11	3.2E-11	2.0E-11	1.3E-11	1.1E-11	
		ingestion			metallic nickel	0.1	1.3E-10	0.01	1.6E-11	8.6E-12	5.5E-12	3.4E-12	2.8E-12	
		ingestion			oxide	5E-03	1.3E-11	5E-04	6.3E-12	3.0E-12	2.1E-12	1.1E-12	6.7E-13	
		inhalation	gases or vapours		nickel carbonyl		1.1E-09		7.3E-10	4.4E-10	2.6E-10	1.8E-10	1.6E-10	
		inhalation	aerosol	F	chloride, sulphate, sulphide, trinickel disulphide		3.9E-10		1.5E-10	8.6E-11	5.1E-11	3.6E-11	3.5E-11	
		inhalation	aerosol	M	metallic nickel, all unspecified forms		4.7E-10		3.7E-10	2.0E-10	1.2E-10	8.8E-11	8.1E-11	
		inhalation	aerosol	S	oxide		2.8E-09		2.9E-09	2.1E-09	1.6E-09	1.6E-09	1.6E-09	
Ni-63	100.1 y	ingestion			dietary nickel, soluble and unspecified forms	0.5	1.7E-09	0.05	1.4E-10	8.0E-11	4.8E-11	3.2E-11	3.0E-11	
		ingestion			metallic nickel	0.1	3.4E-10	0.01	2.7E-11	1.6E-11	9.6E-12	6.4E-12	6.0E-12	
		ingestion			oxide	5E-03	1.7E-11	5E-04	1.4E-12	8.1E-13	4.8E-13	3.2E-13	3.0E-13	
		inhalation	gases or vapours		nickel carbonyl		3.0E-09		2.1E-09	1.2E-09	7.4E-10	5.0E-10	4.7E-10	
		inhalation	aerosol	F	chloride, sulphate, sulphide, trinickel disulphide		1.1E-09		4.1E-10	2.4E-10	1.4E-10	9.9E-11	9.8E-11	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	M	metallic nickel, all unspecified forms		1.4E-09		1.1E-09	6.2E-10	3.9E-10	2.9E-10	2.7E-10	
		inhalation	aerosol	S	oxide		3.7E-09		6.6E-09	4.7E-09	3.5E-09	3.3E-09	3.4E-09	
Zn-65	244.06 d	ingestion			all forms	1	4.7E-08	0.5	1.5E-08	9.5E-09	6.2E-09	4.6E-09	4.3E-09	
		inhalation	aerosol	F	oxide, chromate		2.4E-08		1.1E-08	6.1E-09	4.0E-09	2.8E-09	2.7E-09	
		inhalation	aerosol	M	nitrate, phosphate, all unspecified compounds		1.1E-08		6.7E-09	4.0E-09	2.7E-09	2.0E-09	2.1E-09	
		inhalation	aerosol	S	corrosion products		9.4E-09		8.5E-09	5.2E-09	3.6E-09	2.8E-09	3.2E-09	
Se-75	119.779 d	ingestion			dietary selenium	1	1.6E-08	0.8	1.1E-08	6.6E-09	4.6E-09	2.7E-09	2.5E-09	
		inhalation	aerosol	F	selenium dioxide, selenic acid, elemental selenium		8.4E-09		6.1E-09	3.3E-09	2.3E-09	1.2E-09	1.2E-09	
		inhalation	aerosol	M	all unspecified forms		5.2E-09		4.2E-09	2.4E-09	1.7E-09	1.1E-09	1.2E-09	
		inhalation	aerosol	S			5.7E-09		5.0E-09	2.9E-09	2.0E-09	1.5E-09	1.7E-09	
Se-79	2.95E+5 y	ingestion			dietary selenium	1	2.7E-08	0.8	1.7E-08	1.0E-08	7.0E-09	2.7E-09	1.9E-09	
		inhalation	aerosol	F	selenium dioxide, selenic acid, elemental selenium		1.4E-08		9.9E-09	5.3E-09	3.5E-09	1.2E-09	9.2E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	M	all unspecified forms		8.5E-09		6.9E-09	4.0E-09	2.6E-09	1.6E-09	1.4E-09	
		inhalation	aerosol	S			2.7E-08		2.7E-08	1.9E-08	1.5E-08	1.4E-08	1.4E-08	
Sr-85	64.84 d	ingestion			insoluble forms (assigned to type S)	0.02	1.0E-09	0.01	8.2E-10	4.6E-10	3.3E-10	2.4E-10	2.1E-10	
		ingestion			dietary strontium and in soluble forms	0.6	6.4E-09	0.4*	2.3E-09	1.3E-09	1.0E-09	9.7E-10	3.8E-10	* Adult 0.25
		inhalation	aerosol	F	chloride, sulphate and carbonate		4.0E-09		1.7E-09	8.2E-10	6.8E-10	6.2E-10	2.7E-10	
		inhalation	aerosol	M	fuel fragments, all unspecified forms		3.6E-09		2.6E-09	1.5E-09	1.0E-09	8.0E-10	7.9E-10	
		inhalation	aerosol	S	strontium in aluminosilicate melt, strontium-labelled polystyrene, strontium titanate		4.3E-09		3.6E-09	2.1E-09	1.4E-09	1.1E-09	1.2E-09	
Sr-89	50.53 d	ingestion			insoluble forms (assigned to type S)	0.02	3.1E-09	0.01	1.8E-09	1.1E-09	7.4E-10	5.1E-10	4.0E-10	
		ingestion			dietary strontium and in soluble forms	0.6	3.7E-08	0.4*	1.1E-08	4.7E-09	3.0E-09	3.5E-09	8.9E-10	* Adult 0.25
		inhalation	aerosol	F	chloride, sulphate and carbonate		2.4E-08		9.3E-09	3.2E-09	2.0E-09	2.3E-09	7.0E-10	
		inhalation	aerosol	M	fuel fragments, all unspecified forms		2.1E-08		1.6E-08	8.5E-09	5.6E-09	4.6E-09	4.0E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	S	strontium in aluminosilicate melt, strontium-labelled polystyrene, strontium titanate		2.5E-08		2.1E-08	1.2E-08	8.1E-09	6.3E-09	6.1E-09	
Sr-90	28.79 y	ingestion			insoluble forms (assigned to type S)	0.02	1.3E-08	0.01	3.5E-09	1.9E-09	2.4E-09	3.6E-09	1.1E-09	
		ingestion			dietary strontium and in soluble forms	0.6	3.7E-07	0.4*	1.1E-07	5.6E-08	8.2E-08	1.3E-07	2.4E-08	* Adult 0.25
		inhalation	aerosol	F	chloride, sulphate and carbonate		2.4E-07		9.2E-08	4.2E-08	6.1E-08	9.5E-08	2.5E-08	
		inhalation	aerosol	M	fuel fragments, all unspecified forms		1.4E-07		9.9E-08	5.6E-08	5.0E-08	5.9E-08	3.2E-08	
		inhalation	aerosol	S	strontium in aluminosilicate melt, strontium-labelled polystyrene, strontium titanate		6.0E-07		6.2E-07	4.8E-07	3.9E-07	4.0E-07	4.1E-07	
Y-90	64.10 h	ingestion			all chemical forms	0.001	3.1E-09	0.0005*	2.4E-09	1.5E-09	1.0E-09	6.5E-10	5.6E-10	* Adult 0.0001
		inhalation	aerosol	F	chloride		3.4E-09		2.4E-09	1.1E-09	7.5E-10	5.2E-10	4.1E-10	
		inhalation	aerosol	M	oxide, phosphate, all unspecified forms		4.5E-09		3.4E-09	1.8E-09	1.2E-09	8.6E-10	7.9E-10	
		inhalation	aerosol	S	yttrium in aluminosilicate melt		4.8E-09		3.6E-09	1.9E-09	1.3E-09	9.5E-10	8.9E-10	
Zr-95	64.032 d	ingestion			all other chemical forms	0.02	2.7E-09	0.002	1.2E-09	7.0E-10	4.9E-10	3.4E-10	3.2E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		ingestion			dietary zirconium	0.02	2.7E-09	0.01	1.7E-09	9.5E-10	6.3E-10	4.6E-10	4.2E-10	
		inhalation	aerosol	F			1.7E-08		1.4E-08	6.7E-09	3.7E-09	3.0E-09	2.7E-09	
		inhalation	aerosol	M	oxalate, all unspecified forms		1.4E-08		1.2E-08	6.6E-09	4.2E-09	3.4E-09	3.4E-09	
		inhalation	aerosol	S	carbonate, oxide, tritid		1.7E-08		1.5E-08	8.7E-09	5.9E-09	4.5E-09	4.8E-09	
Nb-95	34.991 d	ingestion			all forms	0.02	1.3E-09	0.01	1.1E-09	6.3E-10	4.5E-10	3.1E-10	3.0E-10	
		inhalation	aerosol	F			2.5E-09		1.9E-09	1.0E-09	6.6E-10	4.7E-10	4.6E-10	
		inhalation	aerosol	M	oxalate, all unspecified forms		4.2E-09		3.4E-09	1.9E-09	1.3E-09	9.9E-10	1.1E-09	
		inhalation	aerosol	S	carbonate, oxide		5.3E-09		4.3E-09	2.5E-09	1.7E-09	1.3E-09	1.4E-09	
Mo-99	65.94 h	ingestion			sulphide	0.1	3.0E-09	0.05	2.0E-09	1.1E-09	7.7E-10	5.1E-10	4.4E-10	
		ingestion			dietary molybdenum	1	3.0E-09	0.6	1.7E-09	9.7E-10	6.6E-10	4.3E-10	3.7E-10	
		ingestion			molybdenum in water	1	1.4E-09	0.9	1.1E-09	6.6E-10	4.7E-10	3.0E-10	2.6E-10	
		inhalation	aerosol	F	ammonium chloride and ammonium molybdate		1.7E-09		1.2E-09	5.3E-10	3.7E-10	2.1E-10	1.9E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	M	oxide, all unspecified forms		2.4E-09		1.8E-09	9.5E-10	6.6E-10	4.8E-10	4.4E-10	
		inhalation	aerosol	S			2.6E-09		1.9E-09	1.0E-09	7.2E-10	5.4E-10	5.0E-10	
Tc-99	2.111E+5 y	ingestion			dietary technetium	1	3.4E-09	0.5	1.2E-09	5.2E-10	2.9E-10	2.0E-10	1.5E-10	
		ingestion			pertechnetate	1	3.4E-09	0.9*	2.0E-09	9.2E-10	5.0E-10	3.5E-10	2.7E-10	* Adult 0.8
		inhalation	aerosol	F	pertechnetate, Tc-DTPA		1.8E-09		1.2E-09	4.5E-10	2.5E-10	1.6E-10	1.3E-10	
		inhalation	aerosol	M	all unspecified forms		8.1E-09		7.1E-09	4.0E-09	2.6E-09	2.0E-09	1.9E-09	
		inhalation	aerosol	S			5.4E-08		5.5E-08	4.1E-08	3.1E-08	3.1E-08	3.1E-08	
Tc-99m	6.015 h	ingestion			dietary technetium	1	1.1E-10	0.5	5.6E-11	3.0E-11	2.0E-11	1.4E-11	1.3E-11	
		ingestion			pertechnetate	1	1.1E-10	0.9*	7.2E-11	3.8E-11	2.4E-11	1.6E-11	1.4E-11	* Adult 0.8
		inhalation	aerosol	F	pertechnetate, Tc-DTPA		4.9E-11		3.6E-11	1.6E-11	9.9E-12	6.4E-12	5.5E-12	
		inhalation	aerosol	M	all unspecified forms		5.0E-11		3.7E-11	2.0E-11	1.4E-11	1.1E-11	1.0E-11	
		inhalation	aerosol	S			4.9E-11		3.7E-11	2.0E-11	1.4E-11	1.1E-11	1.0E-11	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Ru-106	373.59 d	ingestion	particulate matter		all forms	0.1	2.2E-08	0.05	1.2E-08	6.9E-09	4.3E-09	3.0E-09	2.6E-09	
		inhalation	gases or vapours		ruthenium tetroxide	0.02	3.4E-08	0.01	2.7E-08	1.6E-08	1.0E-08	7.6E-09	7.0E-09	
		inhalation	aerosol	F	chloride, oxalate		4.2E-08		3.5E-08	1.8E-08	1.1E-08	8.1E-09	6.7E-09	
		inhalation	aerosol	M	citrate, all unspecified forms		9.2E-08		8.3E-08	4.9E-08	3.2E-08	2.6E-08	2.6E-08	
		inhalation	aerosol	S	dioxide		2.2E-07		2.1E-07	1.3E-07	8.7E-08	7.2E-08	7.4E-08	
Ag-110m	249.76 d	ingestion			all chemical forms	0.1	1.4E-08	0.05	7.7E-09	4.5E-09	3.2E-09	2.2E-09	2.3E-09	
		inhalation	aerosol	F	nitrate		1.8E-08		1.3E-08	7.5E-09	5.1E-09	3.8E-09	4.2E-09	
		inhalation	aerosol	M	iodide, all unspecified forms		3.0E-08		2.6E-08	1.5E-08	1.0E-08	7.9E-09	9.0E-09	
		inhalation	aerosol	S			5.2E-08		4.8E-08	2.9E-08	2.0E-08	1.6E-08	1.8E-08	
Sb-124	60.20 d	ingestion			other chemical forms	0.1	7.2E-09	0.05	4.7E-09	2.7E-09	1.8E-09	1.2E-09	1.1E-09	
		ingestion			dietary antimony	0.2	1.1E-08	0.1	6.1E-09	3.5E-09	2.2E-09	1.5E-09	1.4E-09	
		inhalation	aerosol	F	chloride, tartrate		1.1E-08		8.3E-09	4.3E-09	2.5E-09	1.7E-09	1.4E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	M	antimony trioxide, all unspecified forms		2.1E-08		1.7E-08	9.9E-09	6.6E-09	5.0E-09	5.2E-09	
		inhalation	aerosol	S			2.9E-08		2.5E-08	1.5E-08	9.9E-09	7.5E-09	7.9E-09	
Sb-125	2.75856 y	ingestion			other chemical forms	0.1	3.0E-09	0.05	1.6E-09	9.4E-10	6.0E-10	4.1E-10	3.7E-10	
		ingestion			dietary antimony	0.2	5.2E-09	0.1	2.5E-09	1.4E-09	8.8E-10	6.1E-10	5.4E-10	
		inhalation	aerosol	F	chloride, tartrate		5.6E-09		4.5E-09	2.4E-09	1.4E-09	9.4E-10	8.5E-10	
		inhalation	aerosol	M	antimony trioxide, all unspecified forms		1.4E-08		1.2E-08	6.9E-09	4.5E-09	3.5E-09	3.5E-09	
		inhalation	aerosol	S			4.4E-08		4.2E-08	2.7E-08	1.8E-08	1.5E-08	1.6E-08	
Te-129	69.6 min	ingestion			all forms	0.6	3.3E-10	0.3	2.7E-10	1.8E-10	1.3E-10	8.9E-11	6.1E-11	
		inhalation	gases or vapours		all unspecified compounds		2.9E-10		2.2E-10	1.3E-10	9.0E-11	6.4E-11	5.8E-11	
		inhalation	aerosol	F	chloride, dioxide		1.4E-10		1.0E-10	4.5E-11	3.3E-11	2.1E-11	1.6E-11	
		inhalation	aerosol	M	elemental tellurium, cadmium telluride, all unspecified forms		1.9E-10		1.4E-10	6.9E-11	5.2E-11	3.7E-11	2.9E-11	
		inhalation	aerosol	S			1.9E-10		1.4E-10	6.9E-11	5.2E-11	3.8E-11	2.9E-11	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Te-132	3.204 d	ingestion			all forms	0.6	2.1E-08	0.3	1.2E-08	6.6E-09	3.6E-09	2.5E-09	1.9E-09	
		inhalation	gases or vapours		all unspecified compounds		3.0E-08		2.5E-08	1.4E-08	6.9E-09	4.7E-09	3.4E-09	
		inhalation	aerosol	F	chloride, dioxide		1.3E-08		1.0E-08	4.9E-09	2.6E-09	1.6E-09	1.2E-09	
		inhalation	aerosol	M	elemental tellurium, cadmium telluride, all unspecified forms		7.5E-09		5.5E-09	2.9E-09	1.9E-09	1.3E-09	1.3E-09	
		inhalation	aerosol	S			6.3E-09		4.9E-09	2.6E-09	1.8E-09	1.3E-09	1.3E-09	
I-125	59 400 d	ingestion			all chemical forms	1	3.5E-08	1	4.3E-08	3.6E-08	2.1E-08	1.6E-08	1.3E-08	
		inhalation	gases or vapours		elemental iodine (I_2), unspecified forms	1	3.5E-08	1	4.4E-08	3.6E-08	2.1E-08	1.6E-08	1.3E-08	
		inhalation	gases or vapours		methyl iodide CH_3I, ethyl iodide C_2H_5I		2.5E-08		3.1E-08	2.5E-08	1.5E-08	1.2E-08	8.9E-09	
		inhalation	aerosol	F	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms		1.8E-08		2.3E-08	1.6E-08	9.7E-09	6.6E-09	5.3E-09	
		inhalation	aerosol	M			5.6E-09		6.6E-09	4.7E-09	2.8E-09	2.0E-09	1.7E-09	
		inhalation	aerosol	S			2.0E-09		1.8E-09	9.9E-10	6.4E-10	4.5E-10	4.3E-10	
I-129	1.57E+7 y	ingestion			all chemical forms	1	1.2E-07	1	1.6E-07	1.6E-07	1.2E-07	1.0E-07	9.4E-08	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	gases or vapours		elemental iodine (I_2), unspecified forms	1	1.2E-07	1	1.6E-07	1.7E-07	1.2E-07	1.0E-07	9.4E-08	
		inhalation	gases or vapours		methyl iodide CH_3I, ethyl iodide C_2H_5I		8.6E-08		1.1E-07	1.2E-07	8.4E-08	7.2E-08	6.6E-08	
		inhalation	aerosol	F	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms		6.2E-08		8.5E-08	7.5E-08	5.4E-08	4.2E-08	4.0E-08	
		inhalation	aerosol	M			2.7E-08		3.3E-08	2.9E-08	2.0E-08	1.7E-08	1.7E-08	
		inhalation	aerosol	S			4.3E-08		4.4E-08	3.4E-08	2.7E-08	2.6E-08	2.7E-08	
I-131	8.02070 d	ingestion			all chemical forms	1	1.2E-07	1	1.2E-07	7.4E-08	3.5E-08	2.4E-08	1.6E-08	
		inhalation	gases or vapours		elemental iodine (I_2), unspecified forms	1	1.2E-07	1	1.2E-07	7.5E-08	3.6E-08	2.4E-08	1.7E-08	
		inhalation	gases or vapours		methyl iodide CH_3I, ethyl iodide C_2H_5I		8.2E-08		8.6E-08	5.2E-08	2.5E-08	1.7E-08	1.2E-08	
		inhalation	aerosol	F	sodium iodide, iodine bound to caesium chloride vector, silver iodide, all unspecified forms		5.9E-08		6.2E-08	3.3E-08	1.6E-08	9.7E-09	6.9E-09	
		inhalation	aerosol	M			1.5E-08		1.5E-08	8.3E-09	4.2E-09	2.7E-09	2.1E-09	
		inhalation	aerosol	S			3.8E-09		3.1E-09	1.7E-09	1.1E-09	8.3E-10	7.7E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Cs-134	2.0648 y	ingestion			chloride, nitrate, sulphate; dietary caesium; all unspecified compounds	1	2.3E-08	1	1.9E-08	1.5E-08	1.2E-08	1.3E-08	1.4E-08	
		ingestion			relatively insoluble forms (fragments of irradiated fuel)	0.2	6.6E-09	0.1	4.0E-09	2.8E-09	2.1E-09	1.9E-09	2.0E-09	
		inhalation	aerosol	F	chloride, nitrate, sulphate		1.2E-08		9.9E-09	7.0E-09	5.6E-09	5.3E-09	5.9E-09	
		inhalation	aerosol	M	fragments of irradiated fuel, all unspecified forms		2.6E-08		2.3E-08	1.4E-08	9.9E-09	8.0E-09	8.8E-09	
		inhalation	aerosol	S			7.6E-08		7.2E-08	4.6E-08	3.2E-08	2.7E-08	3.0E-08	
Cs-137	30.1671 y	ingestion			chloride, nitrate, sulphate; dietary caesium; all unspecified compounds	1	2.2E-08	1	1.7E-08	1.3E-08	1.0E-08	1.1E-08	1.4E-08	
		ingestion			relatively insoluble forms (fragments of irradiated fuel)	0.2	5.5E-09	0.1	2.8E-09	1.9E-09	1.5E-09	1.4E-09	1.6E-09	
		inhalation	aerosol	F	chloride, nitrate, sulphate		1.1E-08		9.1E-09	5.7E-09	4.7E-09	4.6E-09	5.8E-09	
		inhalation	aerosol	M	fragments of irradiated fuel, all unspecified forms		2.6E-08		2.3E-08	1.4E-08	9.4E-09	7.8E-09	8.4E-09	
		inhalation	aerosol	S			1.6E-07		1.6E-07	1.3E-07	9.9E-08	9.9E-08	1.0E-07	
Ba-133	10.52 y	ingestion			soluble forms, including dietary barium	0.6	1.5E-08	0.3*	3.6E-09	2.2E-09	3.0E-09	5.7E-09	1.0E-09	* Adult 0.2
		ingestion			insoluble forms (sulphate, titanate)	0.001	8.2E-10	0.0001	7.5E-10	4.2E-10	3.0E-10	2.1E-10	2.0E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F	chloride, carbonate		9.4E-09		3.1E-09	1.8E-09	2.5E-09	4.7E-09	1.0E-09	
		inhalation	aerosol	M	sulphate, all unspecified forms		1.1E-08		8.8E-09	5.1E-09	4.0E-09	4.3E-09	2.9E-09	
		inhalation	aerosol	S			4.7E-08		4.6E-08	3.2E-08	2.4E-08	2.4E-08	2.5E-08	
Ba-140	12.752 d	ingestion			soluble forms, including dietary barium	0.6	2.0E-08	0.3*	5.1E-09	2.4E-09	1.7E-09	1.7E-09	7.1E-10	* Adult 0.2
		ingestion			insoluble forms (sulphate, titanate)	0.001	2.2E-09	0.0001	2.0E-09	1.2E-09	8.4E-10	5.6E-10	5.3E-10	
		inhalation	aerosol	F	chloride, carbonate		1.3E-08		4.3E-09	1.7E-09	1.2E-09	1.2E-09	4.8E-10	
		inhalation	aerosol	M	sulphate, all unspecified forms		1.5E-08		1.1E-08	5.8E-09	3.9E-09	3.0E-09	2.9E-09	
		inhalation	aerosol	S			1.6E-08		1.3E-08	7.3E-09	4.9E-09	3.7E-09	3.8E-09	
La-140	1.6781 d	ingestion			all compounds	0.005	3.5E-09	5E-04	3.0E-09	1.8E-09	1.3E-09	8.5E-10	7.9E-10	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	3.2E-09	3E-04	2.5E-09	1.3E-09	8.8E-10	6.0E-10	5.8E-10	
		inhalation	aerosol		dioxide	5E-06	3.6E-09	5E-07	2.7E-09	1.4E-09	1.0E-09	6.9E-10	6.7E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F*		5E-03	2.9E-09	5E-04	2.2E-09	1.1E-09	7.6E-10	5.1E-10	4.8E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	3.4E-09	1E-04	2.6E-09	1.3E-09	9.5E-10	6.5E-10	6.3E-10	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	3.5E-09	5E-06	2.7E-09	1.4E-09	1.0E-09	6.9E-10	6.7E-10	
Ce-139	137.641 d	ingestion			all compounds	0.005	6.0E-10	0.0005	3.4E-10	1.9E-10	1.3E-10	9.1E-11	8.8E-11	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	5.8E-09	3E-04	4.5E-09	2.2E-09	1.4E-09	1.1E-09	1.1E-09	
		inhalation	aerosol		dioxide	5E-06	5.5E-09	5E-07	4.8E-09	2.7E-09	1.8E-09	1.4E-09	1.4E-09	
		inhalation	aerosol	F*		5E-03	6.1E-09	5E-04	4.2E-09	1.8E-09	1.0E-09	8.1E-10	8.6E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	5.5E-09	1E-04	4.4E-09	2.2E-09	1.4E-09	1.1E-09	1.1E-09	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	5.6E-09	5E-06	5.0E-09	2.8E-09	1.9E-09	1.4E-09	1.5E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Ce-141	32.508 d	ingestion			all compounds	0.005	4.5E-10	0.0005	2.7E-10	1.6E-10	1.1E-10	7.6E-11	6.2E-11	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	5.3E-09	3E-04	4.1E-09	2.1E-09	1.3E-09	1.0E-09	9.4E-10	
		inhalation	aerosol		dioxide	5E-06	6.3E-09	5E-07	5.2E-09	2.9E-09	1.9E-09	1.5E-09	1.4E-09	
		inhalation	aerosol	F*		5E-03	4.3E-09	5E-04	3.1E-09	1.3E-09	6.9E-10	5.8E-10	4.6E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	5.7E-09	1E-04	4.5E-09	2.4E-09	1.6E-09	1.2E-09	1.1E-09	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	6.3E-09	5E-06	5.2E-09	2.9E-09	1.9E-09	1.5E-09	1.4E-09	
Ce-144	284.91 d	ingestion			all compounds	0.005	1.0E-08	0.0005	4.4E-09	2.5E-09	1.7E-09	1.1E-09	9.8E-10	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	1.4E-07	3E-04	1.2E-07	6.4E-08	3.9E-08	3.3E-08	3.0E-08	
		inhalation	aerosol		dioxide	5E-06	1.6E-07	5E-07	1.5E-07	8.7E-08	5.8E-08	4.7E-08	4.7E-08	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F*		5E-03	1.2E-07	5E-04	1.1E-07	4.5E-08	2.4E-08	2.2E-08	1.7E-08	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	1.3E-07	1E-04	1.2E-07	6.1E-08	3.8E-08	3.1E-08	2.9E-08	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	1.7E-07	5E-06	1.6E-07	9.8E-08	6.7E-08	5.4E-08	5.5E-08	
Pr-143	13.57 d	ingestion			all compounds	0.005	8.4E-10	0.0005	6.0E-10	3.8E-10	2.7E-10	1.7E-10	1.4E-10	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	4.3E-09	3E-04	3.3E-09	1.7E-09	1.1E-09	8.3E-10	7.4E-10	
		inhalation	aerosol		dioxide	5E-06	5.2E-09	5E-07	4.2E-09	2.3E-09	1.5E-09	1.2E-09	1.1E-09	
		inhalation	aerosol	F*		5E-03	3.4E-09	5E-04	2.5E-09	1.0E-09	6.0E-10	4.8E-10	3.7E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	4.7E-09	1E-04	3.7E-09	2.0E-09	1.3E-09	1.0E-09	9.3E-10	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	5.2E-09	5E-06	4.2E-09	2.3E-09	1.5E-09	1.2E-09	1.1E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Nd-147	10.98 d	ingestion			all compounds	0.005	7.8E-10	0.0005	6.0E-10	3.7E-10	2.6E-10	1.7E-10	1.5E-10	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	4.0E-09	3E-04	3.1E-09	1.6E-09	1.0E-09	8.1E-10	7.3E-10	
		inhalation	aerosol		dioxide	5E-06	4.9E-09	5E-07	3.9E-09	2.2E-09	1.5E-09	1.2E-09	1.1E-09	
		inhalation	aerosol	F*		5E-03	3.1E-09	5E-04	2.2E-09	9.9E-10	5.9E-10	4.7E-10	3.9E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	4.5E-09	1E-04	3.5E-09	1.9E-09	1.2E-09	9.9E-10	9.1E-10	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	4.9E-09	5E-06	3.9E-09	2.2E-09	1.5E-09	1.2E-09	1.1E-09	
Pm-147	2.6234 y	ingestion			all compounds	0.005	6.5E-10	0.0005	5.9E-11	2.7E-11	1.6E-11	1.2E-11	8.4E-12	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	1.4E-08	3E-04	1.2E-08	5.8E-09	3.4E-09	2.8E-09	2.5E-09	
		inhalation	aerosol		dioxide	5E-06	1.3E-08	5E-07	1.2E-08	6.8E-09	4.4E-09	3.5E-09	3.3E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F*		5E-03	1.4E-08	5E-04	1.2E-08	5.1E-09	2.8E-09	2.3E-09	2.0E-09	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	1.3E-08	1E-04	1.1E-08	5.4E-09	3.2E-09	2.6E-09	2.3E-09	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	1.5E-08	5E-06	1.4E-08	8.3E-09	5.4E-09	4.4E-09	4.4E-09	
Sm-153	46.50 h	ingestion			all compounds	0.005	4.6E-10	0.0005	3.7E-10	2.3E-10	1.7E-10	1.1E-10	8.7E-11	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	1.3E-09	3E-04	9.7E-10	5.3E-10	3.6E-10	2.9E-10	2.5E-10	
		inhalation	aerosol		dioxide	5E-06	1.6E-09	5E-07	1.2E-09	6.8E-10	4.6E-10	3.7E-10	3.4E-10	
		inhalation	aerosol	F*		5E-03	1.0E-09	5E-04	7.6E-10	3.8E-10	2.6E-10	2.0E-10	1.7E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	1.5E-09	1E-04	1.1E-09	6.2E-10	4.2E-10	3.4E-10	3.0E-10	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	1.6E-09	5E-06	1.2E-09	6.8E-10	4.6E-10	3.7E-10	3.4E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Eu-152	13.537 y	ingestion			all compounds	0.005	8.8E-09	0.0005	2.3E-09	1.3E-09	9.4E-10	6.9E-10	6.5E-10	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	1.2E-07	3E-04	1.1E-07	5.9E-08	4.2E-08	4.0E-08	4.0E-08	
		inhalation	aerosol		dioxide	5E-06	9.4E-08	5E-07	8.9E-08	5.6E-08	3.9E-08	3.6E-08	3.8E-08	
		inhalation	aerosol	F*		5E-03	1.5E-07	5E-04	1.3E-07	6.6E-08	4.6E-08	4.5E-08	4.5E-08	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	1.1E-07	1E-04	1.0E-07	5.5E-08	3.8E-08	3.7E-08	3.7E-08	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	1.3E-07	5E-06	1.3E-07	9.5E-08	7.4E-08	7.4E-08	8.0E-08	
Eu-154	8.593 y	ingestion			all compounds	0.005	1.1E-08	0.0005	2.7E-09	1.5E-09	1.1E-09	7.7E-10	7.2E-10	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	1.6E-07	3E-04	1.4E-07	7.2E-08	4.8E-08	4.3E-08	4.2E-08	
		inhalation	aerosol		dioxide	5E-06	1.3E-07	5E-07	1.2E-07	7.3E-08	5.0E-08	4.3E-08	4.5E-08	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F*		5E-03	1.9E-07	5E-04	1.6E-07	7.6E-08	4.9E-08	4.6E-08	4.3E-08	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	1.4E-07	1E-04	1.3E-07	6.6E-08	4.4E-08	3.9E-08	3.8E-08	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	1.7E-07	5E-06	1.6E-07	1.1E-07	8.4E-08	8.2E-08	8.7E-08	
Eu-155	4.7611 y	ingestion			all compounds	0.005	1.1E-09	0.0005	1.9E-10	9.5E-11	6.5E-11	4.7E-11	4.4E-11	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	2.0E-08	3E-04	1.7E-08	8.3E-09	5.0E-09	4.2E-09	3.9E-09	
		inhalation	aerosol		dioxide	5E-06	1.8E-08	5E-07	1.7E-08	9.4E-09	6.1E-09	5.0E-09	4.9E-09	
		inhalation	aerosol	F*		5E-03	2.3E-08	5E-04	1.9E-08	7.7E-09	4.4E-09	3.8E-09	3.4E-09	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	1.9E-08	1E-04	1.6E-08	7.6E-09	4.6E-09	3.9E-09	3.6E-09	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	2.2E-08	5E-06	2.0E-08	1.3E-08	8.6E-09	7.4E-09	7.6E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Gd-153	240.4 d	ingestion			all compounds	0.005	6.5E-10	0.0005	2.7E-10	1.5E-10	1.0E-10	7.1E-11	7.0E-11	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	8.5E-09	3E-04	6.7E-09	3.1E-09	1.9E-09	1.5E-09	1.4E-09	
		inhalation	aerosol		dioxide	5E-06	8.2E-09	5E-07	7.2E-09	4.0E-09	2.6E-09	2.0E-09	2.0E-09	
		inhalation	aerosol	F*		5E-03	8.9E-09	5E-04	6.3E-09	2.3E-09	1.2E-09	1.0E-09	8.5E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	8.0E-09	1E-04	6.5E-09	3.1E-09	1.9E-09	1.5E-09	1.4E-09	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	8.5E-09	5E-06	7.6E-09	4.4E-09	2.9E-09	2.2E-09	2.3E-09	
Tb-160	72.3 d	ingestion			all compounds	0.005	2.9E-09	0.0005	1.9E-09	1.1E-09	7.7E-10	5.3E-10	4.9E-10	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	2.2E-08	3E-04	1.7E-08	8.3E-09	5.1E-09	4.0E-09	3.8E-09	
		inhalation	aerosol		dioxide	5E-06	2.3E-08	5E-07	1.9E-08	1.1E-08	7.3E-09	5.6E-09	5.7E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F*		5E-03	2.2E-08	5E-04	1.5E-08	5.9E-09	3.1E-09	2.6E-09	2.0E-09	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	2.2E-08	1E-04	1.8E-08	8.9E-09	5.7E-09	4.4E-09	4.3E-09	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	2.3E-08	5E-06	2.0E-08	1.1E-08	7.6E-09	5.8E-09	6.0E-09	
Dy-159	144.4 d	ingestion			all compounds	0.005	2.4E-10	0.0005	1.4E-10	7.4E-11	5.3E-11	3.6E-11	3.5E-11	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	2.2E-09	3E-04	1.7E-09	7.7E-10	4.7E-10	3.6E-10	3.4E-10	
		inhalation	aerosol		dioxide	5E-06	2.1E-09	5E-07	1.8E-09	9.8E-10	6.5E-10	4.8E-10	5.0E-10	
		inhalation	aerosol	F*		5E-03	2.4E-09	5E-04	1.6E-09	5.9E-10	3.1E-10	2.5E-10	2.1E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	2.1E-09	1E-04	1.6E-09	7.7E-10	4.8E-10	3.6E-10	3.5E-10	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	2.1E-09	5E-06	1.9E-09	1.0E-09	6.9E-10	5.2E-10	5.4E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Ho-166	26.80 h	ingestion			all compounds	0.005	1.6E-09	0.0005	1.3E-09	8.0E-10	5.7E-10	3.6E-10	3.0E-10	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	2.0E-09	3E-04	1.5E-09	7.4E-10	5.2E-10	3.7E-10	3.2E-10	
		inhalation	aerosol		dioxide	5E-06	2.2E-09	5E-07	1.6E-09	8.6E-10	6.0E-10	4.4E-10	3.9E-10	
		inhalation	aerosol	F*		5E-03	1.8E-09	5E-04	1.3E-09	6.2E-10	4.3E-10	3.0E-10	2.4E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	2.1E-09	1E-04	1.6E-09	8.1E-10	5.7E-10	4.1E-10	3.6E-10	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	2.2E-09	5E-06	1.6E-09	8.6E-10	6.0E-10	4.3E-10	3.9E-10	
Er-169	9.40 d	ingestion			all compounds	0.005	7.9E-11	0.0005	4.6E-11	3.0E-11	2.1E-11	1.4E-11	8.4E-12	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	1.3E-09	3E-04	1.0E-09	5.4E-10	3.5E-10	2.9E-10	2.5E-10	
		inhalation	aerosol		dioxide	5E-06	1.8E-09	5E-07	1.3E-09	7.9E-10	5.2E-10	4.3E-10	3.9E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F*		5E-03	9.3E-10	5E-04	6.7E-10	3.0E-10	1.7E-10	1.5E-10	1.1E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	1.6E-09	1E-04	1.2E-09	6.8E-10	4.4E-10	3.7E-10	3.3E-10	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	1.8E-09	5E-06	1.3E-09	7.9E-10	5.2E-10	4.3E-10	3.9E-10	
Tm-171	1.92 y	ingestion			all compounds	0.005	2.3E-10	0.0005	1.8E-11	6.9E-12	3.6E-12	2.8E-12	2.0E-12	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	4.8E-09	3E-04	4.0E-09	1.8E-09	1.0E-09	8.3E-10	6.9E-10	
		inhalation	aerosol		dioxide	5E-06	4.5E-09	5E-07	4.0E-09	2.2E-09	1.4E-09	1.1E-09	1.0E-09	
		inhalation	aerosol	F*		5E-03	5.1E-09	5E-04	4.0E-09	1.5E-09	7.4E-10	6.6E-10	4.7E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	4.4E-09	1E-04	3.7E-09	1.7E-09	9.6E-10	7.9E-10	6.5E-10	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	4.9E-09	5E-06	4.5E-09	2.6E-09	1.7E-09	1.3E-09	1.3E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Yb-169	32.026 d	ingestion			all compounds	0.005	8.4E-10	0.0005	6.2E-10	3.5E-10	2.5E-10	1.7E-10	1.7E-10	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	6.3E-09	3E-04	4.7E-09	2.4E-09	1.5E-09	1.2E-09	1.1E-09	
		inhalation	aerosol		dioxide	5E-06	7.3E-09	5E-07	5.9E-09	3.4E-09	2.2E-09	1.7E-09	1.7E-09	
		inhalation	aerosol	F*		5E-03	5.3E-09	5E-04	3.6E-09	1.5E-09	8.1E-10	6.7E-10	5.3E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	6.7E-09	1E-04	5.2E-09	2.8E-09	1.8E-09	1.4E-09	1.4E-09	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	7.4E-09	5E-06	6.0E-09	3.4E-09	2.3E-09	1.8E-09	1.7E-09	
Lu-177	6.647 d	ingestion			all compounds	0.005	2.1E-10	0.0005	1.6E-10	9.9E-11	7.1E-11	4.7E-11	3.5E-11	
		inhalation	aerosol		water-soluble forms, including chloride and citrate	3E-03	1.5E-09	3E-04	1.2E-09	6.2E-10	4.0E-10	3.3E-10	2.9E-10	
		inhalation	aerosol		dioxide	5E-06	2.0E-09	5E-07	1.5E-09	8.8E-10	5.9E-10	4.8E-10	4.4E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F*		5E-03	1.1E-09	5E-04	7.9E-10	3.7E-10	2.2E-10	1.9E-10	1.4E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M		1E-03	1.8E-09	1E-04	1.3E-09	7.6E-10	5.1E-10	4.2E-10	3.7E-10	
		inhalation	aerosol	S	fragments of irradiated fuel	5E-05	2.0E-09	5E-06	1.5E-09	8.8E-10	5.9E-10	4.8E-10	4.4E-10	
Ir-192	73.827 d	ingestion			all forms	0.02	2.4E-09	0.01	1.7E-09	1.0E-09	7.0E-10	4.9E-10	4.5E-10	
		inhalation	aerosol	F	chloride		9.5E-09		7.6E-09	3.8E-09	2.4E-09	1.7E-09	1.5E-09	
		inhalation	aerosol	M	all unspecified forms		1.3E-08		1.1E-08	6.4E-09	4.2E-09	3.2E-09	3.3E-09	
		inhalation	aerosol	S	metallic iridium		1.9E-08		1.6E-08	9.2E-09	6.2E-09	4.7E-09	4.9E-09	
Pb-210	22.20 y	ingestion			all forms	0.6	8.0E-06	0.3*	2.5E-06	1.5E-06	1.2E-06	6.9E-07	3.2E-07	* Adult 0.2
		inhalation	aerosol	F	lead chloride, lead bromide, lead fluoride, lead hydroxide and lead nitrate, lead oxides, all unspecified forms		5.7E-06		3.2E-06	1.7E-06	1.4E-06	7.2E-07	4.9E-07	
		inhalation	aerosol	M			4.9E-06		4.1E-06	2.4E-06	1.6E-06	1.1E-06	9.8E-07	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	S	mineral dust		3.4E-05		3.4E-05	2.4E-05	1.7E-05	1.6E-05	1.6E-05	
Pb-212	10.64 h	ingestion			all forms	0.6	1.5E-07	0.3*	5.0E-08	2.5E-08	1.4E-08	8.6E-09	5.6E-09	* Adult 0.2
		inhalation	aerosol	F	lead chloride, lead bromide, lead fluoride, lead hydroxide and lead nitrate, lead oxides, all unspecified forms		1.0E-06		8.0E-07	3.8E-07	2.7E-07	2.0E-07	1.8E-07	
		inhalation	aerosol	M			4.8E-07		3.5E-07	2.2E-07	1.5E-07	1.3E-07	1.2E-07	
		inhalation	aerosol	S	mineral dust		4.9E-07		3.6E-07	2.3E-07	1.6E-07	1.4E-07	1.2E-07	
Pb-214	26.8 min	ingestion			all forms	0.6	1.0E-09	0.3*	4.2E-10	2.5E-10	1.7E-10	1.1E-10	7.7E-11	* Adult 0.2
		inhalation	aerosol	F	lead chloride, lead bromide, lead fluoride, lead hydroxide and lead nitrate, lead oxides, all unspecified forms		6.5E-08		5.2E-08	2.6E-08	1.9E-08	1.6E-08	1.3E-08	
		inhalation	aerosol	M			4.4E-08		3.3E-08	2.0E-08	1.5E-08	1.5E-08	1.2E-08	
		inhalation	aerosol	S	mineral dust		4.4E-08		3.3E-08	2.0E-08	1.5E-08	1.5E-08	1.2E-08	
Bi-210	5.013 d	ingestion			all forms	0.1	2.7E-08	0.05	1.0E-08	5.9E-09	4.1E-09	1.6E-09	1.1E-09	
		inhalation	aerosol	F	bismuth as a radon decay product		4.7E-08		3.1E-08	1.8E-08	1.2E-08	5.1E-09	3.7E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	M	all unspecified forms		2.3E-07		2.0E-07	1.1E-07	7.4E-08	5.4E-08	4.9E-08	
		inhalation	aerosol	S			3.9E-07		3.5E-07	2.0E-07	1.3E-07	9.9E-08	9.4E-08	
Bi-214	19.9 min	ingestion			all forms	0.1	2.7E-10	0.05	2.1E-10	1.4E-10	1.0E-10	6.6E-11	4.7E-11	
		inhalation	aerosol	F	bismuth as a radon decay product		4.2E-08		3.3E-08	1.9E-08	1.4E-08	1.3E-08	1.1E-08	
		inhalation	aerosol	M	all unspecified forms		4.3E-08		3.3E-08	1.9E-08	1.4E-08	1.3E-08	1.1E-08	
		inhalation	aerosol	S			4.3E-08		3.3E-08	1.9E-08	1.4E-08	1.3E-08	1.1E-08	
Po-210	138.376 d	ingestion			all other chemical forms	0.2	5.6E-06	0.1	2.1E-06	1.2E-06	8.7E-07	2.8E-07	1.8E-07	
		ingestion			dietary polonium	1	2.8E-05	0.5	1.0E-05	6.1E-06	4.4E-06	1.4E-06	9.2E-07	
		inhalation	aerosol	F			5.1E-06		3.1E-06	1.8E-06	1.2E-06	4.5E-07	3.2E-07	
		inhalation	aerosol	M	chloride, hydroxide, volatilised polonium, all unspecified forms		8.5E-06		6.9E-06	4.1E-06	2.7E-06	1.9E-06	1.8E-06	
		inhalation	aerosol	S			1.2E-05		1.1E-05	6.3E-06	4.1E-06	3.2E-06	3.0E-06	
Rn-222	3.8235 d	ingestion			gas		4.0E-09		2.1E-09	1.2E-09	8.6E-10	7.5E-10	7.7E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Ra-226	1600 y	ingestion			all chemical forms	0.6	4.7E-06	0.3*	9.5E-07	4.9E-07	5.0E-07	6.5E-07	1.3E-07	* Adult 0.2
		inhalation	aerosol	F	nitrate		2.9E-06		8.8E-07	4.2E-07	4.2E-07	5.2E-07	1.5E-07	
		inhalation	aerosol	M	all unspecified forms		1.0E-05		8.3E-06	4.9E-06	3.2E-06	2.6E-06	2.3E-06	
		inhalation	aerosol	S			5.0E-05		4.9E-05	3.5E-05	2.6E-05	2.4E-05	2.4E-05	
Ra-228	5.75 y	ingestion			all chemical forms	0.6	3.8E-05	0.3*	6.2E-06	2.5E-06	2.5E-06	2.8E-06	3.4E-07	* Adult 0.2
		inhalation	aerosol	F	nitrate		2.3E-05		5.5E-06	2.0E-06	2.0E-06	2.2E-06	3.7E-07	
		inhalation	aerosol	M	all unspecified forms		1.6E-05		1.1E-05	5.5E-06	3.6E-06	3.0E-06	2.0E-06	
		inhalation	aerosol	S			8.8E-05		8.8E-05	5.9E-05	4.1E-05	3.8E-05	4.0E-05	
Ac-228	6.15 h	ingestion			all compounds	0.005	2.6E-09	5E-04	7.4E-10	4.3E-10	3.0E-10	2.0E-10	1.6E-10	
		inhalation	aerosol	F	citrate	5E-03	4.2E-08	5E-04	3.1E-08	1.4E-08	6.7E-09	5.3E-09	3.9E-09	
		inhalation	aerosol	M	chloride, oxide	1E-03	3.9E-08	1E-04	3.3E-08	1.7E-08	9.4E-09	7.3E-09	6.2E-09	
		inhalation	aerosol	S		5E-05	5.1E-08	5E-06	4.7E-08	2.8E-08	1.8E-08	1.4E-08	1.4E-08	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Th-229	7.34E+3 y	ingestion			all forms	0.005	1.1E-05	0.0005	8.9E-07	5.0E-07	3.2E-07	2.5E-07	2.1E-07	
		inhalation	aerosol		water-soluble forms, including chloride, citrate, fluoride, nitrate and sulphate	5E-04	2.1E-04	5E-05	2.0E-04	1.1E-04	7.1E-05	5.9E-05	5.4E-05	
		inhalation	aerosol	F*		5E-03	5.3E-04	5E-04	4.5E-04	2.3E-04	1.5E-04	1.1E-04	1.0E-04	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M	hydroxide	1E-03	1.9E-04	1E-04	1.8E-04	1.0E-04	6.6E-05	5.6E-05	5.1E-05	
		inhalation	aerosol	S	oxide	5E-05	3.4E-04	5E-06	3.4E-04	2.5E-04	1.8E-04	1.8E-04	1.8E-04	
Th-230	7.538E+4 y	ingestion			all forms	0.005	2.5E-06	0.0005	2.2E-07	1.3E-07	8.5E-08	6.9E-08	6.0E-08	
		inhalation	aerosol		water-soluble forms, including chloride, citrate, fluoride, nitrate and sulphate	5E-04	5.0E-05	5E-05	4.6E-05	2.7E-05	1.8E-05	1.6E-05	1.5E-05	
		inhalation	aerosol	F*		5E-03	1.3E-04	5E-04	1.1E-04	5.9E-05	3.9E-05	3.2E-05	2.8E-05	* Type F cannot be assumed without confirmation.

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	M	hydroxide	1E-03	4.6E-05	1E-04	4.2E-05	2.5E-05	1.7E-05	1.5E-05	1.4E-05	
		inhalation	aerosol	S	oxide	5E-05	5.5E-05	5E-06	5.4E-05	3.8E-05	2.8E-05	2.7E-05	2.7E-05	
Th-232	1.405E10 y	ingestion			all forms	0.005	2.7E-06	0.0005	2.4E-07	1.5E-07	1.0E-07	8.5E-08	7.0E-08	
		inhalation	aerosol		water-soluble forms, including chloride, citrate, fluoride, nitrate and sulphate	5E-04	5.2E-05	5E-05	4.9E-05	3.1E-05	2.1E-05	1.8E-05	1.7E-05	
		inhalation	aerosol	F*		5E-03	1.3E-04	5E-04	1.2E-04	6.9E-05	4.9E-05	3.9E-05	3.3E-05	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M	hydroxide	1E-03	4.7E-05	1E-04	4.5E-05	2.9E-05	2.0E-05	1.8E-05	1.6E-05	
		inhalation	aerosol	S	oxide	5E-05	1.4E-04	5E-06	1.5E-04	1.2E-04	1.0E-04	1.1E-04	1.1E-04	
Th-234	24.10 d	ingestion			all forms	0.005	3.6E-09	0.0005	2.5E-09	1.5E-09	1.1E-09	6.7E-10	5.9E-10	
		inhalation	aerosol		water-soluble forms, including chloride, citrate, fluoride, nitrate and sulphate	5E-04	2.1E-08	5E-05	1.7E-08	9.4E-09	6.0E-09	4.7E-09	4.4E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F*		5E-03	2.6E-08	5E-04	2.0E-08	7.4E-09	3.4E-09	2.9E-09	1.5E-09	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M	hydroxide	1E-03	1.9E-08	1E-04	1.6E-08	8.6E-09	5.5E-09	4.4E-09	4.0E-09	
		inhalation	aerosol	S	oxide	5E-05	2.2E-08	5E-06	1.8E-08	1.0E-08	6.9E-09	5.4E-09	5.2E-09	
Pa-231	3.276E+4 y	ingestion			all forms	0.005	5.1E-06	0.0005	4.6E-07	3.2E-07	2.4E-07	2.1E-07	1.8E-07	
		inhalation	aerosol		water-soluble forms, including chloride, citrate, fluoride, nitrate and sulphate	5E-04	9.4E-05	5E-05	9.2E-05	6.3E-05	4.7E-05	4.3E-05	4.0E-05	
		inhalation	aerosol	F*		5E-03	2.5E-04	5E-04	2.3E-04	1.5E-04	1.1E-04	9.5E-05	8.7E-05	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M	hydroxide	1E-03	8.6E-05	1E-04	8.4E-05	5.9E-05	4.4E-05	4.1E-05	3.9E-05	
		inhalation	aerosol	S	oxide	5E-05	1.3E-04	5E-06	1.4E-04	1.1E-04	9.1E-05	9.1E-05	9.1E-05	
Pa-233	26.967 d	ingestion			all forms	0.005	7.5E-10	0.0005	5.0E-10	2.9E-10	2.1E-10	1.4E-10	1.2E-10	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol		water-soluble forms, including chloride, citrate, fluoride, nitrate and sulphate	5E-04	7.7E-09	5E-05	6.1E-09	3.2E-09	2.1E-09	1.6E-09	1.5E-09	
		inhalation	aerosol	F*		5E-03	1.0E-08	5E-04	6.9E-09	2.4E-09	1.1E-09	9.4E-10	5.8E-10	* Type F cannot be assumed without confirmation.
		inhalation	aerosol	M	hydroxide	1E-03	7.1E-09	1E-04	5.5E-09	3.0E-09	1.9E-09	1.5E-09	1.4E-09	
		inhalation	aerosol	S	oxide	5E-05	7.8E-09	5E-06	6.3E-09	3.6E-09	2.4E-09	1.8E-09	1.8E-09	
U-234	2.455E+5 y	ingestion			soluble forms (type F), dietary uranium	0.1	7.0E-07	0.05* 0.03* 0.02*	2.4E-07	1.6E-07	7.5E-08	6.8E-08	3.5E-08	* 1 to 5 years 0.05 * 10 to 15 years 0.03 * Adult 0.02
		ingestion			relatively insoluble forms (assigned to types M and S for inhalation)	0.01	7.0E-08	0.005* 0.003* 0.002*	2.4E-08	1.6E-08	7.5E-09	6.8E-09	3.5E-09	* 1 to 5 years 0.005 * 10 to 15 years 0.003 * Adult 0.002

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F/M			2.9E-06		2.2E-06	1.3E-06	9.2E-07	8.0E-07	7.0E-07	
		inhalation	aerosol	M/S			3.0E-05		2.8E-05	1.7E-05	1.1E-05	9.2E-06	9.1E-06	
		inhalation	aerosol		uranium aluminide (UAl_x)		1.9E-05		1.7E-05	1.0E-05	6.6E-06	5.2E-06	4.9E-06	
		inhalation	aerosol	F			1.3E-06		8.7E-07	5.5E-07	4.1E-07	4.0E-07	3.1E-07	
		inhalation	aerosol	M			9.7E-06		8.3E-06	4.9E-06	3.2E-06	2.6E-06	2.4E-06	
		inhalation	aerosol	S			5.0E-05		4.9E-05	3.4E-05	2.5E-05	2.4E-05	2.4E-05	
U-235	7.04E+8 y	ingestion			soluble forms (type F), dietary uranium	0.1	6.4E-07	0.05* 0.03* 0.02*	2.2E-07	1.4E-07	6.8E-08	6.2E-08	3.2E-08	* 1 to 5 years 0.05 *10 to 15 years 0.03 *Adult 0.02
		ingestion			relatively insoluble forms (assigned to types M and S for inhalation)	0.01	6.4E-08	0.005* 0.003* 0.002*	2.2E-08	1.4E-08	7.0E-09	6.3E-09	3.3E-09	* 1 to 5 years 0.005 * 10 to 15 years 0.003 * Adult 0.002

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F/M			2.6E-06		2.0E-06	1.2E-06	8.4E-07	7.3E-07	6.4E-07	
		inhalation	aerosol	M/S			2.7E-05		2.5E-05	1.6E-05	1.0E-05	8.4E-06	8.3E-06	
		inhalation	aerosol		uranium aluminide (UAl_x)		1.8E-05		1.6E-05	9.4E-06	6.1E-06	4.8E-06	4.5E-06	
		inhalation	aerosol	F			1.2E-06		7.9E-07	5.0E-07	3.8E-07	3.6E-07	2.9E-07	
		inhalation	aerosol	M			8.9E-06		7.7E-06	4.5E-06	3.0E-06	2.4E-06	2.2E-06	
		inhalation	aerosol	S			4.6E-05		4.5E-05	3.2E-05	2.3E-05	2.2E-05	2.2E-05	
U-238	4.468E+9 y	ingestion			soluble forms (type F), dietary uranium	0.1	6.1E-07	0.05* 0.03* 0.02*	2.1E-07	1.4E-07	6.6E-08	6.0E-08	3.1E-08	* 1 to 5 years 0.05 * 10 to 15 years 0.03 * Adult 0.02
		ingestion			relatively insoluble forms (assigned to types M and S for inhalation)	0.01	6.1E-08	0.005* 0.003* 0.002*	2.1E-08	1.4E-08	6.6E-09	6.1E-09	3.1E-09	* 1 to 5 years 0.005 * 10 to 15 years 0.003 * Adult 0.002

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F/M			2.5E-06		1.9E-06	1.2E-06	8.0E-07	7.0E-07	6.1E-07	
		inhalation	aerosol	M/S			2.6E-05		2.4E-05	1.5E-05	9.7E-06	8.0E-06	7.9E-06	
		inhalation	aerosol		uranium aluminide (UAl_x)		1.7E-05		1.5E-05	8.9E-06	5.8E-06	4.5E-06	4.3E-06	
		inhalation	aerosol	F			1.2E-06		7.6E-07	4.8E-07	3.6E-07	3.5E-07	2.8E-07	
		inhalation	aerosol	M			8.4E-06		7.3E-06	4.3E-06	2.8E-06	2.2E-06	2.1E-06	
		inhalation	aerosol	S			4.4E-05		4.3E-05	3.0E-05	2.2E-05	2.1E-05	2.1E-05	
Np-237	2.144E+6 y	ingestion			all forms	0.005	1.5E-06	0.0005	1.3E-07	6.2E-08	4.1E-08	3.5E-08	3.0E-08	
		inhalation	aerosol		nitrate	3.5E-03	5.3E-05	3.5E-04	4.5E-05	2.2E-05	1.4E-05	1.2E-05	1.1E-05	
		inhalation	aerosol	F		5E-04	6.4E-05	5E-05	5.3E-05	2.5E-05	1.6E-05	1.4E-05	1.3E-05	
		inhalation	aerosol	M	citrate, oxalate	1E-04	3.1E-05	1E-05	2.8E-05	1.5E-05	9.8E-06	8.7E-06	8.2E-06	
		inhalation	aerosol	S	dioxide	5E-05	5.3E-05	5E-06	5.2E-05	3.7E-05	2.7E-05	2.6E-05	2.6E-05	
Np-239	2.3565 d	ingestion			all forms	0.005	4.3E-10	0.0005	3.7E-10	2.1E-10	1.6E-10	1.0E-10	8.5E-11	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol		nitrate	3.5E-03	1.3E-09	3.5E-04	9.3E-10	4.8E-10	3.1E-10	2.4E-10	2.1E-10	
		inhalation	aerosol	F		5E-04	9.3E-10	5E-05	6.6E-10	2.9E-10	1.7E-10	1.3E-10	9.9E-11	
		inhalation	aerosol	M	citrate, oxalate	1E-04	1.9E-09	1E-05	1.4E-09	8.1E-10	5.5E-10	4.5E-10	4.0E-10	
		inhalation	aerosol	S	dioxide	5E-05	2.1E-09	5E-06	1.6E-09	9.3E-10	6.3E-10	5.2E-10	4.7E-10	
Pu-238	87.7 y	ingestion			soluble forms (nitrate, chloride, bicarbonates) and dietary plutonium	0.005	2.9E-06	0.0005	2.5E-07	1.6E-07	1.2E-07	1.1E-07	1.1E-07	
		ingestion			insoluble forms (oxides, ...)	0.0001	5.9E-08	0.00001	5.1E-09	3.2E-09	2.4E-09	2.1E-09	2.2E-09	
		inhalation	aerosol		plutonium nitrate $Pu(NO_3)_4$		5.1E-05		4.8E-05	3.2E-05	2.3E-05	2.2E-05	2.3E-05	
		inhalation	aerosol		in a $^{239}PuO_2$ matrix, in a mixture of oxides (MOX: (UO_2 + PuO_2) or $(U,Pu)O_2$)		7.9E-05		7.9E-05	6.0E-05	4.7E-05	4.5E-05	4.4E-05	
		inhalation	aerosol		plutonium dioxide ($^{238}PuO_2$) in a ceramic matrix		4.8E-05		4.7E-05	3.1E-05	2.1E-05	1.9E-05	2.0E-05	
		inhalation	aerosol		plutonium dioxide ($^{238}PuO_2$) in a non-ceramic matrix		4.7E-05		4.5E-05	2.9E-05	2.1E-05	1.9E-05	2.1E-05	
		inhalation	aerosol		plutonium dioxide (1 nm nanoparticle), 1nm PuO_2		6.3E-05		5.8E-05	3.9E-05	2.8E-05	2.8E-05	3.0E-05	
		inhalation	aerosol	F			6.9E-05		6.3E-05	4.3E-05	3.1E-05	3.1E-05	3.3E-05	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	M	citrate, plutonium tributyl phosphate (Pu-TBP), chloride ($PuCl_3$)		5.3E-05		5.0E-05	3.3E-05	2.4E-05	2.3E-05	2.5E-05	
		inhalation	aerosol	S			6.1E-05		6.1E-05	4.3E-05	3.2E-05	3.1E-05	3.1E-05	
Pu-239	2.411E+4 y	ingestion			soluble forms (nitrate, chloride, bicarbonates) and dietary plutonium	0.005	3.0E-06	0.0005	2.6E-07	1.8E-07	1.3E-07	1.2E-07	1.2E-07	
		ingestion			insoluble forms (oxides, ...)	0.0001	6.0E-08	0.00001	5.3E-09	3.5E-09	2.7E-09	2.4E-09	2.4E-09	
		inhalation	aerosol		plutonium nitrate $Pu(NO_3)_4$		5.2E-05		4.9E-05	3.4E-05	2.5E-05	2.3E-05	2.5E-05	
		inhalation	aerosol		as plutonium dioxide $^{239}PuO_2$ and in mixtures of oxides (MOX: (UO_2 + PuO_2) or $(U,Pu)O_2$)		8.4E-05		8.6E-05	6.6E-05	5.2E-05	5.0E-05	4.8E-05	
		inhalation	aerosol		plutonium dioxide (1 nm nanoparticle), 1nm PuO_2		6.5E-05		6.1E-05	4.3E-05	3.2E-05	3.1E-05	3.3E-05	
		inhalation	aerosol	F			7.2E-05		6.6E-05	4.7E-05	3.5E-05	3.5E-05	3.7E-05	
		inhalation	aerosol	M	citrate, plutonium tributyl phosphate (Pu-TBP), chloride ($PuCl_3$)		5.4E-05		5.2E-05	3.5E-05	2.6E-05	2.5E-05	2.7E-05	
		inhalation	aerosol	S			6.3E-05		6.2E-05	4.5E-05	3.4E-05	3.3E-05	3.3E-05	
Pu-240	6564 y	ingestion			soluble forms (nitrate, chloride, bicarbonates) and dietary plutonium	0.005	3.0E-06	0.0005	2.6E-07	1.8E-07	1.3E-07	1.2E-07	1.2E-07	
		ingestion			insoluble forms (oxides, ...)	0.0001	6.0E-08	0.00001	5.3E-09	3.5E-09	2.7E-09	2.4E-09	2.4E-09	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol		plutonium nitrate $Pu(NO_3)_4$		5.2E-05		5.0E-05	3.4E-05	2.5E-05	2.3E-05	2.5E-05	
		inhalation	aerosol		in a $^{239}PuO_2$ matrix, in a mixture of oxides (MOX: (UO_2 + PuO_2) or $(U,Pu)O_2$)		8.4E-05		8.6E-05	6.6E-05	5.2E-05	5.0E-05	4.8E-05	
		inhalation	aerosol		plutonium dioxide (1 nm nanoparticle), 1nm PuO_2		6.5E-05		6.1E-05	4.3E-05	3.2E-05	3.1E-05	3.3E-05	
		inhalation	aerosol	F			7.2E-05		6.6E-05	4.7E-05	3.5E-05	3.5E-05	3.7E-05	
		inhalation	aerosol	M	citrate, plutonium tributyl phosphate (Pu-TBP), chloride ($PuCl_3$)		5.4E-05		5.2E-05	3.5E-05	2.6E-05	2.5E-05	2.7E-05	
		inhalation	aerosol	S			6.3E-05		6.2E-05	4.5E-05	3.4E-05	3.3E-05	3.3E-05	
Pu-241	14.35 y	ingestion			soluble forms (nitrate, chloride, bicarbonates) and dietary plutonium	0.005	2.0E-08	0.0005	1.9E-09	1.5E-09	1.2E-09	1.1E-09	1.1E-09	
		ingestion			insoluble forms (oxides, ...)	0.0001	4.1E-10	0.00001	3.9E-11	3.0E-11	2.5E-11	2.2E-11	2.3E-11	
		inhalation	aerosol		plutonium nitrate $Pu(NO_3)_4$		3.2E-07		3.3E-07	2.6E-07	2.1E-07	2.1E-07	2.2E-07	
		inhalation	aerosol		in a $^{239}PuO_2$ matrix, in a mixture of oxides (MOX: (UO_2 + PuO_2) or $(U,Pu)O_2$)		1.2E-06		1.3E-06	1.1E-06	9.7E-07	9.6E-07	9.1E-07	
		inhalation	aerosol		plutonium dioxide (1 nm nanoparticle), 1nm PuO_2		5.1E-07		5.0E-07	4.1E-07	3.3E-07	3.4E-07	3.4E-07	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	F			6.0E-07		5.8E-07	4.8E-07	3.9E-07	4.0E-07	4.0E-07	
		inhalation	aerosol	M	citrate, plutonium tributyl phosphate (Pu-TBP), chloride ($PuCl_3$)		3.6E-07		3.7E-07	3.0E-07	2.4E-07	2.4E-07	2.5E-07	
		inhalation	aerosol	S			5.4E-07		5.8E-07	5.0E-07	4.3E-07	4.5E-07	4.5E-07	
Am-241	432.2 y	ingestion			all compounds	0.005	2.5E-06	0.0005	2.1E-07	1.2E-07	7.9E-08	6.3E-08	5.9E-08	
		inhalation	aerosol		nitrate		5.3E-05		4.8E-05	3.0E-05	2.0E-05	1.9E-05	1.8E-05	
		inhalation	aerosol	F	citrate		6.0E-05		5.3E-05	3.3E-05	2.3E-05	2.2E-05	2.1E-05	
		inhalation	aerosol	M	oxide, chloride		4.6E-05		4.3E-05	2.6E-05	1.7E-05	1.6E-05	1.5E-05	
		inhalation	aerosol	S	americium bound to plutonium oxide		6.2E-05		6.1E-05	4.4E-05	3.2E-05	3.1E-05	3.1E-05	
Am-243	7.37E+3 y	ingestion			all compounds	0.005	2.4E-06	0.0005	2.0E-07	1.1E-07	7.8E-08	6.3E-08	5.8E-08	
		inhalation	aerosol		nitrate		5.2E-05		4.7E-05	2.9E-05	2.0E-05	1.8E-05	1.8E-05	
		inhalation	aerosol	F	citrate		5.9E-05		5.2E-05	3.3E-05	2.3E-05	2.1E-05	2.0E-05	
		inhalation	aerosol	M	oxide, chloride		4.5E-05		4.2E-05	2.5E-05	1.7E-05	1.5E-05	1.5E-05	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol	S	americium bound to plutonium oxide		6.1E-05		6.0E-05	4.3E-05	3.2E-05	3.0E-05	3.1E-05	
Cm-242	162.8 d	ingestion			all compounds	0.005	4.8E-07	0.0005	3.3E-08	1.2E-08	6.4E-09	5.0E-09	3.5E-09	
		inhalation	aerosol		oxide, nitrate and chloride		1.2E-05		9.4E-06	4.4E-06	2.6E-06	2.2E-06	1.9E-06	
		inhalation	aerosol	F	citrate		1.1E-05		8.4E-06	3.5E-06	1.9E-06	1.7E-06	1.3E-06	
		inhalation	aerosol	M			1.3E-05		1.1E-05	5.6E-06	3.4E-06	2.8E-06	2.5E-06	
		inhalation	aerosol	S			1.5E-05		1.4E-05	8.0E-06	5.2E-06	4.1E-06	3.8E-06	
Cm-243	29.1 y	ingestion			all compounds	0.005	2.3E-06	0.0005	1.9E-07	9.8E-08	6.3E-08	4.9E-08	4.6E-08	
		inhalation	aerosol		oxide, nitrate and chloride		4.7E-05		4.2E-05	2.4E-05	1.5E-05	1.4E-05	1.4E-05	
		inhalation	aerosol	F	citrate		5.3E-05		4.6E-05	2.6E-05	1.7E-05	1.6E-05	1.5E-05	
		inhalation	aerosol	M			4.3E-05		3.9E-05	2.2E-05	1.4E-05	1.2E-05	1.2E-05	
		inhalation	aerosol	S			5.6E-05		5.4E-05	3.7E-05	2.6E-05	2.4E-05	2.5E-05	
Cm-244	18.10 y	ingestion			all compounds	0.005	2.1E-06	0.0005	1.7E-07	8.7E-08	5.4E-08	4.2E-08	3.9E-08	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
		inhalation	aerosol		oxide, nitrate and chloride		4.4E-05		3.9E-05	2.1E-05	1.3E-05	1.2E-05	1.2E-05	
		inhalation	aerosol	F	citrate		4.9E-05		4.2E-05	2.3E-05	1.5E-05	1.3E-05	1.3E-05	
		inhalation	aerosol	M			4.0E-05		3.6E-05	2.0E-05	1.3E-05	1.1E-05	1.1E-05	
		inhalation	aerosol	S			5.2E-05		5.0E-05	3.3E-05	2.3E-05	2.1E-05	2.1E-05	
Bk-249	330 d	ingestion			all compounds	0.005	3.6E-09	0.0005	3.3E-10	2.0E-10	1.4E-10	1.2E-10	1.2E-10	
		inhalation	aerosol	F			9.7E-08		9.0E-08	6.1E-08	4.5E-08	4.5E-08	4.4E-08	
		inhalation	aerosol	M			6.7E-08		6.4E-08	4.1E-08	3.0E-08	2.9E-08	2.9E-08	
		inhalation	aerosol	S	oxide		1.2E-07		1.2E-07	9.2E-08	7.1E-08	7.0E-08	7.2E-08	
Cf-249	351 y	ingestion			all compounds	0.005	2.0E-06	0.0005	1.7E-07	9.4E-08	6.5E-08	5.6E-08	5.2E-08	
		inhalation	aerosol	F	chloride		5.0E-05		4.5E-05	2.8E-05	2.0E-05	2.0E-05	1.9E-05	
		inhalation	aerosol	M	oxide		4.0E-05		3.7E-05	2.3E-05	1.6E-05	1.4E-05	1.4E-05	
		inhalation	aerosol	S			6.5E-05		6.4E-05	4.6E-05	3.4E-05	3.2E-05	3.3E-05	

Nuclide	$T_{½}$	Intake route	Form	Type	Compound	f_A age 3 months	h	$F_A \geq 1$ year	h 1 year	h 5 years	h 10 years	h 15 years	h adult	Note
Cf-252	17.81 d	ingestion			all compounds	0.005	2.1E-06	0.0005	1.8E-07	7.7E-08	4.2E-08	3.2E-08	2.5E-08	
		inhalation	aerosol	F	chloride		4.7E-05		3.8E-05	1.8E-05	9.4E-06	8.3E-06	6.8E-06	
		inhalation	aerosol	M	oxide		4.2E-05		3.7E-05	1.8E-05	1.1E-05	8.7E-06	7.6E-06	
		inhalation	aerosol	S			5.2E-05		4.9E-05	2.9E-05	1.8E-05	1.5E-05	1.4E-05	
Es-254	275.7 d	ingestion			all compounds	0.005	6.9E-07	0.0005	5.2E-08	2.1E-08	1.1E-08	8.5E-09	5.9E-09	
		inhalation	aerosol	F	chloride		1.6E-05		1.2E-05	5.5E-06	2.8E-06	2.6E-06	2.0E-06	
		inhalation	aerosol	M	nitrate		1.7E-05		1.5E-05	7.7E-06	4.6E-06	3.8E-06	3.3E-06	
		inhalation	aerosol	S			2.3E-05		2.0E-05	1.2E-05	7.9E-06	6.3E-06	6.1E-06	
Fm-257	100.5 d	ingestion			all compounds	0.005	6.2E-07	0.0005	4.4E-08	1.6E-08	7.6E-09	6.2E-09	3.7E-09	
		inhalation	aerosol	F			1.4E-05		1.0E-05	4.3E-06	2.1E-06	1.9E-06	1.3E-06	
		inhalation	aerosol	M			1.7E-05		1.4E-05	7.4E-06	4.4E-06	3.6E-06	3.1E-06	
		inhalation	aerosol	S			2.1E-05		1.9E-05	1.1E-05	6.9E-06	5.4E-06	5.1E-06	

Explanatory notes:

$T_{½}$: Radioactive decay half-life

Type: Classification of the material according to its rate of absorption from the respiratory tract into the blood (S = slow, M = moderate and F = fast absorption into the blood)

f_A Proportion of the activity that is absorbed into the blood after entry into the digestive tract

h: Conversion factor for calculating the committed effective dose resulting from intake of a unit activity of the radionuclide, integrated over a period of 50 years for adults and up to age 70 for children. Depending on the route of intake, this is h_{ing} (ingestion) or h_{inh} (inhalation).

Conversion factors for aerosol inhalation apply to particles with an activity median aerodynamic diameter (AMAD) of 1 µm.

237. Annex 10 reads as follows:

Annex 10 to Decree No 422/2016

Procedures for verifying the leak-tightness of a sealed radionuclide sources

1. A leak-tightness test of a sealed radionuclide source must be carried out by

1.1. immersion in a liquid;

1.2. a wipe test of the sealed radionuclide source;

1.3. a wipe test on a substitute surface;

1.4. an emanation test or another test directly verifying the leak-tightness of the sealed source housing; or

1.5. measuring the decrease in radionuclide activity in the case of equipment with a sealed radionuclide source containing radionuclide only in gaseous form.

2. A leak-tightness test of a sealed radionuclide source as part of an acceptance test or a long-term stability test of equipment with a sealed radionuclide source must be carried out by

2.1. measuring the decrease in radionuclide activity in the case of equipment with a sealed radionuclide source containing radionuclide only in gaseous form; or

2.2. a wipe test on a substitute surface in the case of other equipment with a sealed radionuclide source.

3. Unless another value is recommended, a sealed radionuclide source shall be considered leaking if the following is established during the leak-tightness test:

3.1. for an immersion test in liquid, test medium activity exceeding 200 Bq;

3.2. for a sealed radionuclide source wipe test, test medium activity exceeding 200 Bq;

3.3. for a wipe test on a substitute surface, test medium activity exceeding 20 Bq;

3.4. for an emanation test, test medium activity exceeding 200 Bq in 12 hours;

3.5 when measuring the decline in radionuclide activity, a deviation from the natural radioactive decay curve exceeding 20%.'.

142. In Annex 11, the table 'Frequency of a long-term stability testing of a sealed radionuclide source for which the recommended period of use has not expired' reads as follows:

‘Frequency of a long-term stability testing of a sealed radionuclide source for which the recommended period of use has not expired

Type of sealed radionuclide source	Conditions of use		
	Favourable	**Normal**	**Adverse**
Planar sealed radionuclide source emitting alpha radiation	5 years	36 months	12 months
Planar sealed radionuclide source emitting beta radiation with an activity exceeding 40 MBq/cm^2	10 years	5 years	24 months
Planar sealed radionuclide source emitting beta radiation with an activity below 40 MBq/cm^2 and with a thick covering	15 years	10 years	36 months
Single-walled sealed radionuclide source	10 years	5 years	24 months
Double-walled sealed radionuclide source	15 years	10 years	36 months

Explanatory notes:

[*1] - favourable conditions of use (a non-aggressive environment in an inaccessible area, with no risk of mechanical damage, for example reference dosimetric radionuclide sources);

[*2] - normal conditions of use (a non-aggressive industrial environment, such as charge eliminators or thickness gauges in the textile, paper and plastics industries);

[*3] - adverse conditions of use (an aggressive environment or an increased risk of mechanical damage, such as rubber processing plants).’.

143. Annex 12 reads as follows:

‘Annex 12 to Decree No 422/2016

Content of the acceptance test, the long-term stability test and the categorisation of defects identified during the long-term stability test

1. The acceptance test and the long-term stability test must include:

1.1. a visual inspection of

1.1.1. the integrity and intactness of the source of ionising radiation;

1.1.2. the marking of the controls;

1.1.3. the visibility of the light field, if the source of ionising radiation is equipped with one;

1.2. functional tests of control, operating, safety, signalling, indication and adjustment elements;

1.3. verification that the measured values correspond to typical values and, if they do not, verification that this is not due to a defect;

1.4. in the case of a source sof ionising radiation subject to type approval, tests within the scope specified in the product type-approval decision;

1.5. in the case of a sealed radionuclide source:

1.5.1. verification of the information stated in the certificate of the sealed radionuclide source;

1.5.2. a leak-tightness test pursuant to Annex 10;

1.6. in the case of equipment with a sealed radionuclide source and in the case of a radiation generator

1.6.1. verification of the functionality of the source of ionising radiation;

1.6.2. verification of the operating parameters and properties of the source of ionising radiation;

1.6.3. determination of dosimetric quantities relevant to the purpose of use of the source of ionising radiation;

1.7. in the case of equipment with a sealed radionuclide source, a leak-tightness test of the sealed radionuclide source pursuant to Annex 10;

1.8. evaluation of whether the source of ionising radiation used for medical exposure meets the requirements of § 76 and § 77;

1.9. in the case of a source of ionising radiation used in radiotherapy for treatment purposes

1.9.1. verification of imaging systems that do not use ionising radiation or that use ionising radiation originating from the source of ionising radiation used for treatment; verification of imaging systems of additional X-ray equipment shall form part of the test of that equipment pursuant to point 1.10.1;

1.9.2. determination of the combined measurement uncertainty for quantities relevant to the purpose of use of the source of ionising radiation, namely:

1.9.2.1. air-kerma strength in brachytherapy;

1.9.2.2. absorbed doses under reference conditions, or dose rate for other radiotherapy modalities;

1.9.3. selected tests of the planning system;

1.9.4. selected tests of the recording and verification system;

1.10. for X-ray equipment used in radiodiagnostics, interventional radiology or radiotherapy for imaging purposes

1.10.1. verification of imaging systems;

1.10.2. checking for artefacts in the image'

1.11. for mammography X-ray equipment

1.11.1. a spatial resolution test;

1.11.2. digital tomosynthesis tests;

1.12. for radiographic x-ray equipment

1.12.1. a kerma reproducibility check, including exposure with a short exposure time;

1.12.2. a spatial resolution test;

1.12.3. short exposure time check;

1.13. for fluoroscopic X-ray equipment used for medical exposure in radiodiagnostics and interventional radiology

1.13.1. checking that the dimensions of the image receptor and the X-ray field correspond at the base of magnification;

1.13.2. a spatial resolution test;

1.14. for dental intra-oral X-ray equipment

1.14.1. where a image film receptor is used, checking the condition of the processing chemicals and films, the suitability of their combination and checking the documentation on their replacement;

1.14.2. checking the condition of all imaging plates used for indirect digitisation;

1.15. for X-ray equipment used in veterinary medicine, checking the condition of the protective shielding aids.

1.16. for X-ray equipment used for medical exposure in radiodiagnostics, interventional radiology or radiotherapy for imaging purposes that provides quantitative information on patient exposure, verification of the accuracy of that information;

2. The acceptance test must also include

2.1. verification of the data from the manufacturer relevant from the point of view of radiation protection to the possible use of the source of ionising radiation and its accessories, or, if this verification cannot be performed during the test, verification that it was performed by the person who installed the source of ionising radiation;

2.2. for a radiotherapy X-ray irradiator, preparation of the irradiation table;

2.3. for dental intra-oral X-ray equipment, optimisation of the imaging process;

2.4. an estimate of secondary radiation in the vicinity of dental intra-oral or dental panoramic X-ray equipment and, in the event of an unsatisfactory measurement result;

2.5. measurement of secondary radiation in the vicinity of X-ray equipment used in medical exposure for imaging purposes other than those specified in point 2.4;

2.6. checking that an initial verification of the planning system and of the recording and verification system in radiotherapy has been carried out;

3. The long-term stability test must also include

3.1. verification of the stability of the operating parameters and properties of radiation generators and equipment with sealed radionuclide sources, and assessment of whether any instability constitutes a defect;

3.2. verification of the stability of dosimetric quantities relevant to the purpose of use of the radiation generator and equipment with a closed radionuclide source, and assessment of whether any instability constitutes a defect;

3.3. verification of data from the manufacturer relevant from the point of view of radiation protection to the method of use of the source of ionising radiation and its accessories, if this verification can be performed during the test;

3.4. for radiotherapy X-ray equipment, verification of the irradiation table;

3.5. an estimate of secondary radiation around dental intra-oral or dental panoramic X-ray equipment, if there has been a change in its use that could have affected the values given in the last estimate of secondary radiation, or if no estimate or measurement of secondary radiation has been performed on the equipment since installation, or the results are no longer available;

3.6. measurement of secondary radiation in the vicinity of X-ray equipment used in medical exposure for imaging purposes other than those specified in point 3.5, if there has been a change in its use that could have affected the values specified in the last measurement of secondary radiation, or if no measurement of secondary radiation has been performed on the equipment since installation, or the results are no longer available, as well as in the case of an unsatisfactory result of the estimate of secondary radiation pursuant to point 3.5;

3.7. in the case of a long-term stability test following the replacement of accessories to a source of ionising radiation that has an impact on radiation protection, verification of the accuracy of the data given in the technical documentation of those accessories that are relevant from the point of view of radiation protection to the normal use of the source of ionising radiation or its accessories;

3.8. in the case of a long-term stability test at the registrant’s premises, checking the operational stability tests and the availability of equipment required to perform them,

3.9. in the case of dental intra-oral X-ray equipment, verification of the optimisation of the imaging process and,, if the result is unsatisfactory, carrying out that optimisation.

4. For a source of ionising radiation used for medical radiation exposure in radiotherapy, the following are classified as

4.1. very serious defects:

4.1.1. leakage of a sealed radionuclide source;

4.1.2. a defect of a serious nature or a serious combination of defects that may endanger the health of a patient or worker, or that seriously breaches the principles of radiation protection;

4.2. minor defects:

4.2.1. visible damage to a sealed radionuclide source that could lead to leakage in the near future and which is not a very serious defect;

4.2.2. other defects detected during the long-term stability test.

5. For a source of ionising radiation used for medical exposure in radiodiagnostics, interventional radiology or in radiotherapy for imaging purposes, the following are classified as

5.1. very serious defects:

5.1.1. a defect of a serious nature or a serious combination of defects that may endanger the health of a patient or worker, or that seriously breaches the principles of radiation protection; and

5.1.2. the occurrence of significant artefacts completely precluding the diagnostic interpretation of the image;

5.1.3. on radiographic and fluoroscopic X-ray equipment, the first half-value layer at 80 kV is less than 2.3 mm Al;

5.1.4. on radiographic X-ray equipment

5.1.4.1. a voltage deviation from the nominal value greater than 20 %;

5.1.4.2. with a film image receptor, reproducibility of the automatic exposure control greater than 40 %; or

5.1.4.3. spatial resolution of less than 1.6 lp/mm;

5.1.5. on fluoroscopic X-ray equipment

5.1.5.1. a sum of deviations between the edges of the X-ray field and the image receptor on all sides greater than 10 % of the focus-to-image receptor distance;

5.1.5.2. low-contrast detectability greater than 4 %; or

5.1.5.3. a spatial resolution less than 0.8 lp/mm;

5.1.5.4. direct fluoroscopy is enabled;

5.1.5.5. the automatic dose rate control is not functional;

5.1.6. on computed tomography devices, a decrease in the computed tomography kerma index by 70 % or more relative to the baseline value under the same exposure parameters;

5.2. minor defects:

5.2.1. non-compliance with a requirement of § 76 or § 77 that does not constitute a very serious defect;

5.2.2. for mammography X-ray equipment, a signal-to-noise ratio from linearised data of less than 40;

5.2.3. for radiographic X-ray equipment used for imaging children under 3 years of age

5.2.3.1. a coefficient of variation of the transmitted kerma for exposure times up to 10 ms greater than 5 %;

5.2.3.2. a spatial resolution of less than 3 lp/mm;

5.2.3.3. inability to produce a usable image at 50-70 kV with an exposure time of less than 10 ms;

5.2.4. for fluoroscopic X-ray equipment used for medical exposure

5.2.4.1. for devices where the shape of the image receptor and the shape of the X-ray field differ, the absolute value of the difference between the size of the areas of the image receptor and the X-ray field at basic magnification is greater than 10 % of the active area of the image receptor;

5.2.4.2. a discrepancy between the indicated and measured values of the dose quantity greater than 35 % of the measured value;

5.2.4.3. used for imaging children under 3 years of age, a spatial resolution of less than 1.4 lp/mm;

5.2.5. for dental intra-oral X-ray equipment used for medical exposure

5.2.5.1. a discrepancy between the indicated and measured values of the dose quantity greater than 50 % of the measured value;

5.2.5.2. with a film image receptor, the unsatisfactory condition of the processing chemicals or films, or an inappropriate combination of them;

5.2.5.3. the inability to find an optimised setting of the exposure parameters;

5.2.6. for X-ray equipment used for medical exposure in radiodiagnostics, interventional radiology or radiotherapy for imaging purposes, the presence of artefacts that interfere with the diagnostic interpretation of the image;

5.2.7.other defects detected during the long-term stability test.

6. Defects identified for sources of ionising radiation used in defectoscopy and core logging are

6.1. very serious defects, namely

6.1.1. leakage of a sealed radionuclide source;

6.1.2. a defect of a serious nature or a serious combination of defects that may endanger the health of the worker or another person, or that seriously breaches the principles of radiation protection;

6.2 minor defects, namely other defects identified during the long-term stability test.

7. Defects identified for other source of ionizing radiation are

7.1. very serious defects, namely

7.1.1. leakage of a sealed radionuclide source;

7.1.2. a defect of a serious nature or a serious combination of defects that may endanger the health of the worker or another person, or that seriously breaches the principles of radiation protection;

7.2. minor defects, namely

7.2.1. visible damage to a sealed radionuclide source that could lead to leakage in the near future and which is not a very serious defect;

7.2.2. damage to the protective aids for veterinary x-ray equipment that significantly impairs their protective function; or

7.2.3. another defect identified during the long-term stability test.

235. In Annex 13, the words ‘used for medical exposure’ are added at the end of the introductory wording before point 1.

236. Annex 13(2) reads as follows:

„2. for dental panoramic X-ray equipment

2.1. a jaw phantom imaging test according to the instructions of the manufacturer of the equipment, or, if the manufacturer did not provide such instructions, according to the instructions of the person who carried out the long-term stability test or acceptance test

2.1.1. once every 6 months;

2.1.2. whenever there is a suspected malfunction of the source of ionising radiation or the imaging process;

2.1.3. in the event of a change significant from the point of view of radiation protection;

2.1.4. after downtime of more than 6 months; and

2.1.5. in the event of non-compliance being identified within the scope of points 2.1.1 to 2.1.4 after corrective action has been taken;

2.2. visual verification of the cleanliness of the monitor used for clinical diagnosis;

2.2.1. once per month; and

2.2.2. if the monitor is found to be contaminated within the scope of point 2.2.1 after corrective action;

2.3 ongoing verification of the quality of standard cephalometric images;’.

237. In Annex 13(3), the words ‘or 2’ are deleted.

238. In Annex 13(5), at the end of point 5.1.2, the word ‘and’ is replaced by a semicolon and new points 5.1.3 and 5.1.4 are inserted, which read as follows:

‘5.1.3. whenever there is suspected damage to protective aids;

5.1.4. after downtime of more than one year; and’.

Point 5.1.3 becomes point 5.1.5.

239. In Annex 13(5), at the end of point 5.2.2, the word ‘and’ is replaced by a semicolon and new points 5.2.3 and 5.2.4 are inserted, which read as follows:

‘5.2.3 whenever there is suspect miscollimation of the X-ray beam;

5.2.4. after downtime of more than 6 months; and’.

Point 5.2.3 becomes point 5.2.5.

240. In Annex 13, point 5.2.5, the words ‘5.2.2’ are replaced by ‘to 5.2.4’.

241. In Annex 13, points 5.3 and 5.4 are deleted.

242. Annexes 14 and 15 read as follows:

‘Annex 14 to Decree No 422/2016

List of information on a category A exposed worker and information describing their expected exposure

1. Identification of the permit holder for whom the exposed worker performs work in which they are occupationally exposed, namely the name, identification number and address of the permit holder, and the name and address of the workplace;

2. the name(s), surname and birth name of the exposed worker;

3. the title of the exposed worker, if any;

4. information on the highest level of education of the exposed worker;

5. the permanent address and the nationality of the exposed worker;

6. date of birth;

7. place of birth;

8. date of commencement of work with a source of ionising radiation;

9. date of commencement of work with a source of ionising radiation at the workplace, or the date of termination of work with a source of ionising radiation at that workplace;

13. quantities measured/monitored,

16. information on the source of ionising radiation the exposed worker works with;

17. information on the type of radiation to which the exposed worker is exposed; and

18. information on the occupation of the exposed worker.

Annex 15 to Decree No 422/2016

Content requirements for a personal radiation card

Part A of the personal radiation card contains:

1) the registration number of the personal radiation card assigned by the Office;
2) name(s), surname and title;
3) gender;
4) date of birth;
5) the personal code of the exposed worker assigned by the Office;
6) nationality;
7) identity card number of a citizen of the Czech Republic, or the passport number of a foreign national;
8) an ID photo;
9) date of issue;
10) annual effective doses [mSv] in the previous four years, with the date of entry and the name and signature of the supervisor:
    a) personal dose equivalent at a depth of 10 mm – $H_{P(10),}$
    b) committed effective dose – $E_{50;}$

c) effective dose – E;

d) equivalent dose – H_T (specify the organ or tissue for which the equivalent dose is determined);

11) details of the permit holder responsible for the radiation protection of an external worker:

a) name;

b) address;

c) the registration number assigned by the Office (only for holders of permits issued in the Czech Republic);

d) permit number;

e) the start and end of work with sources of ionising radiation for the indicated permit holder;

12) results of preventive medical check-ups:

a) date;

b) result of the check-up (fit/fit under stipulated conditions – a report specifying the conditions under which the work may be performed must be provided/unfit);

c) the name and signature of the supervisor;

13) records of completion of radiation protection training:

a) the date of completion of the training;

b) name and signature of the authorised person.

Part B of a personal radiation card contains:

1) the registration number of the personal radiation card assigned by the Office;
2) name(s), surname and title;
3) the personal code of the exposed worker assigned by the Office provided in Part A;
4) the registration number of the holder of a permit assigned by the Office provided in Part A
5) date of assignment of this part to the worker;
6) monthly doses in a specific year (if a worker works at more than one workplace during one monitoring period, their monitoring and, where appropriate, the summation of doses from multiple dosimeters in that period, must be ensured in accordance with the monitoring programme);
7) signature of the supervisor;
8) the results of the personal monitoring of an external worker at the premises of an operator of a controlled area:

a) the name of the operator of the controlled area;

b) the registration number of the controlled area operator assigned by the Office;

c) identification of the controlled area operator’s workplace to which the monitoring results relate;

d) start and end of work in the controlled area;
e) signature of the supervisor;
f) effective dose [mSv] for a specific period (no more than one month):
i. personal dose equivalent at a tissue depth of 10 mm – $H_{P(10),}$
ii. committed effective dose – $E_{50;}$
iii. effective dose – E;
iv. equivalent dose – H_T (specify the organ or tissue for which the equivalent dose is determined).'.

243. Point 1.7 of Annex 16 reads as follows:
'1.7. the security category of the radionuclide source;'.
244. In Annex 17(3) and (4), the words 'handed over' is replaced by the words 'being handed over'.
245. In Annex 17, the full stop at the end of point 6 is replaced by a semicolon and the following point 7 is added:
'7. in the case of a manufactured radiation generator
7.1. type name;
7.2. type approval information (yes/no, type of document and number); and
7.3. serial number.'.

246. At the end of Annex 17, the following sentence is added: 'The holder of a permit to add a radioactive substance to a consumer product during its manufacture or preparation, or to import and export of such a consumer product, must send the Office the following data on the consumer products manufactured, imported and exported:

1. type of consumer product;

2. type approval information (yes/no, type of document and number);

3. specification of the radionuclide;

4. the activity of the radionuclide and the date on which it was determined; and

5. the number of consumer products of that type.'.

247. In the table in Annex 18, the number '4' is replaced by '10' and, in its first occurrence, the number '0.4' is replaced by '1', the words 'and monitored' are added after the word 'controlled' and the words 'and monitored' are added after the words 'and controlled'.
248. Annex 19 reads as follows:

'Annex 19 to Decree No 422/2016

Content of documentation for licensed activities in the context of exposure situations

1. The documentation for the evaluation of the properties of a source of ionising radiation must contain

1.1. in the case of methodologies,
1.1.1. the identification data of the holder of the permit for the assessment of the properties of the source of ionising radiation;

1.1.2. the name(s) and surname of the person who drawn up the methodology and the date when it was drawn up;

1.1.3. the type of test for which the methodology has been drawn up;

1.1.4. the type, modality or type of source of ionising radiation for which the methodology has been drawn up, or, where appropriate, a description of the manner in which it is normally used,

1.1.5. the method of assessment and the criteria to determine whether the workplace and the source of ionising radiation are technically fit to initiate the test;

1.1.6. instructions that where a requirement of the manufacturer for a parameter is stated in the methodology and the model report, the manufacturer's specific requirement must be stated in the test report;

1.1.7. a clear specification of technical terms, quantities, units or abbreviations used in the methodology or in the model protocol where their interpretation could be ambiguous;

1.1.8. the procedure for conducting the individual parts of the test, including

1.1.8.1. the characteristics of the measured parameter;

1.1.8.2. tthe type of measuring instruments and aids used;

1.1.8.3. the measurement procedure and the method for obtaining the measurement results, in particular a description of the measurement, a diagram of the geometric arrangement of the measurement, the settings of the source of ionising radiation and of the measuring instrument, the quantities and units used, and a description of how they are interpreted;

1.1.8.4. the calculations, algorithms and description of how they are interpreted;

1.1.8.5. if the measured values are compared with baseline initial values, a description of how those baseline values were determined;

1.1.8.6. a description of the determination of the combined measurement uncertainties in the case of radiotherapy for dosimetric quantities relevant to the purpose of use of the source of ionising radiation pursuant to Annex 12;

1.1.8.7. the tolerances for the measured parameters and the recommended values;

1.1.8.8. the method for the final evaluation of the test;

1.2. in the case of a model protocol, the following information completed with actual measurement data:

1.2.1. identification details of the permit holder who conducted the test;

1.2.2. the report number;

1.2.3. information as to which type of test is involved;

1.2.4. in the case of a partial long-term stability test, the reason why it was performed;

1.2.5. identification details of the natural person who conducted the test and of the natural person who directed the test;

1.2.6. in the case of radiotherapy, the identification details of the natural person who represented the operator of the source of ionising radiation during the test and information on their function;

1.2.7. the date and time of the start and end of the test; the end of the test is considered to be the end of the measurements at the workplace; subsequent measurements are not included in the original test because they constitute a separate partial test;

1.2.8. the date by which the next periodic long-term stability test must be performed on the source of ionising radiation;

1.2.9. the type, modality and method of use of the tested source of ionising radiation;

1.2.10. identification details of the permit holder or registrant using the source of ionising radiation;

1.2.11. information on the location of the source of ionising radiation;

1.2.12. identification details of the tested source of ionising radiation, including

1.2.12.1. the type name and serial number of the source of ionising radiation;

1.2.12.2. the type name and serial number of the sealed radionuclide source;

1.2.12.3. the type name and serial number of the radiation generator;

1.2.12.4. the type name and serial number of the X-ray tube and its housing;

1.2.12.5. the type name and serial number of the image receptor that is an integral part of the source of ionising radiation used in radiodiagnostics or interventional radiology,

1.2.12.6. the year of manufacture and the year of installation of the source of ionising radiation;

1.2.12.7. the specification of the focal spot and of the filtration for a source of ionising radiation used in radiodiagnostics or interventional radiology;

1.2.12.8. the specification of other important components of the source of ionising radiation, including modalities and additional systems in radiotherapy;

1.2.12.9. the specification of the radionuclide contained in the sealed radionuclide source, including its activity;

1.2.13. the protocol number, the date of measurement and the identification of the permit holder who performed the acceptance test;

1.2.14. the protocol number, the date of measurement and the identification of the permit holder who performed the previous long-term stability test;

1.2.15. information on whether the source of ionising radiation used in radiodiagnostics, interventional radiology and veterinary imaging uses an image receptor;

1.2.15.1. with direct digitisation;

1.2.15.2. with indirect digitisation; or

1.2.15.3. film-based;

1.2.16. úan indication of whether the source of ionising radiation used in radiodiagnostics, interventional radiology or veterinary imaging is equipped with

1.2.16.1. automatic exposure control;

1.2.16.2. tomography or digital tomosynthesis;

1.2.16.3. digital subtraction angiography;

1.2.16.4. cephalostat;

1.2.17. information as to whether

1.2.17.1. the mammography device permits stereotaxy;

1.2.17.2. an X-ray device is used in radiotherapy, including information on the method of that use,

1.2.17.3. the computer tomography device allows a fluoroscopic imaging mode;

1.2.18. information on whether the source of ionising radiation is

1.2.18.1. stationary;

1.2.18.2. mobile;

1.2.18.3. přenosný,

1.2.19 identification data of the accessories of a source of ionising radiation that have an impact on radiation protection, in particular of

1.2.19.1. the examination tools used in radiodiagnostics or interventional radiology;

1.2.19.2. the developer processor or the indirect digitisation reader used in radiodiagnostics, or interventional radiology;

1.2.19.3. the cassettes, indirect digitisation plates, X-ray films and intensifying screens used, including their sensitivity and an indication of whether they are a green or blue system or high-sensitivity screens, in radiodiagnostics;

1.2.19.4. the diagnostic monitor which, as part of the test, is inspected or used for the evaluation of tests, in radiodiagnostics or interventional radiology;

1.2.19.5. the planning system in radiotherapy;

1.2.19.6. the recording and verification system in radiotherapy;

1.2.19.7. the system for the transmission of data from the source of ionising radiation to the planning system and to the recording and verification system in radiotherapy;

1.2.19.8. the applicators used for sealed radionuclide sources;

1.2.20. an assessment of the availability at the workplace of documentation for the source of ionising radiation that is necessary to carry out the test, namely:

1.2.20.1. the instructions for use; and

1.2.20.2. the type-approval decisions in the case of an acceptance test performed on a source of ionising radiation subject to type approval;

1.2.21. information on

1.2.21.1. technical changes which have occurred since the previous test, affecting the source of ionising radiation and its accessories and having an impact on radiation protection, that may affect the conduct of the test;

1.2.21.2. any limitation of the scope of the test to be performed and the reason for tthat limitation;

1.2.21.3. any changes to the test procedures that occurred during the test, including their justification;

1.2.21.4. the operating conditions affecting the test being performed;

1.2.22. details of the instruments and aids used, including the date of the last verification of specified measuring instruments;

1.2.23. in the case of an acceptance test on an intra-oral dental X-ray device with image digitisation, a copy of the user-adjustable software settings that may affect the image at the initial display of the image without post-processing;

1.2.24. records of the tests performed as part of the testing, including records of any tests that were performed as part of the testing beyond the scope of the methodology, containing

1.2.24.1. information on the measurement conditions that affect the parameters tested;

1.2.24.2. a record of the observed data and measured values and of the parameters derived from them

1.2.24.3. the calibration coefficients and correction factors used in radiotherapy;

1.2.24.4. the formulae of the calculations used, or the completed actual measured values, from which the correctness of the formulae in the model protocol can be verified;

1.2.24.5. the baseline values, including the date on which they were determined, if the measured values are compared to them;

1.2.24.6. in the case of radiotherapy, the combined measurement uncertainty for dosimetric quantities relevant to the purpose of use of the source of ionising radiation pursuant to Annex 12;

1.2.24.7. an evaluation of the test results;

1.2.24.8. the tolerances and recommended values of the parameters to be verified;

1.2.24.9. in the event of non-compliance with the tolerances or the recommended values of the parameters being verified, where insufficient stability of a key quantity describing the properties of the source of ionising radiation is identified, or in the case of borderline results, a written comment describing the non-compliance or borderline results, including a recommended solution;

1.2.24.10. in the event of a deviation from the methodology, a record and a more detailed description of the deviation and its justification;

1.2.25. in the case of radiotherapy, a calculation file containing the calculations, algorithms and a description of how they are to be interpreted for the calculation of dosimetric quantities relevant to the purpose of use of the source of ionising radiation; if a script is used for these calculation, its description forms part of the model protocol;

1.2.26. a summary overview of the results of the individual tests, which includes

1.2.26.1. a table containing the numbers and titles of the tests performed together with their evaluation;

1.2.26.2. written comments on all tests in which a defect, borderline or atypical results, or non-compliance with recommendations were detected;

1.2.26.3. time limits for rectifying minor defects and, if an operating restriction resulting from such a defect has been imposed, its description;

1.2.26.4. specification of any very serious defects together with a warning that, due to the very serious defect identified, the source of ionising radiation must not be used until that defect has been demonstrably eliminated;

1.2.26.5. for radiographic and fluoroscopic X-ray equipment used for medical exposure, a specification as to whether the equipment is suitable for imaging children under 3 years of age;

1.2.26.6. for a sealed radionuclide source and for equipment with a sealed radionuclide source, a description of any visible damage to the radionuclide source, in particular cracks, notches, corrosion or wear;

1.2.27. in the case of an acceptance test or a long-term stability test which has revealed that the current scope or frequency of operational stability tests is unsuitable, a proposed scope and frequency of the operational stability tests;

1.2.28. if incorrect performance of tests of operational stability has been identified, appropriate instructions;

1.2.29. the proposed scope of long-term stability tests, if that scope is atypical;

1.2.30. in the case of an acceptance test or a long-term stability test performed on X-ray equipment used for medical exposure for imaging purposes after servicing that could have affected secondary radiation, or after significant changes in normal operation that could have affected the personal doses of exposed workers or members of the public, a record of the measurements or an estimate of secondary radiation in the vicinity of the source of ionising radiation that includes

1.2.30.1. in the case of measurements, the measured values at work areas near the source of ionising radiation and at locations where persons are present;

1.2.30.2. the exposure parameters and the positions of the source of ionising radiation used during the measurements, corresponding to the standard exposure parameters;

1.2.30.3. estimates of the number and duration of exposures for one calendar year;

1.2.30.4. calculated estimates of the dose quantities at workplaces and at locations where other persons are present, from all modes of use of the source, for one calendar year;

1.2.30.5. a description and diagram of the surroundings of the source of ionising radiation, including a description of the shielding barriers, the distances between places of work and locations where other persons are present and the

source of ionising radiation and the heights of the measurement points above the floor;

1.2.30.6. instructions for the user of the source arising from the measurements or the estimate of secondary radiation;

1.2.30.7. in the case of portable veterinary and industrial sources of ionising radiation, information on the distance from the source of ionising radiation at which the warning tape is to be placed during normal use;

1.2.31. if a detected defect is remedied before the test report is issued,

1.2.31.1. the results of the tests carried out before the defect was remedied;

1.2.31.2. a description of the measures taken after the defect was detected and how it was remedied;

1.2.31.3. the results of the tests after the defect was remedied;

1.3. in the case of a scheme for ensuring the measurement of quantities

1.3.1. information on evidence of the specific professional competence of the persons directing and performing the evaluation of the properties of sources of ionising radiation;

1.3.2. the designation of the person overseeing the management of the evaluation of the properties of the source of ionising radiation for each modality separately;

1.3.3. a list of the specified measuring instruments used during the tests, including their type and serial number;

1.3.4. a list of the working measuring instruments used during the tests, including their type and serial number;

1.3.5. the concept for metrological assurance of specified and working measuring instruments;

1.3.6. a list of the aids used during the tests;

1.3.7. the specification of, and method for ensuring access to measuring aid and measiring instruments used in the tests that are not owned by the permit holder.

249. In Annex 19, the words ‘and specifications of the conversion factors used, if not listed in Annex 3 to this Decree,’ are added at the end of point 2.1.6.

250. In Annex 19, points 3.1.12.1, 4.1.5.1, 5.1.2.1, 6.1.8.1, 7.2.1 and 8.2.1, the word ‘number’ is replaced by the words ‘unique report identifier’.

251. In Annex 19, at the end of point 3.1.12.6, the words ‘the registration number of the workplace assigned by the Authority’ are added.

252. In Annex 19, point 4.1.5.5, the word ‘execution’ is replaced by the words ‘commencement and completion’.

253. In Annex 19, the words ‘(workplace, residential building, school, educational establishment), parcel number and cadastral area,’ are added at the end of point 4.1.5.6.

254. In Annex 19, the words ‘(measurement of a new building before use, reconstruction of a building, informative measurement)’ are added at the end of point 4.1.5.8.

255. In Annex 19, the words ‘description of building ventilation,’ are added at the end of point 4.1.5.9.

256. In Annex 19, point 4.1.5.13, the words ‘with a proposal for further action’ are deleted.

257. In Annex 19, at the end of point 5.1.2.5, the words ‘parcel number and cadastral area’ are added.

258. In Annex 19, point 5.1.2.7, the word ‘execution’ is replaced by the words ‘and the time of commencement and completion’.

259. In Annex 19, point 5.1.2.16 the words ’with information on further action’ are deleted.

260. In Annex 19, point 6.1.5, the words ‘Th-228’ are replaced by ‘Th-232’.

261. In Annex 19, point 6.1.7, the number ‘105’ is replaced by ‘102’.

262. In Annex 19, at the end of point 7.2.9, the words ‘and his address’ are added.

263. In Annex 19, at the end of point 8.2.5, the words ‘(registration number assigned by the Office, address)’ are added.

264. In Annex 19, at the end of the text of point 8.2.10, the words ‘(parcel number, cadastral area)’ are added.

265. At the end of Annex 20(1), the following point 1.4 is added:

‘1.4 The registrant must ensure the optimisation of radiation protection for exposed workers and the public by complying with the instructions on protection against secondary radiation specified in the acceptance test or long-term stability test report during normal imaging, including appropriate structural modifications or the use of protective equipment.’.

266. In Annex 20, at the end of points 2.1.2. and 3.1.2., the words ‘retain it for a period of five years from the date of its acquisition’ are added.

267. In Annex 20, points 2.1.3., 2.2., 2.3. and 2.4. are deleted.

Point 2.5 becomes point 2.2.

268. In Annex 20, points 3.1.3. and 3.2. are deleted.

Point 3.3 becomes point 3.2.

269. In Annex 20, point 3.2 reads as follows:

‘3.2 If a non-conformity is detected during the operational stability test carried out pursuant to Annex 13 to this Decree

3.2.1. in the case of points 2.1., 2.2., 2.3 or 4.1, the registrant shall ensure corrective servicing;

\3.2.2. in the case of point 2.2 or 4.2, the registrant shall clean the monitor used for clinical diagnosis.’.

270. In Annex 20, points 4 and 5 read as follows:

‘4. Requirements for the use of veterinary X-ray equipment

4.1. The registrant must ensure the optimisation of the radiation protection of exposed workers and the public by

4.1.1. ensuring that only individuals whose presence is necessary during the examination are present in the examination room within a distance of up to 2 m from the X-ray beam; for this person, the registrant shall ensure

4.1.1.1. the correct use of a protective shielding apron and collar providing shielding equivalent to lead with a thickness of at least 0.25 mm Pb;

4.1.1.2. if the individual’s hands are present in the vicinity of the X-ray beam during exposure, the use of protective shielding gloves of at least 0.25 mm Pb equivalent;

4.1.1.3. jinstructing them on the correct method of assisting with the examination with regard to the edges of the X-ray field and the results of measurements of secondary radiation;

4.1.1.4. adjusting the size and position of the X-ray field by means of a light field so that the hands of this natural person are not in the X-ray beam;

4.1.1.5. based on their records, that they do not exceed the dose optimisation limit for a member of the public of 0.25 mSv effective dose per year,

4.1.2. the registrant shall ensure collimation of the X-ray beam so that the size of the X-ray field is as small as possible, taking into account the needs of the examination,

4.1.3. give the animal sedatives before the examination, if possible;

4.1.4. during the radiographic examination, select the collimation of the X-ray beam and the size of the image receptor so that the X-ray beam does not exceed the image receptor.

4.2. When performing imaging and during normal operation, the registrant must

4.2.1. use the source of ionising radiation in accordance with the manufacturer's instructions;

4.2.2. for persons pursuant to point 4.1.1,

4.2.2.1. ensure that this natural person is over 15 years of age;

4.2.2.2. inform this individual about the potential risks of ionising radiation associated with assisting in the examination;

4.2.2.3. request their written consent to assist with the examination and retain it for 5 years;

4.2.2.4. keep records of these persons and retain the data therein for a period of 5 years.

4.3. During an examination at a temporary workplace, the registrant must

4.3.1. preferably use a space that is enclosed by natural barriers, in particular by a wall or fence;

4.3.2. if the use of a space pursuant to point 4.3.1 is not possible and the examination is carried out in an open area, ensure that no individual is present in the space in the direction of the X-ray beam during exposure;

4.3.3. mark off the area where the animals are imaged with warning tape placed at a distance specified in the report from the acceptance test or the long-term stability test;

4.3.4. preferably place the image receptor in a holder so that it does not need to be held during exposure; if this is not possible, use means to ensure that the hands of the natural person holding the image receptor are not in the immediate vicinity of the X-ray beam; in this case, the registrant must ensure that the natural person holding the image receptor wears protective gloves;

4.3.5. choose the direction of the X-ray beam so that it is absorbed by the terrain as soon as possible;

4.3.6. define the size of the X-ray field with a light field and, if lighting conditions do not allow for good visibility, use means that ensure that the edges of the X-ray field are correctly focused;

4.3.7. ensure that the exposed worker performing the imaging clearly warns aloud all persons potentially present in the vicinity of the irradiation site immediately before the exposure is performed that ionising radiation will be used.

4.4. In the event of a discrepancy being found during the operational stability test carried out in accordance with Annex 13 to this Decree,

4.4.1. point 5.1, the registrant must remove the non-compliant protective aid from service; and

4.4.2. point 5.2, the registrant shall ensure corrective servicing.

5. Requirements for the use of an X-ray bone densitometer

5.1. The registrant must

5.1.1. follow the instructions of the manufacturer of the source of ionising radiation when performing imaging;

5.1.2. keep a record of each procedure that allows retrospective assessment of the patient’s exposure and retain it for 5 years;

5.1.3. ensure the protection of workers and other persons during exposure by maintaining a distance of at least 2.5 m from the bone densitometer or by placing a protective shielding barrier with an equivalent of at least 0.25 mm lead between these persons and the bone densitometer.

5.2. If a non-conformity is detected in an operational stability test carried out in accordance with point 6 of Annex 13 to this Decree, the registrant must not use the source of ionising radiation for medical exposure until the non-conformity has been rectified by service work and its rectification has been confirmed by a successful operational stability test.’.

271. Annex 21 reads as follows:

STATE OFFICE FOR NUCLEAR SAFETY

Date:

Ref. no.:

File no.:

Unit:

Contact person:

Phone:

REGISTRATION FORM – CONFIRMATION OF REGISTRATION

The State Office for Nuclear Safety (SÚJB), as the administrative authority competent under § 10 of Act No 263/2016, the Atomic Act, confirms the registration of:

- **the import of a radiation generator other than import for own use**
- **the export of a radiation generator, except for own use, and the export of a radiation generator that is an insignificant or minor source of ionising radiation**
- **the distribution of a radiation generator**
- **the use of dental X-ray equipment for medical exposure**
- **the use of an X-ray bone densitometer for medical exposure**
- **the use an X-ray bone densitometer for medical or non-medical exposure**
- **the use of radiographic or intra-oral X-ray equipment in veterinary medicine**

for: Name of the legal person or name(s) and surname of the natural person

address: Residential address of the natural person or registered office of the legal person

ID number:

SÚJB registration number:

On behalf of the State Office for Nuclear Safety:

Distribution list:

- *SÚJB, relevant department, address*
- *Name and address of the registered entity'.*


Záznamy SÚJB

REGISTRAČNÍ FORMULÁŘ
Žádost o registraci
podle § 10 zákona č. 263/2016 Sb.

A. Identifikace žadatele

1. Výběr typu osoby:

fyzická osoba

právnická osoba

2a. Fyzická osoba:

Titul před | Jméno | Příjmení | Titul za

Adresa trvalého bydliště

Ulice | Číslo popisné | Číslo orientační

PSČ | Obec | Stát | IČ

Mám zřízenu datovou schránku

2b. Právnická osoba:

Název | Právní forma

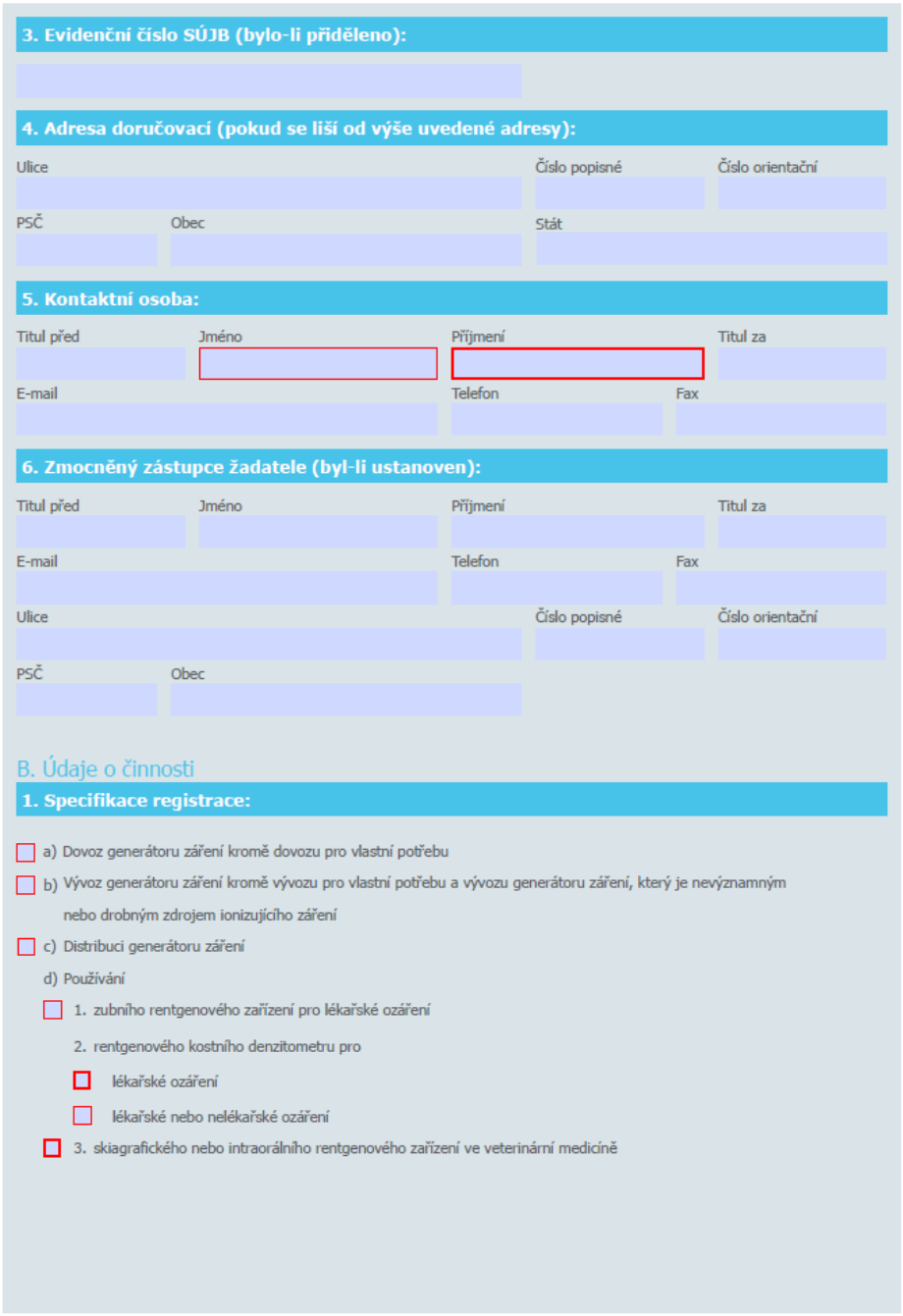
Adresa sídla

Ulice | Číslo popisné | Číslo orientační

PSČ | Obec | Stát | IČ

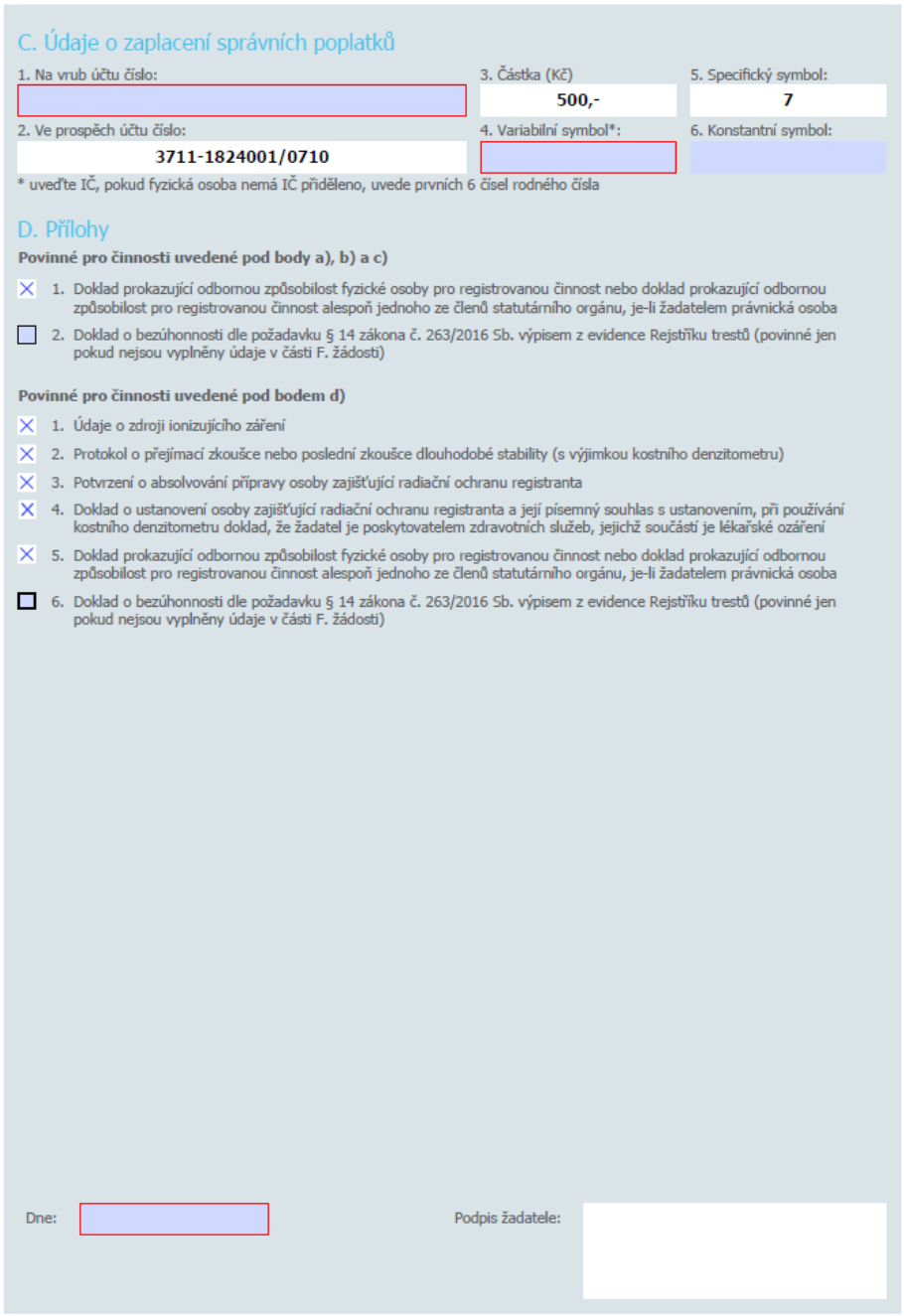
Záznamy SÚJB	**SÚJB records**
REGISTRAČNÍ FORMULÁŘ	REGISTRATION FORM
Žádost o registraci	**REGISTRATION APPLICATION**
podle§ 10 zákona Č. 263/2016Sb.	pursuant to § 10 of Act No 263/2016
Identifikace žadatele	Applicant identification
Výběr typu osoby:	Select entity type:
fyzická osoba	natural person
právnická osoba	legal person

Fyzická osoba:	Natural person:
Titul před	Title before
Jméno	Name
Příjmení	Surname
Titul za	Title after
Adresa trvalého bydliště	Permanent address
Ulice	Street
Číslo popisné	Building number
Číslo orientační	Street number
SČ	Post Code
Obec	Municipality
Stát	Country
IČ	ID No
Mám zřízenu datovou schránku	I have a data mailbox
Právnická osoba:	Legal person:
Název	Name
Právní forma	Legal form
Adresa sídla	Registered office address
Ulice	Street
Číslo popisné	Building number
Číslo	Street
orientační	number
PSČ	Post Code
Obec	Municipality
Stát	Country
IČ	ID No



Evidenční číslo SÚJB (bylo-li přiděleno):	***SÚJB registration number (if assigned):***
Adresa doručovací (pokud se liší od výše uvedené adresy):	Delivery address (if different from the above address):
Ulice	Street
Číslo popisné	Building number
Číslo orientační	Street number
PSČ	Post Code
Obec	Municipality
Stát	Country

Kontaktní osoba:	Contact person:
Titul před	Title before
Jméno	Name
Příjmení	Surname
Titul za	Title after
E-mail	Email
Telefon	Phone
Fax	Fax
Zmocněný zástupce žadatele (byl-li ustanoven):	Authorised representative of the applicant (if appointed):
Titul před	Title before
Jméno	Name
Příjmení	Surname
Titul za	Title after
E-mail	Email
Telefon	Phone
Fax	Fax
Ulice	Street
Číslo popisné	Building number
Číslo orientační	Street number
PSČ	Post Code
Obec	Municipality
Údaje o činnosti	Activity information
Specifikace registrace:	Registration specifications
a) Dovoz generátoru záření kromě dovozu pro vlastni potřebu	a) Import of a radiation generator other than import for own use
b) Vývoz generátoru záření kromě vývozu pro vlastni potřebu a vývozu generátoru záření, který je nevýznamným nebo drobným zdrojem ionizujícího záření	b) Export of a radiation generator, except for own use, and export of a radiation generator that is an insignificant or minor source of ionising radiation
c) Distribuci generátoru záření	c) Distribution of a radiation generator
d) Používáni	d) Use of
1. zubního rentgenového zařízení pro lékařské ozáření	1. dental X-ray equipment for medical exposure
2. rentgenového kostního denzitometru pro	2. X-ray bone densitometer for
lékařské ozáření	medical exposure
lékařské nebo nelékařské ozáření	medical or non-medical exposure
3. skiagrafického nebo intra orálního rentgenového zařízení ve veterinární mediáně	3. radiographic or intra-oral X-ray equipment in veterinary medicine



C. Údaje o zaplacení správních poplatků

1. Na vrub účtu číslo:
3. Částka (Kč): 500,-
5. Specifický symbol: 7
2. Ve prospěch účtu číslo: 3711-1824001/0710
4. Variabilní symbol*:
6. Konstantní symbol:

* uveďte IČ, pokud fyzická osoba nemá IČ přiděleno, uvede prvních 6 čísel rodného čísla

D. Přílohy

Povinné pro činnosti uvedené pod body a), b) a c)

- [x] 1. Doklad prokazující odbornou způsobilost fyzické osoby pro registrovanou činnost nebo doklad prokazující odbornou způsobilost pro registrovanou činnost alespoň jednoho ze členů statutárního orgánu, je-li žadatelem právnická osoba
- [ ] 2. Doklad o bezúhonnosti dle požadavku § 14 zákona č. 263/2016 Sb. výpisem z evidence Rejstříku trestů (povinné jen pokud nejsou vyplněny údaje v části F. žádosti)

Povinné pro činnosti uvedené pod bodem d)

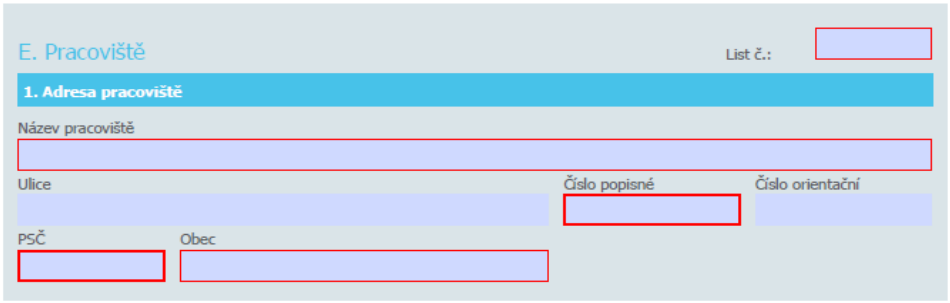
- [x] 1. Údaje o zdroji ionizujícího záření
- [x] 2. Protokol o přejímací zkoušce nebo poslední zkoušce dlouhodobé stability (s výjimkou kostního denzitometru)
- [x] 3. Potvrzení o absolvování přípravy osoby zajišťující radiační ochranu registranta
- [x] 4. Doklad o ustanovení osoby zajišťující radiační ochranu registranta a její písemný souhlas s ustanovením, při používání kostního denzitometru doklad, že žadatel je poskytovatelem zdravotních služeb, jejichž součástí je lékařské ozáření
- [x] 5. Doklad prokazující odbornou způsobilost fyzické osoby pro registrovanou činnost nebo doklad prokazující odbornou způsobilost pro registrovanou činnost alespoň jednoho ze členů statutárního orgánu, je-li žadatelem právnická osoba
- [ ] 6. Doklad o bezúhonnosti dle požadavku § 14 zákona č. 263/2016 Sb. výpisem z evidence Rejstříku trestů (povinné jen pokud nejsou vyplněny údaje v části F. žádosti)

Dne:

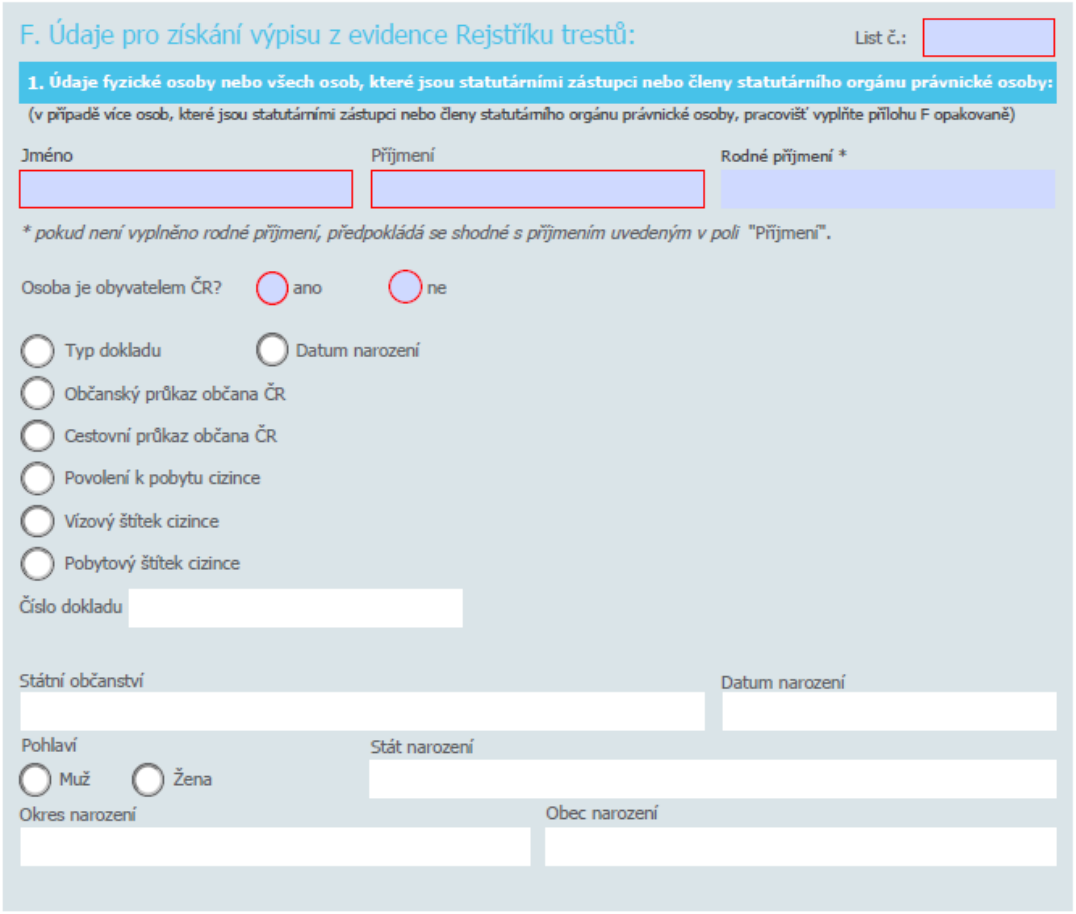
Podpis žadatele:

Údaje o zaplacení správních poplatků	Details of payment of administrative fees
Na vrub účtu číslo:	From account number:
Částkca (Kč)	Amount (CZK)
Specifický symbol:	Specific code:
Ve prospěch účtu číslo:	To account number:
Variabilní symbol*:	Variable code*:
Konstantní symbol:	Constant code:
* uveďte IČ, pokud fyzická osoba nemá IČ přiděleno, uvede pivních 6 čísel rodného čísla	* Enter the ID number. If the individual does not have an ID number, enter the last six digits of their personal ID number

Prilohy	Attachments
Povinné pro činnosti uvedené pod body a), b) a c)	Mandatory for activities set out in points (a), (b) and (c)
Doklad prokazující odbornou způsobilost fyzické osoby pro registrovanou činnost nebo doklad prokazující odbornou způsobilost pro registrovanou činnost alespoň jednoho ze členů statutárního orgánu, je-li žadatelem právnická osoba	Proof of the professional competence of a natural person for the registered activity or proof of the professional competence for the registered activity of at least one member of the statutory body, if the applicant is a legal person.
Doklad o bezúhonnosti dle požadavku § 14 zákona č. 263/2016 Sb. výpisem z evidence Rejstříku trestů (povinné jen pokud nejsou vyplněny údaje v části F. žádosti)	Proof of integrity in accordance with the requirement under § 14 of Act No 263/2016 by means of an extract from the Criminal Records Register (mandatory only if the information in Part F of the application is not completed)
Povinné pro činnosti uvedené pod bodem d)	Mandatory for the activities set out in point (d)
1. Údaje o zdroji ionizujícího záření	1. Information on the source of ionising radiation
2. Protokol o přejímací zkoušce nebo poslední zkoušce dlouhodobé stability (s výjimkou kostního denzitometru)	2. Protocol from the acceptance test or the most recent long-term stability test (except for a bone densitometer)
3. Potvrzení o absolvováni přípravy osoby zajišťující radiační ochranu registranta	3. Confirmation of completion of training of the person ensuring the radiation protection of the registrant
4. Doklad o ustanovení osoby zajišťující radiační ochranu registranta a její písemný souhlas s ustanovením, při používání kostního denzitometru doklad, že žadatel je poskytovatelem zdravotních služeb, jejichž součástí je lékařské ozáření	4. Proof of appointment of the person ensuring the radiation protection of the registrant and their written consent to the appointment; when using a bone densitometer, proof that the applicant is a provider of health services involving medical exposure
5. Doklad prokazující odbornou způsobilost fyzické osoby pro registrovanou činnost nebo doklad prokazující odbornou způsobilost pro registrovanou činnost alespoň jednoho ze členů statutárního orgánu, je-li žadatelem právnická osoba	5. Proof of the professional competence of a natural person for the registered activity or proof of the professional competence for the registered activity of at least one member of the statutory body, if the applicant is a legal person.
6. Doklad o bezúhonnosti dle požadavku§ 14 zákona č. 263/2016 Sb. výpisem z evidence Rejstřiku trestů (povinné jen pokud nejsou vyplněny údaje v části F. žádosti)	6. Proof of integrity in accordance with the requirement under § 14 of Act No 263/2016 by means of an extract from the Criminal Records Register (mandatory only if the information in Part F of the application is not completed)
Dne:	Date:
Podpis žadatelle:	Signature of applicant:



Pracoviště	Facility
List č.:	Sheet no.:
Adresa pracoviště	Facility address
Název pracoviště	Facility name
Ulice	Street
Číslo popisné	Building number
Číslo orientační	Street number
PSČ	Post Code
Obec	Municipality



Údaje pro získání výpisu z evidence Rejstříků trestů:	Information for obtaining an extract from the Criminal Records Register:
List č.:	Sheet no.:
Údaje fyzické osoby nebo všech osob, které jsou statutárními zástupci nebo členy statutárního orgánu právnické osoby:	Information on a natural person, or on all persons who are statutory representatives or members of the statutory body of a legal person:
(v případě více osob, které jsou statutárními zástupci nebo členy statutárního orgánu právnické osoby, pracovist. vyplňte přílohu F opakovaně)	(if several persons are statutory representatives or members of the statutory body of a legal person, complete Annex F repeatedly)
Jméno	Name
Příjmení	Surname

Rodné příjmení	Birth name
* pokud není vyplněno rodné příjmení, předpokládá se shodné s příjmením uvedeným v polí "Příjmení".	* If the birth name is not filled in, it is assumed to be the same as the surname entered in the ‘Surname’ field.
Osoba je obyvatelem ČR?	Is the person a resident of the Czech Republic?
ano	yes
ne	no
Typ dokladu	Type of ID
Datum narozeni	Date of birth
Občanský průkaz občana ČR	Identity card of a citizen of the Czech Republic
Cestovní průkaz občana ČR	Passport of a citizen of the Czech Republic
Povolení k pobytu cizince	Residence permit of a foreign national
Vízový štítek cizince	Visa sticker of a foreign national
Pobytový štítek cizince	Residence sticker of a foreign national
Číslo dokladu	Document number
Stáni občanství	Nationality
Datum narození	Date of birth
Pohlaví	Gender
MUŽ	Male
Žena	Female
Stát narození	Country of birth
Okres narození	District of birth
Obec narození	Municipality of birth

272. Annex 22 is deleted.

273. Annex 23 reads as follows:

‘Annex 23 to Decree No 422/2016

Criteria for the classification of a radiological incident, procedures to follow in the event of a radiological incident or potential radiological incident, the content and retention period of records from the investigation of a radiological incident or potential radiological incident, and the scope of, and time limits for, the provision of information on the radiological incident

1. Criteria for classification of an unrepeated radiological incident involving a single patient

When classifying a radiological incident involving a single patient, the permit holder and the registrant shall proceed as follows:

1. In radiotherapy and in the therapeutic application of radionuclides, a radiological incident is classified

1.1. in category A, if the patient experiences or is expected to experience a serious clinical manifestation that may lead to permanent health damage or premature death, or if there is an increased likelihood of late effects of ionising radiation associated with excessive exposure of healthy tissue;

1.2. in category B, if the patient experiences or is expected to experience a significant clinical manifestation that does not pose a threat to life but increases the likelihood of an undesirable outcome, in particular treatment complications or inadequate tumour control;

1.3. in category C, if there is a low likelihood of clinical manifestation.

2. In diagnostic nuclear medicine, radiodiagnostics or interventional radiology, a radiological incident is classified

2.1. in category A, if the patient may experience tissue reactions that could lead to permanent damage to health and quality of life, or premature death;

2.2. in category B, if the patient may experience tissue reactions that cannot lead to permanent damage to health and quality of life, or premature death;

2.3. in category C, in the case of other radiological incidents, in particular

2.3.1. examination of the wrong patient; or

2.3.2. examination of the wrong anatomical region.

2. Criteria for classification of repeated radiological incidents concerning a single patient

If more than one radiological incident occurs in a single patient, the permit holder must consider the total radiation exposure of the patient and the severity of errors in those radiological incidents. If that overall exposure level or error severity is associated with a level of health risk or error severity corresponding to another

category of radiological incident, the permit holder shall re-evaluate these events as a single radiological incident of the corresponding category.

3. Criteria for classifying repeated radiological incidents involving multiple patients

In the event of a repetition of a radiological incident of the same nature due to the same error or set of errors in various patients, the permit holder or registrant is obliged to consider the level of severity of this repetition. In the event that the number of such repeated radiological incidents indicates a serious systemic error, the permit holder must reclassify all such repeated radiological incidents into a higher category, depending on the severity of the error.

4. Time limits for reporting radiological incidents and potential radiological incidents

1. The Office must be informed in the event of

1.1. a category A radiological incident,

1.1.1. immediately after it is ascertained that a radiological incident has occurred, of all known facts concerning it;

1.1.2. immediately after all other facts have been ascertained within the framework of the investigation of the radiological incident, in particular after ascertaining the facts set out in Part 5, of those facts;

1.1.3. immediately after all measures have been taken to minimise the consequences of the radiological incident, of the measures taken;

1.1.4. immediately after the adoption of all measures to prevent the occurrence of a similar radiological incident in the future, of the measures taken; and

1.1.5. in full, pursuant to Part 5, no later than one month after the ascertainment of a Category A radiological incident in radiotherapy;

1.2. a category B radiological incident no later than 3 months after the ascertainment of the radiological incident;

1.3. a potential radiological incident that could have serious systemic implications, in full, pursuant to Part 5, no later than one month after the ascertainment that a potential radiological incident has occurred.

2. The patient or their legal representative, the prescribing physician and the treating specialist must be informed if tissue reactions caused by incorrect irradiation may adversely affect the patient's health or if changes to their treatment regimen are necessary due to a radiological incident, in the event of

2.1. a category A radiological incident

2.1.1. immediately after it is ascertainment that this radiological incident has occurred, of all known facts concerning it;

2.1.2. immediately after all other facts set out in Part 5 have been ascertained during the investigation of the event, of those facts;

2.1.3. immediately after all measures have been taken to minimise the consequences of the radiological incident, of the measures taken;

2.1.4. immediately after taking all measures to prevent the occurrence of a similar radiological incident in the future, of the measures taken; the patient or their legal representative need not be informed of these measures, and

2.1.5. in full, pursuant to Part 5, no later than one month after ascertaining that a category A radiological incident has occurred in radiotherapy or nuclear medicine;

2.2. a category B radiological incident, in full, pursuant to Part 5, no later than three months after ascertaining that the radiological incident occurred.

5. Scope of the provision of information on serious radiological incidents

1. The Office must be informed, within the time limits set out in Part 4, to the following extent:

1.1. in the event of a category A radiological incident

1.1.1. the date and time when the radiological incident was detected and when it occurred, if known;

1.1.2. the nature, extent and severity of the radiological incident;

1.1.3. the potential impact of the radiological incident;

1.1.4. the measures taken to minimise the consequences of the radiological incident;

1.1.5. other facts ascertained in the course of investigating the radiological incident that affect its nature, extent, impact and severity;

1.1.6. the next planned steps to be taken in investigating the radiological incident; and

1.1.7. the measures taken to prevent the occurrence of a similar radiological incident in the future;

1.2. in the event of a Category B radiological incident

1.2.1. the date when the radiological incident was detected and when it occurred , if known;

1.2.2. the nature, extent and severity of the radiological incident;

1.2.3. the potential impact of the radiological incident;

1.2.4. the measures taken to minimise the consequences of the radiological incident;

1.2.5. other facts ascertained in the course of investigating the radiological incident that affect its nature, extent, impact and severity; and

1.2.6. the measures taken to prevent the occurrence of a similar radiological incident in the future.

1.3. in the event of a potential radiological incident that could have led to a Category A radiological incident,

1.3.1. the date and time when the potential radiological incident was detected;

1.3.2. the date and time when the potential radiological incident occurred, if known;

1.3.3. the nature, extent and severity of the potential radiological incident;

1.3.4. the possible impact of the radiological incident that could have occurred;

1.3.5. any other facts identified in the course of investigating the potential radiological incident that affect its nature, extent, impact and severity;

1.3.6. all measures taken to prevent the occurrence of a similar radiological incident in the future.

2. The patient or their legal representative, the referring physician and the administering specialist must be informed, within the time limits set out in Part 4, to the following extent:

2.1. in the event of a category A radiological incident

2.1.1. information that an erroneous exposure has occurred;

2.1.2. the date and time when the radiological incident was detected and when it occurred, if known;

2.1.3. the nature, extent and severity of the radiological incident;

2.1.4. the potential impact of the radiological incident;

2.1.5. the measures taken to minimise the consequences of the radiological incident;

2.1.6. other facts ascertained in the course of investigating the radiological incident that affect the patient’s health and treatment; and

2.1.7. the next planned steps in addressing the radiological incident;

2.2. in the event of a Category B radiological incident

2.2.1. information that an erroneous exposure has occurred;

2.2.2. the date when the radiological incident was detected and when it occurred , if known;

2.2.3. the nature, extent and severity of the radiological incident;

2.2.4. the potential impact of the radiological incident;

2.2.5. the measures taken to minimise the consequences of the radiological incident; and

2.2.6. other facts ascertained in the course of investigating the radiological incident that affect the patient’s health and treatment.

3. Summary information on the radiological incident and on the potential radiological incident in radiotherapy, of which the Office is informed in accordance with points 1.1.5, 1.2.1, 2.1.5 and 2.2 of Part 4 and which the permit holder prepares and retains in accordance with points 1.1.6, 1.1.7, 1.4.5 and 1.4.6 of Part 7, must include

3.1. the date and time when the radiological incident or potential radiological incident occurred, its duration, and the date and time when it was detected;

3.2. a description of the radiological incident or potential radiological incident, its extent, severity and category;

3.3. the causes of the radiological incident or potential radiological incident and other facts ascertained in the course of investigating it that affect its nature, extent, impact and severity;

3.4. clinical manifestations resulting from the radiological incident;

3.5. the estimated potential long-term consequences of the radiological incident;

3.6. measures to limit the clinical consequences of the radiological incident;

3.7. immediate measures to prevent recurrence of the radiological incident or potential radiological incident; these measures need not be included in the information provided to the patient or their legal representative; and

3.8. preventive systemic measures to prevent the recurrence of the radiological incident or potential radiological incident; these measures need not be included in the information provided to the patient or their legal representative.

6. Content and retention period of records on radiological incidents and potential radiological incidents

1. Records of a radiological incident and potential radiological incident must be retained, in the case of

1.1. a radiological incident of category

1.1.1. A, for 30 years after it was detected; and

1.1.2. B or C, for 10 years after it was detected;

1.2. a potential radiological incident, for 5 years after it was detected.

2. These records must contain all information on the radiological incident or potential radiological incident identified during the investigation, as well as information on the measures taken.

7. Procedures in the event of a radiological incident or a potential radiological incident

1. In radiotherapy, in the event of

1.1. a category A or B radiological incident,

1.1.1. a dosimetric and clinical evaluation of the event must be commenced without delay, involving at least a radiation oncologist and a clinical medical physics expert;

1.1.2. measures must be taken to limit the clinical consequences of the event for the affected patient, in particular interruption of treatment according to the original treatment plan and recalculation of the treatment plan and related activities, including the preparation of a new treatment plan, simulation and verification of the plan if it is necessary to modify the original plan or prepare an entirely new one;

1.1.3. immediate measures must be taken to ensure radiation protection for other patients, including verification that the same cause of the radiological incident is not occurring in other cases;

1.1.4. as part of the investigation of the radiological incident, investigation teams must be established, the problem defined and analysed, and an analysis of the root causes, course and consequences of the radiological incident must be carried out;

1.1.5. preventive systemic measures must be implemented;

1.1.6. a summary of the information on the radiological incident pursuant to Part 5, point 3 must be prepared and sent to the Office within one month of detection of the event; and

1.1.7. a summary of the radiological incident information, to the extent pursuant to Part 5, point 3, must be retained for the period specified in Part 6 and in the patient's medical records;

1.2. a category A radiological incident, if tissue reactions caused by erroneous exposure may negatively affect the patient's health, or if changes in the patient's treatment are necessary due to the radiological incident, the patient or their legal representative, the administering specialist and the referring physician must all be informed within one month after detection of the radiological incident, to the extent pursuant to Part 5, point 2.1;

1.3. a category B radiological incident, if tissue reactions caused by erroneous exposure may negatively affect the patient's health, or if significant changes in the patient's treatment are necessary due to the radiological incident, the patient or their legal representative, the administering specialist and the referring physician must all be informed within three months after detection of the radiological incident, to the extent pursuant to Part 5, point 2.2;

1.4. a category C radiological incident,

1.4.1. as part of the investigation of the radiological incident, an investigation team must be established, the problem defined and analysed, and an analysis of the root causes, course and consequences of the radiological incident carried out, together with a dosimetric and clinical evaluation of the radiological incident;

1.4.2. measures must be taken to limit the clinical consequences of the event for the affected patient;

1.4.3. if necessary, the treatment plan must be amended;

1.4.4. preventive systemic measures must be implemented;

1.4.5. a summary of the radiological incident information must be prepared within one month of detection of the radiological incident to the extent specified in Part 5, point 3; and

1.4.6. a summary of the radiological incident information, to the extent pursuant to Part 5, point 3, must be retained;

1.5. a potential radiological incident,

1.5.1. immediately after it is established that a radiological incident may occur, measures must be taken to prevent it from occurring;

1.5.2. an investigation must be conducted and root causes and contributing factors found;

1.5.3. a record of the case must be created and filed; and

1.5.4. preventive measures must be taken to prevent similar cases from occurring in the future.

2. In nuclear medicine, interventional radiology or radiodiagnostics, in the case of

2.1. a radiological incident in a manner and with timing appropriate to the severity of the radiological incident and its possible consequences,

2.1.1. immediately after ascertaining that a radiological incident has occurred, measures must be taken to avoid increasing the undesirable dose for the patient and to prevent the radiological incident from recurring in another patient;

2.1.2. all available data on the radiological incident must then be collected;

2.1.3. timely actions must be taken to mitigate the consequences of the radiological incident, if possible;

2.1.4. the causes of the radiological incident must be identified and procedures changed to prevent the event from recurring;

2.1.5. the Office, the patient or their legal representative, the administering specialist and the referring physician must be informed of the radiological incident pursuant to Parts 4 and 5; and

2.1.6. records of the radiological incident, its investigation and the measures taken in accordance with Part 6 must be retained;

2.2. a potential radiological incident,

2.2.1. immediately after it is established that a radiological incident may occur, measures must be taken to prevent it from occurring;

2.2.2. subsequently ascertained causes of the potential radiological incident, it must be verified whether the existing standard procedures ensure prevention of the radiological incident, and if not, those procedures must be changed so that a radiological incident cannot occur in the future;

2.2.3. all records of these cases, their investigations and of the measures taken must be retained.'.

274. In Annex 24, at the end of points 2.1.4., 2.2.3. and 2.2.8., the words 'identification of the health insurance company,' are added.

275. In Annex 24, points 2.1.5 and 2.2.4., the word 'district' is replaced by the words 'district code' and the words 'according to the current valid version of the code list of the Czech Statistical Office,' are added at the end of the points.

276. In Annex 24, points 2.1.7. and 2.2.6., the words 'year of birth' are replaced by the word 'age'.

277. in Annex 24, point 2.1.8. reads as follows:

'2.1.8. the unique patient identifier for all provided data created by the health insurance company, identification of the health insurance company;'.

278. In Annex 24, at the end of point 2.1, the following points 2.1.9 and 2.1.10 are added:

'2.1.9. the date of examination, and

2.1.10. the number of examinations.'.

279. In Annex 25, point 1.1 is deleted.

Points 1.2. to 1.5. become points 1.1. to 1.4.

280. The table in Annex 25 reads as follows:

"

REGION	DISTRICT	MUNICIPALITIES
CITY OF PRAGUE	PRAGUE	KOLOVRATY, LYSOLAJE, ŠEBEROV
CENTRAL BOHEMIAN REGION	BENEŠOV	BENEŠOV, BÍLKOVICE, BUKOVANY, BYSTŘICE, ČAKOV, DIVIŠOV, HEŘMANIČKY, CHOTÝŠANY, KŘEČOVICE, LITICHOVICE, MARŠOVICE, MRAČ, NEVEKLOV, OLBRAMOVICE, OSTŘEDEK, POPOVICE, POSTUPICE, SMILKOV, STRANNÝ, STRUHAŘOV, STŘEZIMÍŘ, TEPLÝŠOVICE, TISEM, TOMICE, TŘEBEŠICE, VÁCLAVICE, VELIŠ, VOJKOV, VOTICE, VRCHOTOVY JANOVICE
	BEROUN	BYKOŠ, KONĚPRUSY, KORNO, LIBOMYŠL, MÁLKOV, MĚŇANY, SUCHOMASTY, TMAŇ
	KLADNO	JEMNÍKY, MALÉ PŘÍTOČNO, TŘEBICHOVICE
	KOLÍN	HRADEŠÍN, MASOJEDY, PŘIŠIMASY
	PRAGUE - EAST	BABICE, BŘEZÍ, KLECANY, LOUŇOVICE, ŠTÍHLICE, TEHOVEC, VYŽLOVKA
	PRAGUE – WEST	BOJANOVICE, BRATŘÍNOV, ČÍČOVICE, PETROV, SVRKYNĚ, ŠTĚCHOVICE, TRNOVÁ, JÍLOVIŠTĚ
	PŘÍBRAM	BEZDĚKOV POD TŘEMŠÍNEM, BOROTICE, ČÍM, DALEKÉ DUŠNÍKY, DOLNÍ HBITY, DRAHENICE, DRÁSOV, DUBENEC, DUBLOVICE,

		HÁJE, HLUBYNĚ, HORČÁPSKO, HŘIMĚŽDICE, HUDČICE, HVOŽĎANY, CHOTILSKO, CHRÁST, CHRAŠTICE, JABLONNÁ, JESENICE, KAMÝK NAD VLTAVOU, KLUČENICE, KŇOVICE, KORKYNĚ, KOSOVA HORA, KOUPĚ, KOZÁROVICE, KRÁSNÁ HORA NAD VLTAVOU, KŘEPENICE, LÁZ, LEŠETICE, LHOTA U PŘÍBRAMĚ, MALÁ HRAŠTICE, MILEŠOV, MODŘOVICE, NALŽOVICE, NARYSOV, NEČÍN, NEDRAHOVICE, NECHVALICE, NOVÁ VES POD PLEŠÍ, NOVÉ DVORY, OBORY, OBOŘIŠTĚ, OSEČANY, OSTROV, OUBĚNICE, PEČICE, PETROVICE, POČEPICE, PROSENICKÁ LHOTA, PŘÍBRAM, PŘÍČOVY, RADĚTICE, RADÍČ, ROŽMITÁL POD TŘEMŠÍNEM, RYBNÍKY, SEDLČANY, SEDLEC-PRČICE, SMOLOTELY, STARÁ HUŤ, STAROSEDLSKÝ HRÁDEK, SVATÝ JAN, ŠTĚTKOVICE, TĚCHAŘOVICE, TŘEBSKO, VELKÁ LEČICE, VĚŠÍN, VIŠŇOVÁ, VOLENICE, VRANČICE, VRANOVICE, VŠEVILY, VYSOKÝ CHLUMEC, ZALUŽANY, ZDUCHOVICE, ŽUPANOVICE
	RAKOVNÍK	VELKÁ CHMELIŠTNÁ
SOUTH BOHEMIAN REGION	ČESKÉ BUDĚJOVICE	HRADCE, SLAVČE, VITÍN, ŽÁR
	ČESK	BESEDNICE, POHORSKÁ VES,

	Ý KRUMLOV	SOBĚNOV
	JINDŘICHŮV HRADEC	BEDNÁREC, ČESKÝ RUDOLEC, ČÍMĚŘ, HEŘMANEČ, HORNÍ NĚMČICE, KUNŽAK, LODHÉŘOV, STARÉ MĚSTO POD LANDŠTEJNEM, STRMILOV, STUDENÁ
	PÍSEK	ALBRECHTICE NAD VLTAVOU, BOUDY, BOŽETICE, BRANICE, CERHONICE, ČIMELICE, ČÍŽOVÁ, DOBEV, DRHOVLE, HOROSEDLY, HRAZANY, HREJKOVICE, CHYŠKY, JICKOVICE, KLUKY, KOSTELEC NAD VLTAVOU, KOVÁŘOV, KOŽLÍ, KRÁLOVA LHOTA, KUČEŘ, KVĚTOV, LETY, MILEVSKO, MIROTICE, MIROVICE, MINICE, MIŠOVICE, MYSLÍN, NERESTCE, NEVĚZICE, OKROUHLÁ, ORLÍK NAD VLTAVOU, OSEK, OSLOV, OSTROVEC, PASEKY, PROBULOV, PŘEBOROV, PŘEDOTICE, PŘEŠTĚNICE, RAKOVICE, SMETANOVA LHOTA, STEHLOVICE, TÁLÍN, VARVAŽOV, VLKSICE, VOJNÍKOV, VRÁŽ, VRCOVICE, ZBELÍTOV, ZHOŘ, ZVÍKOVSKÉ PODHRADÍ
	PRACHATICE	BOHUNICE, BOŠICE, BUŠANOVICE, LČOVICE, RADHOSTICE, STACHY, STOŽEC, STRÁŽNÝ, SVATÁ MAŘÍ, ŠUMAVSKÉ HOŠTICE, TVRZICE, ÚJEZDEC, VACOV, VRBICE, VIMPERK, VLACHOVO BŘEZÍ, ZÁLEZLY, ŽELNAVA

	STRAKONICE	BĚLČICE, BEZDĚDOVICE, BLATNÁ, BRATRONICE, BŘEZÍ, BUZICE, ČEČELOVICE, ČEPŘOVICE, ČESTICE, DOUBRAVICE, DRÁŽOV, DŘEŠÍN, HAJANY, HÁJEK, HLUPÍN, HORNOSÍN, HOSLOVICE, CHOBOT, CHLUM, CHRÁŠŤOVICE, JINÍN, KADOV, KOCELOVICE, KRAJNÍČKO, KRTY-HRADEC, KUŘIMANY, LAŽÁNKY, LAŽANY, LIBĚTICE, LNÁŘE, LOM, MAČKOV, MEČICHOV, MĚKYNEC, MILOŇOVICE, MNICHOV, MYŠTICE, NEBŘEHOVICE, NĚMČICE, NĚMĚTICE, NIHOŠOVICE, NIŠOVICE, NOVÁ VES, PŘEDMÍŘ, PŘEDNÍ ZBOROVICE, PŘEDSLAVICE, PŘECHOVICE, PŘEŠŤOVICE, SEDLICE, SOUSEDOVICE, STOŽICE, STRAŠICE, STRUNKOVICE NAD VOLYŇKOU, STŘELSKÉ HOŠTICE, ŠKVOŘETICE, TCHOŘOVICE, TŘEBOHOSTICE, TŘEŠOVICE, ÚLEHLE, UZENICE, UZENIČKY, VACOVICE, VELKÁ TURNÁ, VOLYNĚ, ZÁBOŘÍ
	TÁBOR	BOROTÍN, DRAŽIČKY, JISTEBNICE, NADĚJKOV, OPAŘANY, RADKOV, SVRABOV
PLZEŇSKÝ KRAJ	DOMAŽLICE	BABYLON, ČESKÁ KUBICE, CHODOV, KANIČKY, MEZHOLEZY, NOVÁ VES, TRHANOV, ÚSILOV
	KLATOVY	BĚHAŘOV, BEZDĚKOV, BOLEŠINY, BŘEŽANY, BUKOVNÍK, ČERNÍKOV, ČÍHAŇ, ČÍMICE, DEŠENICE, DLAŽOV, DOBRŠÍN, DOLANY, DOMORAZ, FRYMBURK, HNAČOV,

		HRADEŠICE, HRÁDEK, CHANOVICE, CHLISTOV, CHUDENICE, JANOVICE NAD ÚHLAVOU, KAŠPERSKÉ HORY, KLATOVY, KOLINEC, KOVČÍN, KVÁŠŇOVICE, LOMEC, MALÝ BOR, MAŇOVICE, MĚČÍN, MOKROSUKY, MYSLÍV, MYSLOVICE, NALŽOVSKÉ HORY, NEZAMYSLICE, OLŠANY, OSTŘETICE, PAČEJOV, POLEŇ, PŘEDSLAV, SLATINA, SOBĚŠICE, STRÁŽOV, SVÉRADICE, TÝNEC, TUŽICE, VELKÝ BOR, ZAVLEKOV, ZBOROVY, ŽICHOVICE
	PLZEŇ - MĚSTO	LHŮTA
	PLZEŇ - JIH	ČIŽICE, ČMELÍNY, DOLNÍ LUKAVICE, DRAHKOV, HORNÍ LUKAVICE, HORŠICE, HRADEC, HRADIŠTĚ, CHOCENICE, JAROV, KASEJOVICE, KBEL, KLÁŠTER, MÍŠOV, MOHELNICE, NEKVASOVY, NEPOMUK, NETUNICE, NEURAZY, NEZDŘEV, NOVÉ MITROVICE, OSELCE, PTENÍN, PRÁDLO, SRBY, TŘEBČICE, TÝNIŠTĚ, ÚNĚTICE, VLČTEJN, VRČEŇ, ŽDÍREC, ŽINKOVY
	PLZEŇ - SEVER	BOHY, DOLANY, LOCHOUSICE
	ROKYCANY	BŘEZINA, KAMENEC, KAKEJCOV

	TACHOV	BROD NAD TICHOU, HOŠŤKA, LESNÁ, STARÉ SEDLO, TISOVÁ, ZADNÍ CHODOV
KARLOVARSKÝ KRAJ	CHEB	DOLNÍ ŽANDOV, KRÁSNÁ, KŘIŽOVATKA, MILÍKOV, PLESNÁ, POUSTKA, PRAMENY, SKALNÁ, STARÁ VODA, VALY, VOJTANOV
	KARLOVY VARY	ABERTAMY, ANDĚLSKÁ HORA, BOŽÍ DAR, BŘEZOVÁ, ČERNAVA, DĚPOLTOVICE, HORNÍ BLATNÁ, HROZNĚTÍN, JÁCHYMOV, KOLOVÁ, MERKLÍN, NEJDEK, NOVÉ HAMRY, PERNINK, PILA, POTŮČKY, SMOLNÉ PECE, STANOVICE, STRUŽNÁ, VYSOKÁ PEC, TEPLIČKA
	SOKOLOV	HORNÍ SLAVKOV, JINDŘICHOVICE, KRASLICE, KRÁSNO, KYNŠPERK NAD OHŘÍ, LOKET, PŘEBUZ, ROTAVA, ŠINDELOVÁ
ÚSTÍ NAD LABEM REGION	CHOMUTOV	KALEK, LOUČNÁ
	MOST	KLÍNY
	TEPLICE	DUBÍ, HROB, JENÍKOV, PROBOŠTOV, TEPLICE
LIBEREC REGION	JABLONEC NAD NISOU	ALBRECHTICE V JIZERSKÝCH HORÁCH, DALEŠICE, DESNÁ, JABLONEC NAD NISOU, JANOV NAD NISOU, JOSEFŮV DŮL, KOŘENOV, LUČANY NAD NISOU, MARŠOVICE, NOVÁ VES NAD NISOU, PULEČNÝ, RÁDLO, SMRŽOVKA, TANVALD
	LIBER	BÍLÝ POTOK, HEJNICE, MNÍŠEK,

	EC	LIBEREC, OLDŘICHOV V HÁJÍCH, STRÁŽ NAD NISOU
	SEMILY	HARRACHOV, PASEKY NAD JIZEROU
HRADEC KRÁLOVÉ REGION	RYCHNOV NAD KNĚŽNOU	ZDOBNICE
	TRUTNOV	KLÁŠTERSKÁ LHOTA, KUNČICE NAD LABEM, MLADÉ BUKY, PEC POD SNĚŽKOU, VRCHLABÍ
PARDUBICE REGION	CHRUDIM	BÍTOVANY, BOŘICE, CTĚTÍN, ČANKOVICE, DOLNÍ BEZDĚKOV, HLINSKO, HONBICE, HROCHŮV TÝNEC, JENÍKOV, JENIŠOVICE, LEŠTINKA, NABOČANY, POKŘIKOV, PROSETÍN, PŘESTAVLKY, RANÁ, STUDNICE, TRHOVÁ KAMENICE, TROJOVICE, ÚHŘETICE, VÍTANOV, VOJTĚCHOV, VORTOVÁ, VYŽICE, ZÁJEZDEC
	PARDUBICE	HOLOTÍN
	SVITAVY	BŘEZINY, HARTINKOV
	ÚSTÍ NAD ORLICÍ	PASTVINY
KRAJ VYSOČINA	HAVLÍČKŮV BROD	BOJIŠTĚ, DOLNÍ MĚSTO, DOLNÍ SOKOLOVEC, HORNÍ PASEKA, KAMENNÁ LHOTA, KOUTY, LIPNICE

		NAD SÁZAVOU, POHLED, RUŠINOV, TRPIŠOVICE, ÚSOBÍ
	JIHLAVA	BÍLÝ KÁMEN, BRTNICE, CEJLE, DUDÍN, HUBENOV, JERSÍN, JEŽENÁ, KALIŠTĚ, KAMENICE, KLATOVEC, KNÍNICE, MILÍČOV, MIROŠOV, MRÁKOTÍN, OLŠÍ, OPATOV, PUKLICE, ŘÍDELOV, SMRČNÁ, ŠIMANOV, VĚTRNÝ JENÍKOV, ZBILIDY
	PELHŘIMOV	HOJANOVICE, JANKOV, KALIŠTĚ, KOBEROVICE, NOVÝ RYCHNOV, PROSEČ, ÚSTRAŠÍN, VESELÁ
	TŘEBÍČ	BENETICE, BOCHOVICE, BRANSOUZE, BUDIŠOV, ČIKOV, ČÍMĚŘ, DOLNÍ VILÉMOVICE, HLUBOKÉ, HODOV, HORNÍ HEŘMANICE, HORNÍ ÚJEZD, HORNÍ VILÉMOVICE, HROZNATÍN, JAKUBOV U MORAVSKÝCH BUDĚJOVIC, JAROMĚŘICE NAD ROKYTNOU, JASENICE, KAMENNÁ, KLUČOV, KOJATÍN, KOŽICHOVICE, KRALICE NAD OSLAVOU, LIPNÍK, MIKULOVICE, NALOUČANY, NÁRAMEČ, NOVÝ TELEČKOV, OCMANICE, OKŘEŠICE, OSTAŠOV, PETRŮVKY, POZĎATÍN, PŘECKOV, PYŠEL, RAPOTICE, ROHY, RUDÍKOV, SLAVIČKY, SMRK, STAŘEČ, STŘÍTEŽ, STUDNICE, SVATOSLAV, TRNAVA, TŘEBÍČ, VALDÍKOV, VLADISLAV, VLČATÍN, ZAHRÁDKA
	ŽĎÁR NAD SÁZA	BALINY, BŘEZÍ, BŘEZSKÉ, DAŇKOVICE, DOLNÍ HEŘMANICE, HAMRY NAD SÁZAVOU, HORNÍ

	VOU	RADSLAVICE, CHLUMEK, JABLOŇOV, JIMRAMOV, KADOV, KARLOV, KRÁSNÉ, KŘÍDLA, KŘIŽÁNKY, MĚŘÍN, MEZIŘÍČKO, NOVÉ SADY, NOVÝ JIMRAMOV, OSLAVIČKA, OŘECHOV, OSLAVICE, OSOVÉ, OTÍN, PAVLÍNOV, PETRÁVEČ, PÍSEČNÉ, RUDA, SÁZAVA, SKŘINÁŘOV, SNĚŽNÉ, STRÁNECKÁ ZHOŘ, SVRATKA, TASOV, UHŘÍNOV, VĚCHNOV, VELKÁ BÍTEŠ, VELKÉ MEZIŘÍČÍ, VÍR, VLKOV, ZÁBLATÍ
SOUTH MORAVIAN REGION	BLANSKO	BUKOVINA, HOLŠTEJN, KRASOVÁ, NĚMČICE, SLOUP, SUDICE, VELENOV, ŽĎÁRNÁ
	BRNO-VENKOV	BRANÍŠKOV, HORNÍ LOUČKY, KATOV, KETKOVICE, KUŘIMSKÁ NOVÁ VES, LESNÍ HLUBOKÉ, LOMNIČKA, LUBNÉ, ŘIKONÍN, STANOVIŠTĚ, TIŠNOVSKÁ NOVÁ VES, ÚJEZD U TIŠNOVA, VŠECHOVICE, ŽĎÁREC
	VYŠKOV	KRÁSENSKO, OLŠANY, PODOMÍ, VYŠKOV
	ZNOJMO	BOSKOVŠTEJN, CHVALATICE, PETROVICE, SKALICE, SLATINA
OLOMOUCKÝ KRAJ	JESENÍK	KOBYLÁ NAD VIDNAVKOU, VELKÁ KRAŠ
	OLOMOUC	BOUZOV, BYSTROVANY, DASKABÁT, LUKÁ, TĚŠETICE, VELKÝ ÚJEZD, STRUKOV
	PROSTĚJO	BOHUSLAVICE, BRODEK U KONICE, BŘEZSKO, BUDĚTSKO,

	V	DZBEL, HAČKY, JESENEC, KONICE, LIPOVÁ, LUDMÍROV, OCHOZ, OTINOVES, POLOMÍ, RAKŮVKA, ROZSTÁNÍ, SKŘÍPOV, STRAŽISKO, SUCHDOL, ŠUBÍŘOV, VINCENCOV
	PŘEROV	LAZNÍČKY, POLKOVICE, STŘÍTEŽ NAD LUDINOU
	ŠUMPERK	BLUDOV, BOHDÍKOV, BRNÍČKO, KOPŘIVNÁ, PALONÍN, POSTŘELMŮVEK
MORAVIAN-SILESIAN REGION	BRUNTÁL	LESKOVEC NAD MORAVICÍ, MĚSTO ALBRECHTICE, ŠIROKÁ NIVA, ZÁTOR
	OPAVA	NOVÉ LUBLICE

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281. Annex 27 reads as follows:

‘Annex 27 to Decree No 422/2016

Activity concentration of radionuclides in drinking water for public consumption and for placing bottled water on the market

Maximum permissible value of the activity concentration of radon and tritium

	Maximum permissible value
Activity concentration of Rn-222	300 Bq/l
Activity concentration of H-3	3500 Bq/l

Reference levels for radionuclide content

	Reference level
Activity concentration of Rn-222	100 Bq/l
Activity concentration of H-3	1000 Bq/l
Indicative dose	0.1 mSv/year

Investigation levels of radionuclide activity concentrations

	Investigation levels
Total alpha activity concentration	0.2 Bq/l
Total beta activity concentration	0.5 Bq/l
Activity concentration of Cs-137	0.5 Bq/l

The method and scope of systematic measurement and evaluation of natural radionuclide content in water

1. Basic analysis

a) activity concentration of Rn-222, in the case of water from a groundwater source;

b) total alpha activity concentration;

c) total beta activity concentration.

2. Supplementary analysis

Analysis of the presence of individual natural radionuclides in water in which an investigation level has been exceeded, according to the following procedure:

a) uranium content, if the total alpha activity concentration exceeds the investigation level;

b) Ra-226 activity concentration, if the total alpha activity concentration, after deduction of the uranium contribution, exceeds the investigation level;

c) Ra-228 activity concentration, if the Ra-226 activity concentration exceeds the investigation level for total alpha activity;

d) determination of other alpha-emitting radionuclides, if the total alpha activity concentration, after deduction of the Ra-226 and uranium contribution, exceeds the investigation level;

e) potassium content, if the total beta activity concentration exceeds the investigation level;

f) determination of other beta-emitting radionuclides, if the total beta activity concentration, after deduction of the K-40 contribution, exceeds the investigation level.

The method and scope of systematic measurement and evaluation of artificial radionuclide content in water

a) tritium activity concentration;

b) activity concentration of gamma-emitting radionuclides when the tritium activity concentration exceeds the indicator value of 100 Bq/l;

c) the indicative dose if the Cs-137 activity concentration exceeds the investigation level.'.

Frequency of systematic measurement and evaluation of radionuclide content in water

Volume of water supplied or produced per day [m^3]*)	Number of samples per calendar year
volume ≤ 1 000	1
1 000 < volume ≤ 10 000	1 + 1 per each 3 300 m^3/day, including any part thereof, of the total volume
10 000 < volume ≤ 100 000	3 + 1 per each 10 000 m^3/day, including any part thereof, of the total volume
volume > 100 000	10 + 1 per each 25 000 m^3/day, including any part thereof, of the total volume

Explanatory notes:

*) Volumes are calculated as average values over the calendar year. The frequency may also be determined by the number of inhabitants supplied, assuming a water consumption of 200 l/day per individual.

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282. In the heading of Annex 28, the words ‘Building materials’ are replaced by the words ‘List of building materials’.
283. In Annex 28, point 5, the words ‘§ 92(1)(b) and (c)’ is replaced by the words ‘§ 93(1)(b)’.
284. The following Annex 30 is added:

„**Annex 30 to Decree No 422/2016**

Dose conversion factors for determining the effective dose from radon inhalation

Table 1: Dose conversion factors

	Dose conversion factor	
	radon decay products, ^{222}Rn	**radon ^{222}Rn**
Nature of the workplace	**mSv/(mJ·h·m^{-3})**	**mSv/(Bq·h·m^{-3})**
underground workplaces with natural ventilation	6	$13 \cdot 10^{-6}$
workplaces in buildings including underground levels; underground workplaces, underground works and mines with forced ventilation	3	$6{,}7 \cdot 10^{-6}$

Table 2: Derived values for workplaces in buildings including underground levels, and underground workplaces with forced ventilation, corresponding to an effective dose of 20 mSv assuming a working time of 2 000 hours, a breathing rate of 1.2 m^3/h and an equilibrium factor F = 0.4

Quantity	**Value**	**Unit**
Exposure to ^{222}Rn	$3 \cdot 10^6$	Bq·h·m^{-3}
Exposure to radon decay products	$1{,}2 \cdot 10^6$	Bq·h·m^{-3}
Annual latent energy intake	8	mJ
Annual intake of radon decay products	$1{,}4 \cdot 10^6$	Bq
Average equivalent radon activity concentration	600	Bq·m^{-3}

Average latent energy concentration	3, 3	μJ·m^{-3}
Average radon ^{222}Rn activity concentration	1 500	Bq·m^{-3}

Table 3: Derived values for underground workplaces with natural ventilation, corresponding to an effective dose of 20 mSv assuming a working time of 2 000 hours, a breathing rate of 1.2 m^3/h and an equilibrium factor F = 0.4

Quantity	**Value**	**Unit**
Exposure to ^{222}Rn	$1,5 \cdot 10^6$	$Bq \cdot h \cdot m^{-3}$
Exposure to radon decay products	$0,6 \cdot 10^6$	$Bq \cdot h \cdot m^{-3}$
Annual latent energy intake	4	mJ
Annual intake of radon decay products	$0,7 \cdot 10^6$	Bq
Average equivalent radon activity concentration	300	$Bq \cdot m^{-3}$
Average latent energy concentration	1.6	$\mu J \cdot m^{-3}$
Average radon ^{222}Rn activity concentration	750	$Bq \cdot m^{-3}$

“.

Article II

Effective date

This Decree comes into effect on 1 February 2026, except for (a) § 77(1)(a) points 3 to 5, (b) point 7 and (e) point 1, which come into on 1 January 2028, and (b) § 76(2)(c) and (3)(e), which come into effect on 1 January 2030.

Ing. Dana Drábová, PhD.