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SCOTTISH STATUTORY INSTRUMENTS

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**2015 No. 346**

**WATER SUPPLY**

**The Private and Public Water Supplies (Miscellaneous Amendments) (Scotland) Regulations 2015**

*Made* - - - - 29th September 2015  
*Laid before the Scottish Parliament* - - - - 1st October 2015  
*Coming into force* - - 28th November 2015

The Scottish Ministers make the following Regulations in exercise of the powers conferred by sections 76B, 76F(5) to (8), 76J and 101(1) and (1A) of the Water (Scotland) Act 1980<sup>(1)</sup> and section 2(2) of the European Communities Act 1972<sup>(2)</sup> and all other powers enabling them to do so.

There has been a consultation as required by Article 9 of Regulation (EC) No 178/2002 of the European Parliament and of the Council laying down the general principles and requirements of food law, establishing the European Food Safety Authority and laying down procedures in matters of food safety<sup>(3)</sup>.

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- (1) 1980 c.45. Sections 76B, 76F(5) and (6) and 76J were inserted by section 168 of, and Schedule 22 to, the Water Act 1989 (c.15) and section 76F(7) and (8) was inserted by section 114 of the Local Government etc. (Scotland) Act 1994 (c.39) (“the 1994 Act”). Section 76B was amended by section 56(2) of the Food Safety Act 1990 (c.16) and paragraph 50 of schedule 6 to the Water Industry (Scotland) Act 2002 (asp 3). Section 76F(5) was amended by paragraph 119(42) of Schedule 13 to the 1994 Act. Section 76J was amended by paragraph 119(45) of Schedule 13 to the 1994 Act. Section 101(1A) was inserted by section 27(1) of, and paragraph 9(5) of Schedule 10 to, the Natural Heritage (Scotland) Act 1991 (c.28). Section 109(1) contains a definition of “prescribed” relevant to the exercise of the statutory powers under which these Regulations are made. The definition of “prescribed” in section 109(1) was amended by paragraph 38(f) of Schedule 11 to the Local Government Finance Act 1992 (c.14).
- (2) 1972 c.68. Section 2(2) was amended by the Scotland Act 1998 (c.46) (“the 1998 Act”), Schedule 8, paragraph 15(3) (which was amended by section 27(4) of the Legislative and Regulatory Reform Act 2006 (c.51) (“the 2006 Act”). Section 2(2) was also amended by section 27(1)(a) of the 2006 Act and by the European Union (Amendment) Act 2008 (c.7), Schedule, Part 1. The functions conferred upon the Minister of the Crown under section 2(2), insofar as within devolved competence, were transferred to the Scottish Ministers by virtue of section 53 of the 1998 Act. Section 2(2) is cited to enable provision in relation to the matters listed in the penultimate paragraph of the explanatory note to these Regulations.
- (3) OJ L 31, 1.2.2002, p.1, to which there are no relevant amendments to Article 9.

## PART 1

### General

#### Citation, commencement and extent

1.—(1) These Regulations may be cited as the Private and Public Water Supplies (Miscellaneous Amendments) (Scotland) Regulations 2015 and come into force on 28th November 2015.

(2) These Regulations extend to Scotland only.

#### Interpretation

2. In these Regulations—

“the 2006 Regulations” means the Private Water Supplies (Scotland) Regulations 2006<sup>(4)</sup>; and

“the 2014 Regulations” means the Public Water Supplies (Scotland) Regulations 2014<sup>(5)</sup>.

## PART 2

### Amendment of Private Water Supplies (Scotland) Regulations 2006

#### Amendment of regulation 2

3. In regulation 2(1) (interpretation) of the 2006 Regulations, after the definition of “state” insert —

““total indicative dose” means the committed effective dose for one year of ingestion resulting from all radionuclides whose presence has been detected in a supply of water intended for human consumption purposes, of natural and artificial origin, but excluding tritium, potassium-40, radon and short-lived radon decay products;”.

#### Insertion of regulation 5B

4. After regulation 5A (duty of relevant person in relation to disinfection)<sup>(6)</sup> of the 2006 Regulations insert—

##### “Application and introduction of substances and products

**5B.** Where a relevant person, in the preparation or distribution of a private water supply for human consumption purposes, applies any substance or product to, or introduces any substance or product into, the water which is to be supplied for those purposes, the person must take all measures necessary to ensure that, in doing so, the water supplied does not, at its point of use, contain the substance or product, or any impurity associated with the substance or product, at a concentration or value which would make the water unwholesome.”.

#### Amendment of regulation 21

5. In regulation 21 (monitoring duties and powers) of the 2006 Regulations—

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(4) S.S.I. 2006/209, amended by S.S.I. 2010/95 and S.S.I. 2014/364.

(5) S.S.I. 2014/364, amended by S.S.I. 2015/100.

(6) Regulation 5A was inserted by S.S.I. 2010/95.

- (a) in paragraph (1), after “Subject to” insert “paragraph (2A) and”;
- (b) in paragraph (2), after “paragraph” insert “(2A) or”; and
- (c) after paragraph (2) insert—
  - “(2A) The monitoring local authority must ensure that for Type A supplies (which serve premises located in the area of the authority)—
    - (a) audit monitoring for—
      - (i) radon (item 6C) in Table C of Schedule 1;
      - (ii) total indicative dose (item 8) in that table; and
      - (iii) tritium (item 10) in that table,is carried out in accordance with Schedule 2A and that the measured values obtained are representative of the quality of the water consumed throughout the year; and
    - (b) for total indicative dose (item 8) in Table C of Schedule 1—
      - (i) the method used for monitoring compliance (including screening);
      - (ii) the method used for calculating the total indicative dose; and
      - (iii) the method of analysis used (including its performance characteristics),are each in accordance with the relevant requirements of Schedule 5A.”.

#### **Amendment of regulation 22**

- 6. In regulation 22 (monitoring: general provision) of the 2006 Regulations—
  - (a) in paragraph (1), after “Samples” insert “required”;
  - (b) in paragraph (2), for “Samples” substitute “Subject to regulation 21(2A), samples”;
  - (c) in paragraph (4), after “Schedule 5” insert “(where applicable)”.

#### **Amendment of regulation 24**

- 7.—(1) In regulation 24(2) (monitoring: total indicative dose and tritium) of the 2006 Regulations, before sub-paragraph (a) insert—
  - “(za) “(za) not be likely to contain radon in concentrations which could exceed the concentration specified for radon (item 6C) in column (3) of Table C of Schedule 1;”.
- (2) In the cross heading for regulation 24 (monitoring: total indicative dose and tritium), after “**Monitoring:**” insert “**radon,**”.

#### **Amendment of Schedule 1**

- 8. In Schedule 1 (prescribed concentrations and values) to the 2006 Regulations—
  - (a) in Part II (national requirements) of Table B (chemical parameters), omit the entries for—
    - (i) item 3 (hydrogen ion);
    - (ii) item 6 (odour); and
    - (iii) item 9 (taste);
  - (b) in Table C (indicator parameters)—
    - (i) in the heading for column (3), after “maximum” insert “unless otherwise stated”;
    - (ii) after the entry for item 5 (colony count) insert—

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“5A.	Colour	Acceptable to consumers and no abnormal change”
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(iii) after the entry for item 6 (conductivity) insert—

“6A.	Hydrogen ion	9.5	pH value
		6.5 (minimum)	
6B.	Odour	Acceptable to consumers and no abnormal change	
6C.	Radon (for radioactivity)(ii)	100	Bq/l”

(iv) after the entry for item 7 (sulphate) insert—

“7A.	Taste	Acceptable to consumers and no abnormal change”
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(v) after the entry for item 10 (tritium) insert—

“10A.	Turbidity	Acceptable to consumers and no abnormal change”
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(vi) in the entry for item 8 (total indicative dose), omit “(ii)” and “/year”; and

(vii) in the entry for item 10 (tritium), after “(for radioactivity)” insert “(iii)”; and

(c) in the notes to Table C, for note (ii) substitute—

“(ii) Remedial action is to be deemed justified on radiological protection grounds, without further consideration, where radon concentrations exceed 1,000 Bq/l.

(iii) If the concentration of tritium exceeds this value, an analysis of the presence of other artificial radionuclides must be also carried out by Scottish Water.”.

## Amendment of Schedule 2

9. In Schedule 2 (parameters, monitoring and sampling frequencies) of the 2006 Regulations, in Table B (audit monitoring: Type A supplies), after the row relating to item 28 (polycyclic aromatic hydrocarbons) insert—

“28A.	Radon	1	1	Y”
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## Insertion of Schedule 2A

10. After Schedule 2 (parameters, monitoring and sampling frequencies) of the 2006 Regulations insert—

“SCHEDULE 2A

Regulation 21(2A)

MONITORING OF RADIOACTIVE SUBSTANCES

**General principles and monitoring frequencies**

1.—(1) Subject to sub-paragraphs (2) and (3), the monitoring local authority must monitor Type A supplies, which serve premises located in the area of the authority, for—

- (a) radon (item 6C) in Table C of Schedule 1;
- (b) total indicative dose (item 8) in that table; and
- (c) tritium (item 10) in that table.

(2) Where the Scottish Ministers, by notice in writing to the monitoring local authority, confirm that they have established that radon, total indicative dose or, as the case may be, tritium (“the parameter”) is not likely to be present, for a period specified in the notice, in a Type A supply (which serves premises located in the area of the authority) in concentrations which could exceed the prescribed concentration or value for that parameter, the monitoring local authority is not required to monitor the supply for the parameter during the period specified in the notice.

(3) In case of naturally occurring radionuclides—

- (a) where previous results show that the concentration of radionuclides in the supply is stable, the minimum sampling and analysis frequencies are to be decided by the Scottish Ministers, and confirmed by notice in writing to the monitoring local authority, taking into consideration the risk to human health; and
- (b) where the Scottish Ministers, by notice in writing to the monitoring local authority, confirm that they are satisfied (on the basis of representative surveys, monitoring data or other reliable information) that levels of radon, tritium and the calculated total indicative dose in a Type A supply (which serves premises located in the area of the monitoring local authority) will, for a period specified in the notice, remain below the prescribed concentration or value for each parameter, the monitoring local authority is not required to monitor the supply for these parameters during the period specified in the notice.

(4) Where sub-paragraph (3)(b) applies, the Scottish Ministers must communicate the grounds for the decision to the European Commission and provide the Commission with the necessary documentation supporting that decision, including the findings of any surveys, monitoring or investigations carried out.

**Radon**

2.—(1) Subject to paragraphs 5 and 6, the monitoring local authority must ensure that representative surveys are undertaken to determine the scale and nature of likely exposures to radon in Type A supplies (which serve premises located in the area of the authority) originating from different types of groundwater sources and wells in different geological areas.

(2) The surveys must be designed in such a way that underlying factors, and especially the geology and hydrology of the area, radioactivity of rock or soil, and well type, can be identified and used to direct further action to areas of likely high exposure.

(3) Monitoring of radon concentrations must be carried out if the monitoring local authority has reason to believe, on the basis of the results of the representative surveys or other reliable information, that the prescribed concentration or value for radon might be exceeded.

### **Tritium**

3.—(1) Subject to paragraphs 5 and 6, the monitoring local authority must monitor Type A supplies (which serve premises located in the area of the authority) for tritium where—

- (a) an anthropogenic source of tritium or other artificial radionuclides is present within the catchment area for the supply; and
- (b) it cannot be shown on the basis of other surveillance programmes or investigations that the level of tritium is below the prescribed concentration or value for tritium.

(2) Where monitoring for tritium is required by sub-paragraph (1), samples must be taken in accordance with regulation 23(1) (as read with regulation 22).

(3) If the concentration of tritium in any such sample exceeds the prescribed concentration or value for tritium, the monitoring local authority must carry out an investigation of the presence of other artificial radionuclides.

### **Total indicative dose**

4.—(1) Subject to paragraphs 5 and 6, the monitoring local authority must monitor Type A supplies (which serve premises located in the area of the authority) for total indicative dose where —

- (a) a source of artificial radioactivity or elevated natural radioactivity is present; and
- (b) it cannot be shown on the basis of other representative monitoring programmes or other investigations that the level of total indicative dose is below the prescribed concentration or value for that parameter.

(2) Where sub-paragraph (1) requires monitoring (of radionuclide levels) only in relation to a source of artificial radioactivity, samples must be taken in accordance with regulation 23(1) (as read with regulation 22).

(3) Where sub-paragraph (1) requires monitoring (of radionuclide levels) in relation to a source of elevated natural radioactivity, the Scottish Ministers must specify, by notice in writing to the monitoring local authority, the frequency of the monitoring required of—

- (a) gross alpha activity;
- (b) gross beta activity; or
- (c) individual natural radionuclides,

for screening strategies pursuant to regulation 21(2A)(b) and Schedule 5A.

(4) Where sub-paragraph (3) applies, the frequency specified may vary from a single check measurement to the frequency which would otherwise apply under regulation 23(1).

(5) Where a single check for natural radioactivity is specified under sub-paragraph (3), the monitoring local authority must carry out a further check if any change occurs in relation to the supply which is likely to influence the concentrations of radionuclides in the supply.

### **Water treatment**

5. Where a Type A supply (which serves premises located in the area of a monitoring local authority) is treated to reduce the level of radionuclides, the monitoring local authority must monitor the supply for total indicative dose, radon and tritium in accordance with regulation 23(1) (as read with regulation 22) to verify the continued efficacy of that treatment.

**Averaging**

6. In circumstances where the prescribed concentration or value for total indicative dose, radon or, as the case may be, tritium is exceeded in a sample taken in relation to a Type A supply (which serves premises located in the area of a monitoring local authority), the Scottish Ministers must specify, by notice in writing to the monitoring local authority, the extent of resampling necessary to ensure that the measured values are representative of an average activity concentration for a full year.”.

**Amendment of Schedule 3**

11. In the table in Schedule 3 (circumstances and conditions to be considered by a monitoring local authority: decision on audit monitoring) to the 2006 Regulations—

(a) after the entry for polycyclic aromatic hydrocarbons (item no. (26)) insert—

“(26A)	Radon	The supply is located in an area which puts it at high risk of exceeding the prescribed concentration or value for radon (at the point referred to in regulation 7(5)) and the supply is not open to atmospheric pressure before that point.	The monitoring local authority for the supply in question is in receipt of a notice under regulation 24(1) which specifies, for an area in which that supply is located, that the condition in regulation 24(2)(za) is satisfied (and the notice applies to that extent).”
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(b) in the entry for total indicative dose (item no. (33))—

- (i) in column (3), for the words from “for” to the end, substitute “of the supply indicates that the total indicative dose is not likely to be well below the prescribed concentration or value for that parameter.”; and
- (ii) in column (4), for the words from “If” to the end, substitute “The monitoring local authority for the supply in question is in receipt of a notice under regulation 24(1) which specifies, for an area in which that supply is located, that the condition in regulation 24(2)(a) is satisfied (and the notice applies to that extent); and

(c) in the entry for tritium (item no. (35))—

- (i) in column (3), for the words from “Tritium”, where it first occurs, to the end, substitute “Routine monitoring of the supply indicates that tritium is not likely to be well below the prescribed concentration or value for that parameter.”; and
- (ii) in column (4), for the words from “If” to the end, substitute “The monitoring local authority for the supply in question is in receipt of a notice under regulation 24(1) which specifies, for an area in which that supply is located, that the condition in regulation 24(2)(b) is satisfied (and the notice applies to that extent).”.

**Insertion of Schedule 5A**

12. After Schedule 5 (analytical methodology) of the 2006 Regulations insert—

## “SCHEDULE 5A

Regulation 21(2A)

**MONITORING FOR TOTAL INDICATIVE DOSE AND  
ANALYTICAL PERFORMANCE CHARACTERISTICS**

**Monitoring for compliance with the total indicative dose**

1.—(1) The monitoring local authority may use reliable screening strategies to indicate the presence of radioactivity in Type A supplies (which serve premises located in the area of the authority).

(2) These strategies may include screening for—

- (a) certain radionuclides or an individual radionuclide; or
- (b) gross alpha activity or gross beta activity.

**Screening for certain radionuclides or for an individual radionuclide**

2.—(1) Where screening is carried out for certain radionuclides or for an individual radionuclide, the monitoring local authority must carry out an analysis of additional radionuclides if, in relation to any supply referred to in paragraph 1—

- (a) one of the activity concentrations of a radionuclide listed in column 2 of the table below exceeds 20% of the corresponding derived concentration in column 3; or
- (b) the tritium concentration exceeds the prescribed concentration or value for tritium.

(2) The monitoring local authority must, in deciding which radionuclides require to be measured for each supply, take into account all relevant information about likely sources of radioactivity.

<i>Derived concentrations for radioactivity in water intended for human consumption<sup>(a)</sup></i>		
<i>Origin</i>	<i>Radionuclide</i>	<i>Derived concentration (Bq/l)</i>
Natural	U-238 <sup>(b)</sup>	3.0
	U-234 <sup>(b)</sup>	2.8
	Ra-226	0.5
	Ra-228	0.2
	Pb-210	0.2
	Po-210	0.1
Artificial	C-14	240
	Sr-90	4.9
	Pu-239 / Pu-240	0.6

(a) This table includes values for the most common natural and artificial radionuclides. These are precise values, calculated for a dose of 0.1 mSv, an annual intake of 730 litres and using the dose coefficients laid down in Table (A) of Annex III to Council Directive 96/29/Euratom laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation<sup>7</sup>. Derived concentrations for other radionuclides may be calculated on the same basis.

(b) This allows only for the radiological properties of uranium, not for its chemical toxicity.

<i>Derived concentrations for radioactivity in water intended for human consumption<sup>(a)</sup></i>		
<i>Origin</i>	<i>Radionuclide</i>	<i>Derived concentration (Bq/l)</i>
	Am-241	0.7
	Co-60	40
	Cs-134	7.2
	Cs-137	11
	I-131	6.2

#### Notes

- (a) This table includes values for the most common natural and artificial radionuclides. These are precise values, calculated for a dose of 0.1 mSv, an annual intake of 730 litres and using the dose coefficients laid down in Table (A) of Annex III to Council Directive 96/29/Euratom laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation<sup>7</sup>. Derived concentrations for other radionuclides may be calculated on the same basis.
- (b) This allows only for the radiological properties of uranium, not for its chemical toxicity.

### Screening for gross alpha activity and gross beta activity

3.—(1) The monitoring local authority may use screening strategies for gross alpha activity and gross beta activity (or, where appropriate, residual beta activity after subtraction of the potassium-40 activity) to monitor a supply referred to in paragraph 1 for total indicative dose.

(2) Subject to sub-paragraph (3), screening levels must be set at—

- (a) 0.1 Bq/l for gross alpha activity; and
- (b) 1.0 Bq/l for gross beta activity.

(3) The monitoring local authority may set alternative levels to those specified in sub-paragraph (2) if it can demonstrate that these will ensure that a total indicative dose of 0.1 mSv is not exceeded.

(4) If the gross alpha activity is less than 0.1 Bq/l and the gross beta activity is less than 1.0 Bq/l, the monitoring local authority may assume that the total indicative dose is less than 0.1 mSv.

(5) Where sub-paragraph (4) applies, the monitoring local authority is not required to carry out a radiological investigation unless it is aware—

- (a) that specific radionuclides are present in the water; and
- (b) that these are liable to cause an indicative dose in excess of 0.1 mSv.

(6) If the gross alpha activity exceeds 0.1 Bq/l or the gross beta activity exceeds 1.0 Bq/l, the monitoring local authority must carry out an analysis for specific radionuclides.

(7) The monitoring local authority must, in deciding which radionuclides require to be measured for the purposes of sub-paragraph (6), take into account all relevant information about likely sources of radioactivity.

(8) If elevated levels of tritium are detected in a sample, the monitoring local authority must also measure the gross alpha activity and gross beta activity in that sample.

### Calculation of the total indicative dose

4.—(1) The total indicative dose must be calculated from—

- (a) the measured radionuclide concentrations and the dose coefficients laid down in Table (A) of Annex III to Council Directive 96/29/Euratom<sup>(8)</sup>; or

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(8) Table (A) lays down ingestion dose coefficients for members of the public.

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(b) more recent information recognised by the Scottish Ministers, on the basis of an annual intake of water of 730 litres for adults.

(2) Where the following formula is satisfied, the monitoring local authority may assume that the total indicative dose is less than 0.1 mSv and that no further investigation is required—

$$\sum_{i=1}^n \frac{C_i (obs)}{C_i (der)} \leq 1$$

where—

“ $C_i (obs)$ ” refers to the observed concentration of radionuclide “ $i$ ”;

“ $C_i (der)$ ” refers to derived concentration of radionuclide “ $i$ ”; and

“ $n$ ” refers to the number of radionuclides detected.

#### Performance characteristics and methods of analysis

5. For each parameter or radionuclide listed in column 1 of the table below, the method of analysis used must be capable of measuring activity concentrations with at least the limit of detection specified for that parameter or radionuclide in column 2.

<i>Parameter / radionuclide</i>	<i>Limit of detection (in Bq/l<sup>(a)(b)</sup>)</i>
Tritium	10 <sup>(e)</sup>
Radon	10 <sup>(e)</sup>
gross alpha activity	0.04 <sup>(d)</sup>
gross beta activity	0.4 <sup>(d)</sup>
U-238	0.02
U-234	0.02
Ra-226	0.04
Ra-228	0.02 <sup>(e)</sup>
Pb-210	0.02
Po-210	0.01
C-14	20
Sr-90	0.4
Pu-239 / Pu-240	0.04
Am-241	0.06
Co-60	0.5
Cs-134	0.5

(1)  
(1)  
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<i>Parameter / radionuclide</i>	<i>Limit of detection (in Bq/l<sup>(a)(b)</sup>)</i>
Cs-137	0.5
I-131	0.5

Notes—”.

- (a) The limit of detection must be calculated according to the ISO standard 11929:2010 entitled “*Determination of the characteristic limits (decision threshold, detection limit and limits of the confidence interval) for measurements of ionising radiation - Fundamentals and application*” (as it was first published), with probabilities of errors of 1st and 2nd kind of 0.05 each.
- (b) Measurement uncertainties must be calculated and reported as complete standard uncertainties, or as expanded standard uncertainties with an expansion factor of 1.96, according to the ISO IEC Guide 98-3:2008 entitled “*Guide to the expression of uncertainty in measurement*” (as it was first published).
- (c) The limit of detection for tritium and for radon is 10% of the corresponding prescribed concentration or value for the parameter.
- (d) The limit of detection for gross alpha activity and gross beta activities is 40% of the screening values of 0.1 Bq/l and 1.0 Bq/l respectively.
- (e) This limit of detection applies only to initial screening for total indicative dose for a new water source. If initial checking indicates that it is unlikely that Ra-228 exceeds 20% of the derived concentration, the limit of detection may be increased to 0.08 Bq/l for routine Ra-228 nuclide specific measurements, until a subsequent re-check is required.

## PART 3

### Amendment of Public Water Supplies (Scotland) Regulations 2014

#### Amendment of regulation 2

**13.** In regulation 2(1) (interpretation) of the 2014 Regulations, after the definition of “human consumption purposes” insert—

““indicative dose” means the committed effective dose for one year of ingestion resulting from all radionuclides whose presence has been detected in a supply of water intended for human consumption purposes, of natural and artificial origin, but excluding tritium, potassium-40, radon and short-lived radon decay products;”.

#### Amendment of regulation 6

**14.** In regulation 6 (monitoring: general provisions) of the 2014 Regulations—

- (a) in paragraph (3), for “paragraph (4)” substitute “paragraphs (4) and (6A)”;
- (b) in paragraph (6)—
  - (i) at the end of sub-paragraph (b) insert “and”; and
  - (ii) omit sub-paragraphs (d) and (e);
- (c) after paragraph (6) insert—
  - “(6A) Scottish Water must ensure—
    - (a) that audit monitoring for—
      - (i) indicative dose (item 14) in Table C;
      - (ii) radon (item 14A) in Table C; and
      - (iii) tritium (item 15) in Table C,

is carried out in accordance with Schedule 2A and that the measured values obtained are representative of the quality of the water consumed throughout the year; and

- (b) that, for indicative dose (item 14) in Table C—
- (i) the method used for monitoring compliance (including screening);
  - (ii) the method used for calculating the indicative dose; and
  - (iii) the method of analysis used (including its performance characteristics),
- are each in accordance with the relevant requirements of Schedule 3A.”;
- (d) in paragraph (7)—
- (i) after “(item 14)” insert “, radon (item 14A)”;
  - (ii) at the end of sub-paragraph (a), omit “or”; and
  - (iii) after sub-paragraph (a), insert—
- “(aa) “(aa) in the case of radon, contains level of radon that are, in the opinion of the Scottish Ministers, significantly below the prescribed concentration or value for that parameter; or”;
- (e) in paragraph (8)(b)—
- (i) after “in relation to” insert “radon or”; and
  - (ii) after “levels of” insert “radon or, as the case may be,”; and
- (f) omit paragraph (9).

#### **Amendment of regulation 9**

**15.** In regulation 9(1) (numbers of samples) of the 2014 Regulations, after “regulations” insert “6(6A),”.

#### **Amendment of Schedule 1**

**16.** In Schedule 1 (prescribed concentrations and values) to the 2014 Regulations—

- (a) in Part 2 of Table C (indicator parameters)—
- (i) in the entry for item 14 (indicative dose), omit “/year”;
  - (ii) after that entry, insert—

“14A.	Radon <sup>(e)</sup>	100	Bq/l	Supply point <sup>(b)</sup> ”
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- (iii) in the entry for item 15 (tritium), after “Tritium” insert “<sup>(f)</sup>”;
- (b) in the notes to Table C, after the note for “<sup>(d)</sup>” insert—
- “(e) “(e) Remedial action is to be deemed justified on radiological protection grounds, without further consideration, where radon concentrations exceed 1,000 Bq/l.
  - (f) If the concentration of tritium exceeds this value, an analysis of the presence of other artificial radionuclides must be also carried out by Scottish Water.”; and
- (c) after Table C (and the notes to that table), omit the definition of “Indicative dose”.

## Amendment of Schedule 2

17. In Schedule 2 (monitoring) to the 2014 Regulations—

(a) in Table 2, for the entry for item 44 (indicative dose) substitute—

“44.	Indicative dose <sup>(b)</sup>			
44A.	Radon <sup>(b)</sup> ”			

(b) in Table 3, for the entry for item 16 (indicative dose) substitute—

“16.	Indicative dose			
16A.	Radon”			

(c) after Table 4, in the final paragraph, omit ““Indicative dose”,”.

## Insertion of Schedule 2A

18. After Schedule 2 (monitoring) to the 2014 Regulations insert—

“SCHEDULE 2A

Regulation 6(6A)

### MONITORING OF RADIOACTIVE SUBSTANCES

#### General principles and monitoring frequencies

1.—(1) Subject to sub-paragraphs (2) and (3), Scottish Water must monitor the water it supplies, or intends to supply, for human consumption purposes for—

- (a) indicative dose (item 14) in Table C;
- (b) radon (item 14A) in Table C; and
- (c) tritium (item 15) in Table C.

(2) Where the Scottish Ministers, by notice to Scottish Water, confirm that they have established that indicative dose, radon or, as the case may be, tritium (“the parameter”) is not likely to be present, for a period specified in the notice, in a supply of water for human consumption purposes in concentrations which could exceed the prescribed concentration or value for that parameter, Scottish Water is not required to monitor the supply for the parameter during the period specified in the notice.

(3) In case of naturally occurring radionuclides—

- (a) where previous results show that the concentration of radionuclides in the supply is stable, the minimum sampling and analysis frequencies are to be decided by the Scottish Ministers, and confirmed by notice to Scottish Water, taking into consideration the risk to human health; and
- (b) where the Scottish Ministers, by notice to Scottish Water, confirm that they are satisfied (on the basis of representative surveys, monitoring data or other reliable information) that levels of radon, tritium and the calculated indicative dose in a supply of water for human consumption purposes will, for a period specified in the notice, remain below the prescribed concentration or value for each parameter, Scottish Water is not required to monitor the supply for these parameters during the period specified in the notice.

(4) Where sub-paragraph (3)(b) applies, the Scottish Ministers must communicate the grounds for the decision to the European Commission and provide the Commission with the necessary

documentation supporting that decision, including the findings of any surveys, monitoring or investigations carried out.

### **Radon**

2.—(1) Subject to paragraphs 5 and 6, Scottish Water must ensure that representative surveys are undertaken to determine the scale and nature of likely exposures to radon in water it supplies, or intends to supply, for human consumption purposes originating from different types of ground water sources and wells in different geological areas.

(2) The surveys must be designed in such a way that underlying factors, and especially the geology and hydrology of the area, radioactivity of rock or soil, and well type, can be identified and used to direct further action to areas of likely high exposure.

(3) Monitoring of radon concentrations must be carried out if Scottish Water has reason to believe, on the basis of the results of the representative surveys or other reliable information, that the prescribed concentration or value for radon might be exceeded.

### **Tritium**

3.—(1) Subject to paragraphs 5 and 6, Scottish Water must monitor the water it supplies, or intends to supply, for human consumption purposes for tritium where—

- (a) an anthropogenic source of tritium or other artificial radionuclides is present within the catchment area for the supply; and
- (b) it cannot be shown on the basis of other surveillance programmes or investigations that the level of tritium is below the prescribed concentration or value for tritium.

(2) Where monitoring for tritium is required by sub-paragraph (1), samples must be taken in accordance with regulation 9(1) and (4).

(3) If the concentration of tritium in any such sample exceeds the prescribed concentration or value for tritium, Scottish Water must carry out an investigation of the presence of other artificial radionuclides.

### **Indicative dose**

4.—(1) Subject to paragraphs 5 and 6, Scottish Water must monitor the water it supplies, or intends to supply, for human consumption purposes for indicative dose where—

- (a) a source of artificial radioactivity or elevated natural radioactivity is present; and
- (b) it cannot be shown on the basis of other representative monitoring programmes or other investigations that the level of indicative dose is below the prescribed concentration or value for that parameter.

(2) Where sub-paragraph (1) requires monitoring (of radionuclide levels) only in relation to a source of artificial radioactivity, samples must be taken in accordance with regulation 9(1) and (4).

(3) Where sub-paragraph (1) requires monitoring (of radionuclide levels) in relation to a source of elevated natural radioactivity, the Scottish Ministers must specify, by notice to Scottish Water, the frequency of the monitoring required of—

- (a) gross alpha activity;
- (b) gross beta activity; or
- (c) individual natural radionuclides,

for screening strategies pursuant to regulation 6(6A)(b) and Schedule 3A.

(4) Where sub-paragraph (3) applies, the frequency specified may vary from a single check measurement to the frequency which would otherwise apply under regulation 9(1) and (4).

(5) Where a single check for natural radioactivity is specified under sub-paragraph (3), Scottish Water must carry out a further check if any change occurs in relation to the supply which is likely to influence the concentrations of radionuclides in the supply.

#### **Water treatment**

5. Where Scottish Water supplies, or intends to supply, water for human consumption purposes which is treated to reduce the level of radionuclides, Scottish Water must monitor the supply for indicative dose, radon and tritium in accordance with regulation 9(1) and (4) to verify the continued efficacy of that treatment.

#### **Averaging**

6. In circumstances where the prescribed concentration or value for indicative dose, radon or, as the case may be, tritium is exceeded in a sample taken in relation to a supply, or intended supply, of water by Scottish Water for human consumption purposes, the Scottish Ministers must specify, by notice to Scottish Water, the extent of resampling necessary to ensure that the measured values are representative of an average activity concentration for a full year.”.

### **Insertion of Schedule 3A**

19. After Schedule 3 (analysis: methods and capabilities) to the 2014 Regulations insert—

“SCHEDULE 3A

Regulation 6(6A)

#### **MONITORING FOR INDICATIVE DOSE AND ANALYTICAL PERFORMANCE CHARACTERISTICS**

##### **Monitoring for compliance with the indicative dose**

1.—(1) Scottish Water may use reliable screening strategies to indicate the presence of radioactivity in water it supplies, or intends to supply, for human consumption purposes.

(2) These strategies may include screening for—

- (a) certain radionuclides or an individual radionuclide; or
- (b) gross alpha activity or gross beta activity.

##### **Screening for certain radionuclides or for an individual radionuclide**

2.—(1) Where screening is carried out for certain radionuclides or for an individual radionuclide, Scottish Water must carry out an analysis of additional radionuclides if, in relation to any supply referred to in paragraph 1—

- (a) one of the activity concentrations of a radionuclide listed in column 2 of the table below exceeds 20% of the corresponding derived concentration in column 3; or
- (b) the tritium concentration exceeds the prescribed concentration or value for tritium.

(2) Scottish Water must, in deciding which radionuclides require to be measured for each supply, take into account all relevant information about likely sources of radioactivity.

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<i>Derived concentrations for radioactivity in water intended for human consumption<sup>(a)</sup></i>		
<i>Origin</i>	<i>Radionuclide</i>	<i>Derived concentration (Bq/l)</i>
Natural	U-238 <sup>(b)</sup>	3.0
	U-234 <sup>(b)</sup>	2.8
	Ra-226	0.5
	Ra-228	0.2
	Pb-210	0.2
	Po-210	0.1
Artificial	C-14	240
	Sr-90	4.9
	Pu-239 / Pu-240	0.6
	Am-241	0.7
	Co-60	40
	Cs-134	7.2
	Cs-137	11
	I-131	6.2

Notes—

- (a) This table includes values for the most common natural and artificial radionuclides. These are precise values, calculated for a dose of 0.1 mSv, an annual intake of 730 litres and using the dose coefficients laid down in Table (A) of Annex III to Council Directive 96/29/Euratom laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation<sup>9</sup>. Derived concentrations for other radionuclides may be calculated on the same basis.
- (b) This allows only for the radiological properties of uranium, not for its chemical toxicity.

### Screening for gross alpha activity and gross beta activity

3.—(1) Scottish Water may use screening strategies for gross alpha activity and gross beta activity (or, where appropriate, residual beta activity after subtraction of the potassium-40 activity) to monitor a supply referred to in paragraph 1 for indicative dose.

(2) Subject to sub-paragraph (3), screening levels must be set at—

- (a) 0.1 Bq/l for gross alpha activity; and
- (b) 1.0 Bq/l for gross beta activity.

(3) Scottish Water may set alternative levels to those specified in sub-paragraph (2) if it can demonstrate that these will ensure that an indicative dose of 0.1 mSv is not exceeded.

(4) If the gross alpha activity is less than 0.1 Bq/l and the gross beta activity is less than 1.0 Bq/l, Scottish Water may assume that the indicative dose is less than 0.1 mSv.

(5) Where sub-paragraph (4) applies, Scottish Water is not required to carry out a radiological investigation unless it is aware—

- (a) that specific radionuclides are present in the water; and
- (b) that these are liable to cause an indicative dose in excess of 0.1 mSv.

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(1)  
(1)

(6) If the gross alpha activity exceeds 0.1 Bq/l or the gross beta activity exceeds 1.0 Bq/l, Scottish Water must carry out an analysis for specific radionuclides.

(7) Scottish Water must, in deciding which radionuclides require to be measured for the purposes of sub-paragraph (6), take into account all relevant information about likely sources of radioactivity.

(8) If elevated levels of tritium are detected in a sample, Scottish Water must also measure the gross alpha activity and gross beta activity in that sample.

#### Calculation of the indicative dose

4.—(1) The indicative dose must be calculated from—

- (a) the measured radionuclide concentrations and the dose coefficients laid down in Table (A) of Annex III to Council Directive 96/29/Euratom<sup>(10)</sup>; or
- (b) more recent information recognised by the Scottish Ministers,

on the basis of an annual intake of water of 730 litres for adults.

(2) Where the following formula is satisfied, Scottish Water may assume that the indicative dose is less than 0.1 mSv and that no further investigation is required—

$$\sum_{i=1}^n \frac{C_i (obs)}{C_i (der)} \leq 1$$

where—

“ $C_i (obs)$ ” refers to the observed concentration of radionuclide “ $i$ ”;

“ $C_i (der)$ ” refers to derived concentration of radionuclide “ $i$ ”; and

“ $n$ ” refers to the number of radionuclides detected.

#### Performance characteristics and methods of analysis

5. For each parameter or radionuclide listed in column 1 of the table below, the method of analysis used must be capable of measuring activity concentrations with at least the limit of detection specified for that parameter or radionuclide in column 2.

<i>Parameter / radionuclide</i>	<i>Limit of detection (in Bq/l)<sup>(a)(b)</sup></i>
Tritium	10 <sup>(c)</sup>
Radon	10 <sup>(c)</sup>
gross alpha activity	0.04 <sup>(d)</sup>
gross beta activity	0.4 <sup>(d)</sup>
U-238	0.02
U-234	0.02
Ra-226	0.04

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(10) Table (A) lays down ingestion dose coefficients for members of the public.

(1)  
(1)  
(1)  
(1)

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<i>Parameter / radionuclide</i>	<i>Limit of detection (in Bq/l)<sup>(a)(b)</sup></i>
Ra-228	0.02 <sup>(e)</sup>
Pb-210	0.02
Po-210	0.01
C-14	20
Sr-90	0.4
Pu-239 / Pu-240	0.04
Am-241	0.06
Co-60	0.5
Cs-134	0.5
Cs-137	0.5
I-131	0.5

Notes—”.

- (a) The limit of detection must be calculated according to the ISO standard 11929:2010 entitled “*Determination of the characteristic limits (decision threshold, detection limit and limits of the confidence interval) for measurements of ionising radiation - Fundamentals and application*” (as it was first published), with probabilities of errors of 1st and 2nd kind of 0.05 each.
- (b) Measurement uncertainties must be calculated and reported as complete standard uncertainties, or as expanded standard uncertainties with an expansion factor of 1.96, according to the ISO IEC Guide 98-3:2008 entitled “*Guide to the expression of uncertainty in measurement*” (as it was first published).
- (c) The limit of detection for tritium and for radon is 10% of the corresponding prescribed concentration or value for the parameter.
- (d) The limit of detection for gross alpha activity and gross beta activities is 40% of the screening values of 0.1 Bq/l and 1.0 Bq/l respectively.
- (e) This limit of detection applies only to initial screening for indicative dose for a new water source. If initial checking indicates that it is unlikely that Ra-228 exceeds 20% of the derived concentration, the limit of detection may be increased to 0.08 Bq/l for routine Ra-228 nuclide specific measurements, until a subsequent re-check is required.

St Andrew’s House, Edinburgh  
29th September 2015

*AILEEN McLEOD*  
Authorised to sign by the Scottish Ministers

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## EXPLANATORY NOTE

*(This note is not part of the Regulations)*

These Regulations amend the Private Water Supplies (Scotland) Regulations 2006 and the Public Water Supplies (Scotland) Regulations 2014 with the aim of further protecting human health from the adverse effects of any contamination of water supplied for human consumption purposes.

In particular, these Regulations implement Council Directive 2013/51/Euratom laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption<sup>(11)</sup>. They also make some adjustments to the Private Water Supplies (Scotland) Regulations 2006 in connection with the implementation of Council Directive 98/83/EC on the quality of water intended for human consumption<sup>(12)</sup>.

Part 1 makes provision for citation, commencement, extent and interpretation.

Part 2 amends the Private Water Supplies (Scotland) Regulations 2006 (“the 2006 Regulations”).

Part 3 amends the Public Water Supplies (Scotland) Regulations 2014 (“the 2014 Regulations”).

The powers in section 2(2) of the European Communities Act 1972 (“the 1972 Act”) are exercised so far as may be necessary (to supplement the other powers cited) for the purposes of implementing, or enabling the implementation of, obligations arising under or by virtue of Council Directive 98/83/EC and Council Directive 2013/51, and for the purposes of dealing with matters arising out of or related to such obligations. In particular, these powers enable—

provision to be made in regulation 4 in relation to the application and introduction of substances and products (pursuant to Article 10 of Council Directive 98/83/EC); and

other provision to be made in these Regulations (including provision which inserts radon as an indicator parameter) to the extent that these other provisions also have the effect of indirectly extending the scope of regulation 18 (investigations: Schedule 1 indicator parameters) of the 2006 Regulations and that of regulations 17 to 23 (investigation and remedial action) of the 2014 Regulations so as to enable appropriate remedial action to be taken in relation to radon (pursuant to Article 7 of Council Directive 2013/51).

A business and regulatory impact assessment has been prepared for these Regulations. A copy of this may be obtained from the Scottish Government, Victoria Quay, Leith, Edinburgh, EH6 6QQ.

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<sup>(11)</sup> OJ L 296, 7.11.2013, p.12.

<sup>(12)</sup> OJ L 330, 5.12.1998, p.32, amended by Corrigendum (OJ L 111, 20.4.2001, p.31), Regulation (EC) No 1882/2003 (OJ L 284, 31.10.2003, p.1) and Regulation (EC) No 596/2009 (OJ L 188, 18.7.2009, p.14).