

SCHEDULE 1

Regulations 2(12)

“Table in Schedule 2 of the Water Supply (Water Quality) Regulations (Northern Ireland) 2007 (indicator parameters)

<i>Item</i>	<i>Parameters</i>	<i>Specification concentration or Value (maximum unless otherwise stated) or State</i>	<i>Units of Measurement</i>	<i>Point of Monitoring</i>
1	Ammonium	0.50	mgNH ₄ /l	Consumers' taps
2	Chloride ⁽ⁱ⁾	250	mgCl/l	Supply point ^(*)
3	<i>Clostridium Perfringens</i> (including spores)	0	Number/100ml	Supply point ^(*)
4	Coliform bacteria	0	Number/100ml	Consumers' taps
5	Colony counts	No abnormal change	Number/1ml at 22°C Number/1ml at 37°C	Consumers' taps, service reservoirs and treatment works
6	Conductivity ⁽ⁱ⁾	2500	µS/cm at 20 °C	Supply point ^(*)
7	Hydrogen ion ⁽ⁱ⁾	9.5 6.5 (minimum)	pH value	Consumers' taps
8	Radon radioactivity ^{(ii)(v)} (for	100	Bq/l	Supply point ^(*)
9	Sulphate ⁽ⁱ⁾	250	mgSO ₄ /l	Supply point ^(*)
10	Indicative dose (for radioactivity) ^{(iii)(v)(vi)}	0.10	mSv	Supply point ^(*)
11	Total organic carbon (TOC)	No abnormal change	mgC/l	Supply point ^(*)

(*) May be monitored from samples of water leaving treatment works or other supply point, as no significant change during distribution.

(i) The water should not be aggressive.

(ii) Where radon concentrations exceed 1000Bq/l, remedial action shall be carried out on radiological protection grounds without further consideration.

(iii) Excluding tritium, potassium-40, radon, and radon decay products.

(iv) Elevated levels of tritium may indicate the presence of other artificial radionuclides. If the tritium concentration exceeds its parametric value, an analysis of the presence of other radionuclides shall be required.

(v) Where treatment to reduce the level of radionuclides in water intended for human consumption has been taken, monitoring must be carried out to ensure the continued efficacy of the treatment.

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

Status: This is the original version (as it was originally made).

<i>Item</i>	<i>Parameters</i>	<i>Specification concentration or Value (maximum unless otherwise stated) or State</i>	<i>Units of Measurement</i>	<i>Point of Monitoring</i>
12	Tritium radioactivity) ^{(iv)(v)} (for	100	Bq/l	Supply point ^(*)
13	Turbidity	1	NTU	Treatment works”

(*) May be monitored from samples of water leaving treatment works or other supply point, as no significant change during distribution.

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(ii) Where radon concentrations exceed 1000Bq/l, remedial action shall be carried out on radiological protection grounds without further consideration.

(iii) Excluding tritium, potassium-40, radon, and radon decay products.

(iv) Elevated levels of tritium may indicate the presence of other artificial radionuclides. If the tritium concentration exceeds its parametric value, an analysis of the presence of other radionuclides shall be required.

(v) Where treatment to reduce the level of radionuclides in water intended for human consumption has been taken, monitoring must be carried out to ensure the continued efficacy of the treatment.

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

SCHEDULE 2

Regulation 2(13)

“Tables 1-3 in Schedule 3 of the Water Supply
(Water Quality) Regulations (Northern Ireland) 2007

Table 1:

Parameters and circumstances for check monitoring

<i>Item</i>	<i>Parameter</i>	<i>Circumstances</i>
1	Aluminium	When used as a flocculant or where the water originates from, or is influenced by, surface waters.
2	Ammonium	
3	<i>Clostridium pefringens</i> (including spores)	Where the water originates from, or is influenced by, surface waters.
4	Coliform bacteria	
5	Colony Counts	
6	Colour	
7	Conductivity	
8	<i>Escherichia coli (E.coli)</i>	
9	Hydrogen ion	

<i>Item</i>	<i>Parameter</i>	<i>Circumstances</i>
10	Indicative Dose	Where treatment to reduce the level of radionuclides in water intended for human consumption has been taken.
11	Iron	When used as a flocculant or where the water originates from, or is influenced by, surface waters.
12	Manganese	Where the water originates from, or is influenced by, surface waters.
13	Nitrate	When chloramination is practised
14	Nitrite	When chloramination is practised
15	Odour	
16	Radon	Where treatment to reduce the level of radionuclides in water intended for human consumption has been taken.
17	Taste	
18	Tritium	Where treatment to reduce the level of radionuclides in water intended for human consumption has been taken.
19	Turbidity	

Table 2

Annual Sampling Frequencies: Water Supply Zones

<i>(1)</i> <i>Substances and parameters subject to monitoring</i>	<i>(2)</i> <i>Estimated population of water supply zone</i>	<i>(3)</i> <i>Reduced</i>	<i>(4)</i> <i>Standard</i>
<i>Subject to check monitoring</i>			
<i>E.coli</i>	<100		4
Coliform bacteria	≥100		12 per 5,000 population ⁽⁶⁾
Residual disinfectant			
Aluminium	<100	1	2
Ammonium	100-4,999	2	4
<i>Clostridium perfringens</i>	5,000-9,999	6	12
(including spores) ^(*)			
Colony Counts	10,000-29,999	12	24
Colour	30,000-49,999	18	36
Conductivity ^(*)	50,000-79,999	26	52
Hydrogen ion	80,000-100,000	38	76
Iron			
Manganese			

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(1) <i>Substances and parameters subject to monitoring</i>	(2) <i>Estimated population of water supply zone</i>	(3) <i>Reduced</i>	(4) <i>Standard</i>
Nitrate ⁽ⁱⁱ⁾ Nitrite ⁽ⁱⁱⁱ⁾ Odour Taste Turbidity			
<i>Subject to audit monitoring</i>			
Aluminium Antimony Arsenic Benzene ^(*) Benzo(a)pyrene Boron ^(*) Bromate ⁽ⁱⁱⁱ⁾ Cadmium Chromium <i>Clostridium perfringens</i> (including spores) Copper	<100 100-4,999 5,000-100,000		1 4 8
Cyanide ^(*) 1,2, dichloroethane ^(*) Enterococci Fluoride ^(*) Gross Alpha ^{(*)(iv)(v)} Gross Beta ^{(*)(iv)(v)} Iron Lead Manganese Mercury ^(*) Nickel Nitrate ⁽ⁱⁱ⁾ Nitrite ⁽ⁱⁱⁱ⁾			

(1) <i>Substances and parameters subject to monitoring</i>	(2) <i>Estimated population of water supply zone</i>	(3) <i>Reduced</i>	(4) <i>Standard</i>
Pesticides and related products ^(*) Polycyclic aromatic hydrocarbons Radon ^(*) Selenium Sodium Trichloroethene/ Tetrachloroethene ^(*) Tetrachloromethane ^(*) Trihalomethanes Chloride ^(*) Sulphate ^(*) Total Organic carbon ^(*) Tritium ^(*)			

(*) Sampling for these parameters may be within water supply zones or at supply points as specified in Table 3, subject to notes (ii) and below (iii) below.

- (i) Where the population is not an exact multiple of 5,000, the population figure should be rounded up to the nearest multiple of 5,000.
- (ii) Check monitoring in water supply zones is required only where chloramination is practised. In other circumstances audit monitoring is required.
- (iii) Audit monitoring in water supply zones is required only where sodium hypochlorite is added after water has left the treatment works. In other circumstances, audit monitoring is required at supply points.
- (iv) To monitor for indicative dose (for radioactivity).
- (v) In the event that a single sample is taken in a year, a further sample should be taken if there is any change in relation to that supply that could affect the concentration of radionuclides in the water supply.

Note: This table sets out the annual sampling frequencies for all the substances and parameters in column 1. These are determined for each water supply zone according to its estimated population (column 2). The number of samples is either the standard number in column 4 or the reduced number in column 3 (if one is given). Regulation 9 provides for the circumstances in which the reduced number of samples may be taken.

Table 3:

Annual Sampling Frequencies: Treatment Works or Supply Points

(1) <i>Item</i>	(2) <i>Substances and parameters</i>	(3) <i>Volume of water supplied m3/d</i>	(4) <i>Reduced</i>	(5) <i>Standard</i>
1	<i>E.coli</i>	<20		4
2	Coliform bacteria	20-1,999	12	52

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(1) Item	(2) Substances and parameters	(3) Volume of water supplied m ³ /d	(4) Reduced	(5) Standard
3	Colony counts	2,000-5,999	52	104
4	Nitrite ⁽ⁱⁱ⁾	6,000-11,999	104	208
5	Residual disinfectant	≥ 12,000	104	365
6	Turbidity			
<i>Subject to check monitoring</i>				
7	<i>Clostridium perfringens</i> ⁽ⁱ⁾	<20		2
8	Conductivity	20-999	2	4
		1,000-1,999	6	12
		2,000-5,999	12	24
		6,000-9,999	18	36
		10,000-15,999	26	52
		16,000-32,999	52	104
		33,000-49,999	78	156
		50,000-67,999	104	208
		68,000-84,999	130	260
		85,000-101,999	156	312
		102,000-119,999	183	365
		120,000-241,999	365	730
		242,000-484,999	730	1,460
		485,000-728,999	1,095	2,190
8A	Indicative Dose (for radioactivity)	<20		1
8B	Gross alpha ^(iv)	20-999		4
8C	Gross beta ^(iv)	1,000-49,999		8
8D	Radon	50,000-89,999		12
8E	Tritium	90,000-299,999		24
		300,000-649,999		36
		≥ 650,000		48
<i>Subject to audit monitoring</i>				
9	Benzene	<20		1
10	Boron	20-999		4
11	Bromate ⁽ⁱⁱⁱ⁾	1,000-49,999		8

(1) Item	(2) Substances and parameters	(3) Volume of water supplied m ³ /d	(4) Reduced	(5) Standard
11A	<i>Clostridium perfringens</i> (including spores)	50,000-89,999		12
12	Cyanide	90,000-299,999		24
13	1,2,dichloroethane	300,000-649,999		36
14	Fluoride	≥ 650,000		48
15	Mercury			
16	Nitrite ^(iia)			
17	Pesticides and related products			
18	Trichloroethene/ Tetrachloroethene			
19	Tetrachloromethane			
20	Chloride			
21	Sulphate			
22	Total Organic Carbon			
22a	Radon			
23	Tritium			
24	Indicative Dose (for radioactivity)			
25	Gross alpha ^(iv)			
26	Gross beta ^(iv)			

(i) Check monitoring is required only in respect of surface waters (see regulation 6(2) and Table 1 in Schedule 3)

(ii) Sampling at treatment works when chloramination is practised.

(iia) Sampling at treatment works when chloramination is not practised.

(iii) Audit monitoring at supply points is required only where sodium hypochlorite is not added after water has left the treatment works. In other circumstances, audit monitoring is required in water supply zones.

(iv) To monitor for indicative dose (for radioactivity).

Note 1: Sampling is at treatment works for the substances and parameters shown in column (1) of Table 3 as items (1) to (6) and at supply points for the other substances and parameters, except nitrite subject to footnotes (ii) and (ii)(a) to the Table below.

Note 2: Table 3 sets out the annual sampling frequencies for all of the substances and parameters in column 2 at treatment works or supply points. The frequencies are determined according to the volume of water supplied at each treatment works or supply point (column 3). The number of samples is either the standard number in column 5 or the reduced number in column 4 (if one is given). Regulation 9 provides for the circumstances in which the reduced number of samples may be taken.

SCHEDULE 3

Regulation 2(14)

“Schedule 5 Monitoring for indicative dose and analytical performance characteristics.

1. A water undertaker may use a screening strategy for gross alpha and gross beta to monitor for the parametric indicator value for indicative dose (1). The recommended screening value for gross alpha is 0.1Bq/l and for gross beta is 1.0Bq/l.

If the gross alpha activity is less than 0.1Bq/l and the gross beta activity is less than 1.0Bq/l it may be assumed that the indicative dose is less than 0.1mSv and radiological investigation is not needed, unless it is known from the other sources of information that specific radionuclides are present in water that are liable to cause an excess of 0.1mSv. Where the screening values are exceeded then additional radiological investigation is required.

The radionuclides to be measured must be based on all relevant information about likely sources of radioactivity.

2. Calculation of the ID

The ID must be calculated from the measured radionuclide concentrations and the dose coefficients laid down in Annex III, Table A of Directive 96/29/Euratom or more recent information recognised by the Department, on the basis of the annual intake of water (730l) for adults. 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.

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

where

$Ci(obs)$ = observed concentration of radionuclide i

$Ci(der)$ = derived concentration of radionuclide i

n = number of radionuclides detected.

<i>Derived concentrations for radioactivity in water for human consumption⁽¹⁾</i>		
<i>Origin</i>	<i>Nuclide</i>	<i>Derived concentration</i>
Natural	U-238 ⁽²⁾	3.0 Bq/l
	U-234 ⁽²⁾	2.8 Bq/l
	Ra-226	0.5 Bq/l
	Ra-228	0.2 Bq/l
	Pb-210	0.2 Bq/l
	Po-210	0.1 Bq/l

(1) This table includes values for the most common natural and artificial radionuclides; these are precise values, calculated for a dose of 0.1mSv, an annual intake of 730 litre and using the dose coefficients laid down in Annex III Table A of Directive 96/29/Euratom; derived concentration 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 competent authorities.

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

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

Derived concentrations for radioactivity in water for human consumption⁽¹⁾		
<i>Origin</i>	<i>Nuclide</i>	<i>Derived concentration</i>
Artificial	C-14	240 Bq/l
	Sr-90	4.9 Bq/l
	Pu-239/Pu-240	0.6 Bq/l
	Am-241	0.7 Bq/l
	Co-60	40 Bq/l
	Cs-134	7.2 Bq/l
	Cs-137	11 Bq/l
	I-131	6.2 Bq/l

(1) This table includes values for the most common natural and artificial radionuclides; these are precise values, calculated for a dose of 0.1mSV, an annual intake of 730 litre and using the dose coefficients laid down in Annex III Table A of Directive 96/29/Euratom; derived concentration 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 competent authorities.

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

3. Performance characteristics and method of analysis.

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 ^{(1)/(2)}
Tritium	10 Bq/l ⁽³⁾
Radon	10 Bq/l ⁽³⁾
gross alpha activity	0.04 Bq/l ⁽⁴⁾
gross beta activity	0.4 Bq/l ⁽⁴⁾
U-238	0.02 Bq/l
U-234	0.02 Bq/l
Ra-226	0.04 Bq/l
Ra-228	0.02 Bq/l ⁽⁵⁾
Pb-210	0.02 Bq/l
Po-210	0.01 Bq/l
C-14	20 Bq/l
Sr-90	0.4 Bq/l
Pu-239/Pu-240	0.04 Bq/l
Am-241	0.06 Bq/l
Co-60	0.5 Bq/l
Cs-134	0.5 Bq/l
Cs-137	0.5 Bq/l
I-131	0.5 Bq/l ⁽⁶⁾

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- (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 the confidence interval) for measurements of ionising radiation—Fundamentals and application, with probabilities of error of 1st and 2nd kind of 0.05 each
- (2) 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 Guide for the Expression of Uncertainty in Measurement.
- (3) The limit of detection for tritium and for radon is 10% of its parametric value of 100 Bq/l.
- (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/l respectively.
- (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/l for routine Ra-228 nuclide specific measurements until a subsequent re-check is required.