SCOTTISH STATUTORY INSTRUMENTS

2015 No. 346

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

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) 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[e]	100	Bq/l	Supply point[b]"

(iii) in the entry for item 15 (tritium), after "Tritium" insert "[f]";

(b) in the notes to Table C, after the note for "[d]" insert—

"(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[b]
44A.	Radon[b]"

(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.

Derived concentrations for radioactivity in water intended for human consumption[(a)]		
Origin	*Radionuclide*	*Derived concentration (Bq/l)*
Natural	U-238[(b)]	3.0
	U-234[(b)]	2.8
	Ra-226	0.5
	Ra-228	0.2
	Pb-210	0.2

(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 radiation1. 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.

Derived concentrations for radioactivity in water intended for human consumption[(a)]		
Origin	*Radionuclide*	*Derived concentration (Bq/l)*
	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 radiation1. 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 indicate 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, 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(**2**); 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—

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

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.

Parameter / radionuclide	*Limit of detection (in Bq/l)*[(a)(b)]
Tritium	10[(c)]
Radon	10[(c)]
gross alpha activity	0.04[(d)]
gross beta activity	0.4[(d)]
U-238	0.02
U-234	0.02
Ra-226	0.04
Ra-228	0.02[(e)]
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

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

Parameter / radionuclide	*Limit of detection (in Bq/l)*[(a)(b)]
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.