SCHEDULE 3

Sampling and analysis

PART 3

Monitoring for indicative dose and analytical performance characteristics

Monitoring for compliance with the ID

5.—(1) A local authority may use various reliable screening strategies to indicate the presence of radioactivity in water intended for human consumption.

(2) These strategies may include screening for—

(a) certain radionuclides, or screening for an individual radionuclide;

(b) gross alpha activity or gross beta activity screening.

Screening for certain radionuclides, or screening for an individual radionuclide

6.—(1) If one of the activity concentrations exceeds 20% of the corresponding derived value or the tritium concentration exceeds its parametric value specified in the radioactive parameters table, an analysis of additional radionuclides is required.

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

Screening strategies for gross alpha activity and gross beta activity

7.—(1) Subject to paragraph 6(1), the recommended screening values are—

(a) 0.1 Bq/l for gross alpha activity, and

(b) 1.0 Bq/l for gross beta activity(**1**).

(2) If the gross alpha activity exceeds 0.1 Bq/l or the gross beta activity exceeds 1.0 Bq/l, analysis for specific radionuclides is required.

(3) The Secretary of State may set alternative screening levels for gross alpha activity and gross beta activity where it is demonstrated by the local authority that the alternative levels are in compliance with an ID of 0,1 mSv.

(4) The determination by the local authority of which radionuclides to measure must be based on all relevant information about likely sources of radioactivity.

Calculation of the ID

8.—(1) The ID must be calculated from—

(a) the measured radionuclide concentrations and the dose coefficients laid down in Annex III, Table A of 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 ionising radiation(**2**), or

(**1**) Where appropriate, gross beta activity may be replaced by residual beta activity after subtraction of the K-40 activity concentration.

(**2**) OJ No L 159, 29.6.1996, p 1. It is prospectively repealed by Council Directive 2013/59/EURATOM (OJ No L 13, 17.01.2014, p 1 from 6 February 2018.

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

(2) Where the following formula is satisfied, it can be assumed that the ID is less than the parametric value of 0,1mSv and no further investigation is required—

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

Where—

"$C_i(obs)$" means the observed concentration of radionuclide *I*;

"$C_i(der)$" means the derived concentration of radionuclide *I*;

"*n*" means the number of radionuclides detected.

Derived concentrations for radioactivity in water intend for human consumption(3)

Origin	*Nuclide*	*Derived concentration*
Natural	U-238[(i)]	3,0 Bq/1
	U-234[(i)]	2,8 Bq/1
	Ra-226	0,5 Bq/1
	Ra-228	0,2 Bq/1
	Pb-210	0,2 Bq/1
	Po-210	0,1 Bq/1
Artificial	C-14	240 Bq/1
	Sr-90	4,9 Bq/1
	Pu-239/Pu-240	0,6 Bq/1
	Am-241	0,7 Bq/1
	Co-60	40 Bq/1
	Cs-134	7,2 Bq/1
	Cs-137	11 Bq/1
	1-131	6,2 Bq/1

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

Performance characteristics and methods of analysis

9. For the following parameters and radionuclides, the method of analysis used must, as a minimum, be capable of measuring activity concentrations with a limit of detection specified below—

Parameters and radionuclides	*Limit of detection (Notes 1,2)*	*Notes*
Tritium	10 Bq/1	Note 3

(3) **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 Annex III, Table A of Directive 96/29/Euratom. Derived concentrations for other radionuclides can be calculated on the same basis, and values can be updated on the basis of more recent information recognised by the Secretary of State.**

Parameters and radionuclides	*Limit of detection (Notes 1,2)*	*Notes*
Radon	10 Bq/1	Note 3
gross alpha	0,04 Bq/1	Note 4
gross beta	0,4 Bq/1	Note 4
U-238	0,02 Bq/1	
U-234	0,02 Bq/1	
Ra-226	0,04 Bq/1	
Ra-228	0,02 Bq/1	Note 5
Pb-210	0,02 Bq/1	
Po-210	0,01 Bq/1	
C-14	20 Bq/1	
Sr-90	0,4 Bq/1	
Pu-239/Pu-240	0,04 Bq/1	
Am-241	0,06 Bq/1	
Co-60	0,5 Bq/1	
Cs-134	0,5 Bq/1	
Cs-137	0,5 Bq/1	
I-131	0,5 Bq/1	

Note 1: The limit of detection must be calculated according to the ISO standard 11929: Determination of the characteristic limits (decision threshold, detection limit, and limits of confidence interval) for measurements of ionising radiation – Fundamentals and application, with probabilities of errors of 1st and 2nd kind of 0,05 each(**4**).

Note 2: Measurement uncertainties must be calculated and reported as complete standard uncertainties, or as expanded uncertainties with an expansion factor of 1,96 according the ISO Guide for the Expression of Uncertainty in Measurement(**5**).

Note 3: The limit of detection for tritium and for radon is 10% of its parametric value of 100 Bq/1.

Note 4: The limit of detection for gross alpha activity and gross beta activities are 40% of the screening values of 0,1 and 1,0 Bq/1 respectively.

Note 5: This limit of detection applies only to initial screening for ID for a new water source; if initial checking indicates that it is not plausible that Ra-228 exceeds 20% of the derived concentration, the limit of detection may be increased to 0,08 Bq/1 for routine Ra-228 nuclide specific measurements, until a subsequent re-check is required.

(**4**) A copy may be obtained at www.iso.org or from the Drinking Water Inspectorate, Area 7E, 9 Millbank, c/o Nobel House, 17 Smith Square, London, SW1P 3JR.
(**5**) See previous footnote.