

## SCHEDULE 1

Regulation 7

### NEW SCHEDULE 1A TO BE INSERTED INTO THE 2014 REGULATIONS

#### “SCHEDULE 1A

Regulation 6(2) and (3)

#### MONITORING: MINIMUM REQUIREMENTS

### PART A

#### Monitoring programmes

1. Each monitoring programme must—
  - (a) verify that—
    - (i) the measures in place to control risks to human health throughout the water supply chain (from the catchment area through abstraction, treatment and storage to distribution) are working effectively; and
    - (ii) water at the point of compliance meets the water quality standards;
  - (b) provide information on the quality of water supplied to demonstrate that—
    - (i) the water quality standards are being met; and
    - (ii) the prescribed concentration or value for each parameter in Table C is not being exceeded at the point of monitoring for the parameter; and
  - (c) identify the most appropriate means of mitigating the risks to human health.
- 2.—(1) Each monitoring programme must fulfil the requirements of Part B of this schedule (and, where applicable, Part C of this schedule) by means of—
  - (a) the collection and analysis of the quality of discrete water samples; or
  - (b) measurements of the quality of water recorded by a continuous monitoring process.(2) In addition, monitoring programmes may consist of—
  - (a) inspections of records of the functionality and maintenance status of equipment; and
  - (b) inspections of the catchment area, water abstraction, treatment, storage and distribution infrastructure.
3. Scottish Water must ensure that each monitoring programme prepared by it is reviewed on a continuous basis, and updated or reconfirmed at least every 5 years.

### PART B

#### Standard parameters and frequencies

- 1.—(1) Each monitoring programme must take into account—
  - (a) each parameter; and
  - (b) any other micro-organism, parasite or substance which needs to be monitored by virtue of regulation 5(2) or (3),including those that are important for assessing the impact of any part of the public water supply system on the quality of water at a point of compliance.

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(2) When choosing appropriate parameters and other micro-organisms, parasites or substances for monitoring (as required by, or in accordance with, this schedule), local conditions for the parts of the public water supply system in question must be taken into consideration.

2.—(1) The following parameters (“Group A parameters”) must be monitored at least at the minimum frequencies determined in accordance with the table in paragraph 3:—

- (a) *Escherichia coli*, coliform bacteria, colony count 22 °C, colour, turbidity, taste, odour, hydrogen ion concentration (pH), and conductivity; and
- (b) any other parameter, or other micro-organism, parasite or substance, (except radon, tritium and indicative dose) identified as relevant in the monitoring programme—
  - (i) by virtue of regulation 5(2) (as read with regulation 6(2)(a)); or
  - (ii) where relevant, through a risk assessment.

(2) Ammonium and nitrite must be included as Group A parameters, if chloramination is used.

(3) Aluminium and iron must be included as Group A parameters, if used as water treatment chemicals.

(4) Aluminium, iron and manganese must be included as Group A parameters, if the water in question originates from, or is influenced by surface waters.

3.—(1) Other parameters, except radon, tritium and indicative dose, (“Group B parameters”) must be monitored at least at the frequencies determined in accordance with the table below.

(2) In the table, “Group A parameters” is to be construed in accordance with paragraph 2.

#### Minimum frequency of sampling and analysis for compliance monitoring

<i>Volume of water (in m<sup>3</sup>) distributed or produced each day within a water supply zone (Notes 1 and 2)</i>		<i>Group A parameters: number of samples per year</i>	<i>Group B parameters: number of samples per year</i>
> 0	≤ 10	2	1
> 10	≤ 1,000	4	1
> 1,000	≤ 10,000	4 for the first 1,000 m <sup>3</sup> /day of the total volume, plus 3 for each additional 1,000 m <sup>3</sup> /day and part thereof	1 for the first 1,000 m <sup>3</sup> /day of the total volume, plus 1 for each additional 4,500 m <sup>3</sup> /day and part thereof
> 10,000	≤ 100,000	4 for the first 1,000 m <sup>3</sup> /day of the total volume, plus 3 for each additional 1,000 m <sup>3</sup> /day and part thereof	3 for the first 10,000 m <sup>3</sup> /day of the total volume, plus 1 for each additional 10,000 m <sup>3</sup> /day and part thereof
> 100,000		4 for the first 1,000 m <sup>3</sup> /day of the total volume, plus 3 for each additional 1,000 m <sup>3</sup> /day and part thereof	12 for the first 100,000 m <sup>3</sup> /day of the total volume, plus 1 for each additional 25,000 m <sup>3</sup> /day and part thereof

Note 1: The volumes are calculated as averages taken over a year.

Note 2: The number of inhabitants in a water supply zone may be used instead of the volume of water to determine the minimum frequency, assuming water consumption of 200 litres/day per person.

## PART C

### Deviation from standard parameters and frequencies

1. Scottish Water may (or, where required, must), in accordance with this Part, deviate from the requirements of paragraphs 2 and 3 in Part B of this schedule.

2. Based on the results of a risk assessment, the list of parameters in Part B of this schedule (including any micro-organism, parasite or substance referred to in paragraph 2(1)(b) of that Part), must be extended and/or the minimum sampling frequencies under that Part increased if—

- (a) the list of parameters or frequencies required to be monitored under that Part B is not sufficient to fulfil the obligations imposed by regulation 5(1), (3) and (4);
- (b) additional monitoring is required by regulation 5(2); or
- (c) this is necessary to verify the matters in paragraph 1(a) of Part A of this schedule.

3. Subject to paragraph 4, based on the results of a risk assessment the list of parameters in Part B of this schedule (including any micro-organism, parasite or substance referred to in paragraph 2(1)(b) of that Part) and the sampling frequencies under that Part B may be reduced, provided that the following conditions are met:—

- (a) the frequency of sampling for *Escherichia coli* must not be reduced below the minimum frequency required by that Part B; and
- (b) for other parameters in the list—
  - (i) the location and frequency of sampling must be determined in relation to the parameter's origin, as well as the variability and long-term trend of its concentration, taking into account the water quality standards;
  - (ii) to reduce the minimum sampling frequency for a parameter under Part B of this schedule, the results obtained from samples collected at regular intervals over a period of at least 3 years from sampling points representative of the whole water supply zone must all be less than 60 % of the prescribed concentration or value for the parameter;
  - (iii) to remove a parameter from the list of parameters to be monitored under Part B of this schedule, the results obtained from samples collected at regular intervals over a period of at least 3 years from points representative of the whole water supply zone must all be less than 30 % of the prescribed concentration or value of the parameter; and
  - (iv) the removal of a parameter from the list of parameters to be monitored under Part B of this schedule must be based on the result of the risk assessment, informed by the results of monitoring of sources of water and confirming that human health is protected from the adverse effects of any contamination of water.

4.—(1) The minimum sampling frequency for a parameter under Part B of this schedule (including for a micro-organism, parasite or substance referred to in paragraph 2(1)(b) of that Part) may be reduced under paragraph 3(b)(ii) only if the risk assessment confirms that no factor (that can be reasonably anticipated) is likely to cause deterioration of the quality of the water.

(2) Any such parameter may be removed from the list of parameters to be monitored under paragraph 3(b)(iii) only if—

- (a) the risk assessment confirms that no factor (that can be reasonably anticipated) is likely to cause deterioration of the quality of the water; and
- (b) the Drinking Water Quality Regulator for Scotland, by notice to Scottish Water, consents to the removal of the parameter from the list of parameters to be monitored in relation to

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a supply of water (or in relation to more than one supply of water), and that consent has not been revoked under sub-paragraph (4).

(3) The Drinking Water Quality Regulator for Scotland may not consent, under paragraph (2)(b), to the removal of any of the following from the list of parameters to be monitored:—

- (a) enterococci, *Escherichia coli*, coliform bacteria, colony count 22 °C, colour, turbidity or hydrogen ion concentration (pH);
- (b) iron, lead or manganese;
- (c) where the water is supplied to premises within a nitrate vulnerable zone, nitrate; or
- (d) any other parameter, or other micro-organism, parasite or substance, identified (for the time being) as relevant in the monitoring programme in relation to a supply of water—
  - (i) by virtue of regulation 5(2); or
  - (ii) where relevant, through a risk assessment.

(4) The Drinking Water Quality Regulator for Scotland may, by notice to Scottish Water, revoke with immediate effect any consent given by it under sub-paragraph (2)(b).

(5) In sub-paragraph (3) “nitrate vulnerable zone” means any area of land designated as a nitrate vulnerable zone by regulation 2 of the Designation of Nitrate Vulnerable Zones (Scotland) Regulations 2015(3).

## PART D

### Sampling methods and sampling points

1.—(1) Sampling points, in relation to water, must be determined by Scottish Water so as to ensure that the results of the analysis of discrete water samples collected at those points will establish whether or not the water meets the water quality standards at each point of compliance.

(2) In the case of a supply of water in pipes to any premises used for a commercial or public activity, the sampling points must include a point of compliance within each premises.

(3) In the case of a supply of water in pipes to premises (including any premises used for a commercial or public activity), Scottish Water may take samples of the water within the water supply zone or at a treatment works for a particular parameter—

- (a) if it can be demonstrated that there would be no adverse change to the measured value of the parameter concerned; and
- (b) in the case of any premises used for a commercial or public activity, the Drinking Water Quality Regulator for Scotland, by notice to Scottish Water, consents to the samples being taken within the water supply zone or at the treatment works for the particular parameter, and that consent has not been revoked under sub-paragraph (6).

(4) In a case where Scottish Water may take samples of the water within the water supply zone or at a treatment works for a particular parameter, the point at which the samples are taken is to be treated for the purposes of these Regulations as the point of compliance for the parameter.

(5) As far as possible, the number of samples must be distributed equally in time and location.

(6) The Drinking Water Quality Regulator for Scotland may, by notice to Scottish Water, revoke with immediate effect any consent given by it under sub-paragraph (3)(b).

2. Subject to paragraph 1, sampling at the point of compliance must meet the following requirements:—

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(3) [S.S.I. 2015/376](#).

- (a) a sample for copper, lead or nickel must be taken at the consumer's tap without prior flushing;
  - (b) a sample for any such parameter or any other chemical parameter must—
    - (i) be a random daytime sample of one litre volume; or
    - (ii) use a fixed stagnation time method that better reflects the national situation, provided that, at the water supply zone level, this does not result in fewer cases of non-compliance than using the random daytime method; and
  - (c) a sample for microbiological parameters at the point of compliance must be taken and handled in accordance with sampling purpose B of European standard EN ISO 19458:2006 entitled "*Water quality - Sampling for microbiological analysis (ISO 19458:2006)*"(4).
3. Sampling of water in a public water supply system, with the exception of sampling at the consumer's tap, must be in accordance with international standard ISO 5667-5:2006 entitled "*Water quality. Sampling. Guidance on sampling of drinking water from treatment works and piped distribution systems*"(5).
4. For microbiological parameters, sampling of water in a public water supply system must be taken and handled in accordance with sampling purpose A of European standard EN ISO 19458:2006 entitled "*Water quality - Sampling for microbiological analysis (ISO 19458:2006)*".

## PART E

### Radioactive substances

#### General principles and monitoring frequencies

- 1.—(1) Subject to sub-paragraph (2), Scottish Water in relation to a supply of water must ensure that the water is monitored for radon, tritium and indicative dose.
- (2) Where the Scottish Ministers, by notice to Scottish Water, confirm that they have established that radon, tritium or, as the case may be, indicative dose is not likely to be present in relation one or more supplies of water, for a period specified in the notice, in concentrations which could exceed the prescribed concentration or value for the parameter, Scottish Water is not required to monitor any such supply of water for the parameter during the period specified.
- (3) In case of naturally occurring radionuclides—
- (a) where previous results show that the concentration of radionuclides in one or more supplies of water 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 one or more supplies of water will, for a period specified in the notice, remain below the prescribed concentration or value for each of these parameters at the point of compliance, Scottish Water is not required to monitor any such supply for these parameters during the period specified.
- (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

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(4) This standard was approved by the European Committee for Standardization (CEN) on 1st July 2006. Under reference BS EN ISO 19458, it is published as a UK standard by the British Standards Institution (ISBN 0 580 49136 6).

(5) This standard was approved by the International Organization for Standardization (ISO). Under reference BS ISO 5667-5:2006, it is published as a UK standard by the British Standards Institution (ISBN 0 580 47140 3).

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 the water 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 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 paragraph 6.

(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) Scottish Water must monitor the water 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 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 paragraph 6.

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

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

depending on the screening strategy adopted pursuant to Part B of this schedule.

(4) Where sub-paragraph (3) applies, the frequency determined may vary from a single check measurement to the frequency which would otherwise apply by virtue of paragraph 6.

(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 the water is treated to reduce the level of radionuclides, Scottish Water must monitor the water for indicative dose, radon and tritium in accordance with paragraph 6 to verify the continued efficacy of that treatment.

### **Minimum sampling and analysis frequencies**

6. The minimum sampling and analysis frequency for the monitoring of radon, tritium and indicative dose in water (where required by this schedule) from a public water supply system or from a tanker or used in a food production undertaking is set out in the following table.

<i>Volume of water (in m<sup>3</sup>) distributed or produced each day within a water supply zone (Note 1)</i>		<i>Number of samples per year</i> <i>(Notes 2 and 3)</i>
> 0	≤ 100	1
> 100	≤ 1,000	1
> 1,000	≤ 10,000	1, plus 1 for each 3,300 m <sup>3</sup> /day and part thereof of the total volume
> 10,000	≤ 100,000	3, plus 1 for each 10,000 m <sup>3</sup> /day and part thereof of the total volume
> 100,000		10, plus 1 for each 25,000 m <sup>3</sup> /day and part thereof of the total volume

Note 1: The volumes are calculated as averages taken over a year. The number of inhabitants in a water supply zone may be used instead of the volume of water to determine the minimum frequency, assuming water consumption of 200 litres/day per person.

Note 2: As far as possible, the number of samples must be distributed equally in time and location.

Note 3: In the event of intermittent short-term supply the monitoring frequency of water distributed by tankers must be decided by Scottish Water in relation to the water.

### **Averaging**

7. Where the prescribed concentration or value for radon, tritium or, as the case may be, indicative dose is exceeded in a sample of the water, the Drinking Water Quality Regulator for Scotland 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.

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## PART F

### Indicative dose

#### Monitoring for compliance with the indicative dose

1.—(1) Scottish Water, in relation to water, may use reliable screening strategies to indicate the presence of radioactivity in the water.

(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 of the water 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 referred to in the second column of the table below exceeds 20% of the corresponding derived concentration in the third column; 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.

<i>Origin</i>	<i>Radionuclide (Note 1)</i>	<i>Derived concentration (Bq/l)</i>	<i>Notes</i>
Natural	U-238	3.0	Note 2
	U-234	2.8	Note 2
	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	

Note 1: 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



<i>Origin</i>	<i>Radionuclide (Note 1)</i>	<i>Derived concentration (Bq/l)</i>	<i>Notes</i>
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protection of the health of workers and the general public against the dangers arising from ionizing radiation<sup>(6)</sup>. Derived concentrations for other radionuclides may be calculated on the same basis.

Note 2: 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 the water 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 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation; 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 “ $i$ ”;

<sup>(6)</sup> OJ L 159, 29.6.1996, p.1, as amended by Corrigendum (OJ L 314, 4.12.1996, p.20).

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“ $C_i$  (der)” refers to derived concentration of radionuclide “ $i$ ”; and  
 “ $n$ ” refers to the number of radionuclides detected.”

## SCHEDULE 2

Regulation 10

### SUBSTITUTION OF SCHEDULE 3 OF THE 2014 REGULATIONS

#### “SCHEDULE 3

Regulation 14A(1) and (2)

#### METHODS OF ANALYSIS

1.—(1) Scottish Water must ensure that the methods of analysis used for the purposes of monitoring and demonstrating compliance with these Regulations are validated and documented in accordance with European standard EN ISO/IEC 17025:2005 entitled “*General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)*”(7), or other equivalent standards accepted at international level.

(2) Scottish Water must ensure that laboratories or parties contracted by laboratories apply quality management system practices in accordance with European standard EN ISO/IEC 17025:2005 entitled “*General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)*”, or other equivalent standards accepted at international level.

2. In the absence of an analytical method meeting the minimum performance criteria set out in Part B of this schedule, Scottish Water must ensure that monitoring is carried out using best available techniques not entailing excessive costs.

## PART A

### Microbiological parameters

1.—(1) Subject to sub-paragraph (2), the methods in paragraph 2 are given for reference.

(2) Scottish Water may use other methods, providing the provisions of regulation 14A are met.

2. The methods for microbiological parameters are—

(a) for *Escherichia coli* and coliform bacteria—

(i) European standard EN ISO 9308-1:2014 entitled “*Water quality - Enumeration of Escherichia coli and coliform bacteria - Part 1: Membrane filtration method for waters with low bacterial background flora (ISO 9308-1:2014)*”(8); or

(ii) European standard EN ISO 9308-2:2014 entitled “*Water quality - Enumeration of Escherichia coli and coliform bacteria - Part 2: Most probable number method (ISO 9308-2:2012)*”(9);

(7) This standard was approved by the European Committee for Standardization (CEN) on 15th March 2005. Under reference BS EN ISO/IEC 17025:2005, it is published as a UK standard by the British Standards Institution (ISBN 0 580 46330 3).

(8) This standard was approved by the European Committee for Standardization (CEN) on 18th January 2017. Under reference BS EN ISO 9308-1:2014+A1:2017, it is published as a UK standard by the British Standards Institution (ISBN 978 0 580 92379 1).

(9) This standard was approved by the European Committee for Standardization (CEN) on 11th April 2014. Under reference BS EN ISO 9308-2:2014, it is published as a UK standard by the British Standards Institution (ISBN 978 0 580 84023 4).

- (b) for enterococci, European standard EN ISO 7899-2:2000 entitled “*Water quality - Detection and enumeration of intestinal enterococci - Part 2: Membrane filtration method (ISO 7899-2:2000)*”(10);
- (c) for *Pseudomonas aeruginosa*, European standard EN ISO 16266:2008 entitled “*Water quality - Detection and enumeration of Pseudomonas aeruginosa - Method by membrane filtration (ISO 16266:2006)*”(11);
- (d) for colony count 22 °C (the enumeration of culturable microorganisms — colony count after aerobic incubation at 22 °C), European standard EN ISO 6222:1999 entitled “*Water quality - Enumeration of culturable micro-organisms - Colony count by inoculation in a nutrient agar culture medium (ISO 6222:1999)*”(12);
- (e) for colony count 36 °C (the enumeration of culturable microorganisms — colony count after aerobic incubation at 36 °C), European standard EN ISO 6222:1999 entitled “*Water quality - Enumeration of culturable micro-organisms - Colony count by inoculation in a nutrient agar culture medium (ISO 6222:1999)*”; and
- (f) for *Clostridium perfringens* including spores, European standard EN ISO 14189:2016 entitled “*Water quality - Enumeration of Clostridium perfringens - Method using membrane filtration (ISO 14189:2013)*”(13).

## PART B

### Chemical and indicator parameters

1.—(1) Subject to paragraph 3, for a parameter in Table 1, the method of analysis used must, as a minimum, be capable of measuring concentrations equal to the prescribed concentration or value for the parameter with—

- (a) a limit of quantification of 30 % or less of the prescribed concentration or value for the parameter; and
- (b) an uncertainty of measurement as specified in Table 1 for the parameter.

(2) The result of the analysis for a parameter in Table B or Table C must be expressed using at least the same number of significant figures as the prescribed concentration or value for the parameter in the table.

2. The uncertainty of measurement specified in Table 1 for a parameter must not be used as an additional tolerance to the prescribed concentration or value for the parameter.

3. Until 31st December 2019, Scottish Water may, for a parameter in Table 2, use the corresponding ‘trueness’, ‘precision’ and ‘limit of detection’ in that table as an alternative set of performance characteristics (instead of using the limit of quantification and the uncertainty of measurement referred to in paragraph 1(1)).

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(10) This standard was approved by the European Committee for Standardization (CEN) on 11th April 2014. Under reference BS EN ISO 7899-2:2000, it is published as a UK standard by the British Standards Institution (ISBN 0 580 34953 5).

(11) This standard was approved by the European Committee for Standardization (CEN) on 11th January 2008. Under reference BS EN ISO 16266:2008, it is published as a UK standard by the British Standards Institution (ISBN 978 0 580 59736 7).

(12) This standard was approved by the European Committee for Standardization (CEN) on 16th March 1999. Under reference BS EN ISO 6222:1999, it is published as a UK standard by the British Standards Institution (ISBN 0 580 32495 8).

(13) This standard was approved by the European Committee for Standardization (CEN) on 15th July 2016. Under reference BS EN ISO 14189:2016, it is published as a UK standard by the British Standards Institution (ISBN 978 0 580 92184 1).

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**TABLE 1****Minimum performance characteristic: uncertainty of measurement**

<i>Parameter</i>	<i>Uncertainty of measurement (% of prescribed concentration or value, except pH) (Note 1)</i>	<i>Notes(14)</i>
Aluminium	25	
Ammonium	40	
Antimony	40	
Arsenic	30	
Benzo(a)pyrene	50	Note 5
Benzene	40	
Boron	25	
Bromate	40	
Cadmium	25	
Chloride	15	
Chromium	30	
Conductivity	20	
Copper	25	
Cyanide	30	Note 6
1,2-dichloroethane	40	
Fluoride	20	
Hydrogen ion concentration (in pH)	0.2	Note 7
Iron	30	
Lead	25	
Manganese	30	
Mercury	30	
Nickel	25	
Nitrate	15	
Nitrite	20	
Oxidisability	50	Note 8
Pesticides	30	Note 9
Polycyclic aromatic hydrocarbons	30	Note 10
Selenium	40	

(14) Acrylamide, epichlorohydrin and vinyl chloride to be controlled by product specification.

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<i>Parameter</i>	<i>Uncertainty of measurement (% of prescribed concentration or value, except pH) (Note 1)</i>	<i>Notes(14)</i>
Sodium	15	
Sulphate	15	
Tetrachloroethene	30	Note 11
Trichloroethene	40	Note 11
Trihalomethanes: total	40	Note 10
Total organic carbon	30	Note 12
Turbidity	30	Note 13

**TABLE 2****Minimum performance characteristics: trueness, precision and limit of detection**

<i>Parameter</i>	<i>Trueness (% of prescribed concentration or value, except for pH) (Note 2)</i>	<i>Precision (% of prescribed concentration or value, except for pH) (Note 3)</i>	<i>Limit of detection (% of prescribed concentration or value, except for pH) (Note 4)</i>	<i>Notes(15)</i>
Aluminium	10	10	10	
Ammonium	10	10	10	
Antimony	25	25	25	
Arsenic	10	10	10	
Benzo(a)pyrene	25	25	25	
Benzene	25	25	25	
Boron	10	10	10	
Bromate	25	25	25	
Cadmium	10	10	10	
Chloride	10	10	10	
Chromium	10	10	10	
Conductivity	10	10	10	
Copper	10	10	10	
Cyanide	10	10	10	Note 6
1,2-dichloroethane	25	25	10	
Fluoride	10	10	10	

(14) Acrylamide, epichlorohydrin and vinyl chloride to be controlled by product specification.

(15) Acrylamide, epichlorohydrin and vinyl chloride to be controlled by product specification.

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

<i>Parameter</i>	<i>Trueness (% of prescribed concentration or value, except for pH) (Note 2)</i>	<i>Precision (% of prescribed concentration or value, except for pH) (Note 3)</i>	<i>Limit of detection (% of prescribed concentration or value, except for pH) (Note 4)</i>	<i>Notes(15)</i>
Hydrogen ion concentration (in pH)	0.2	0.2		Note 7
Iron	10	10	10	
Lead	10	10	10	
Manganese	10	10	10	
Mercury	20	10	20	
Nickel	10	10	10	
Nitrate	10	10	10	
Nitrite	10	10	10	
Oxidisability	25	25	25	Note 8
Pesticides	25	25	25	Note 9
Polycyclic aromatic hydrocarbons	25	25	25	Note 10
Selenium	10	10	10	
Sodium	10	10	10	
Sulphate	10	10	10	
Tetrachloroethene	25	25	10	Note 11
Trichloroethene	25	25	10	Note 11
Trihalomethanes: total	25	25	10	Note 10
Turbidity	25	25	25	

#### Notes to Table 1 and Table 2

Note 1: Uncertainty of measurement is a non-negative parameter characterising the dispersion of the quantity values being attributed to a measurand, based on the information used. The performance criterion for measurement uncertainty ( $k = 2$ ) is the percentage of the prescribed concentration or value for the parameter stated in the table or better. Measurement uncertainty must be estimated at the level of the prescribed concentration or value for the parameter, unless otherwise specified.

Note 2: Trueness is a measure of systematic error, i.e. the difference between the mean value of the large number of repeated measurements and the true value. Further specifications are those set

(15) Acrylamide, epichlorohydrin and vinyl chloride to be controlled by product specification.

<i>Parameter</i>	<i>Trueness (% of prescribed concentration or value, except for pH) (Note 2)</i>	<i>Precision (% of prescribed concentration or value, except for pH) (Note 3)</i>	<i>Limit of detection (% of prescribed concentration or value, except for pH) (Note 4)</i>	<i>Notes(15)</i>
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out in international standard ISO 5725 entitled “Accuracy (trueness and precision) of measurement methods and results”(16).

Note 3: Precision is a measure of random error and is usually expressed as the standard deviation (within and between batches) of the spread of results from the mean. Acceptable precision is twice the relative standard deviation. This term is further specified in international standard ISO 5725 entitled “Accuracy (trueness and precision) of measurement methods and results”.

Note 4: Limit of detection is either three times the standard deviation within a batch of a natural sample containing a low concentration of the parameter, or five times the standard deviation of a blank sample (within a batch).

Note 5: If the value of uncertainty of measurement cannot be met, the best available technique should be selected (up to 60 %).

Note 6: The method determines total cyanide in all forms.

Note 7: Values for trueness, precision and uncertainty of measurement are expressed in pH units.

Note 8: Reference method European standard EN ISO 8467:1995 entitled “Water quality - Determination of permanganate index (ISO 8467:1993)”(17).

Note 9: The performance characteristics for individual pesticides are given as an indication. Values for the uncertainty of measurement as low as 30 % can be achieved for several pesticides, higher values up to 80 % may be allowed for a number of pesticides.

Note 10: The performance characteristics apply to individual substances, specified at 25 % of the prescribed concentration or value for the corresponding parameter in Table B.

Note 11: The performance characteristics apply to individual substances, specified at 50 % of the prescribed concentration or value for the corresponding parameter in Table B.

Note 12: The uncertainty of measurement should be estimated at the level of 3 mg/l of the total organic carbon in accordance with European standard EN 1484:1997 entitled “Water analysis - Guidelines for the determination of total organic carbon and dissolved organic carbon”(18).

Note 13: The uncertainty of measurement must be estimated at the level of 1.0 nephelometric turbidity units in accordance with European standard EN ISO 7027-1:2016 entitled “Water quality - Determination of turbidity - Part 1: Quantitative methods (ISO 7027-1:2016)”(19).

(15) Acrylamide, epichlorohydrin and vinyl chloride to be controlled by product specification.

(16) This standard has been approved by the International Organization for Standardization (ISO). Under reference BS ISO 5725-1 to BS ISO 5725-6, these are published as UK standards by the British Standards Institution.

(17) This standard was approved by the European Committee for Standardization (CEN) on 3rd November 1994. Under reference EN ISO 8467:1995, it is published as a UK standard by the British Standards Institution (ISBN 0 580 23435 5).

(18) This standard was approved by the European Committee for Standardization (CEN) on 6th April 1997. Under reference BS EN 1484:1997, it is published as a UK standard by the British Standards Institution (ISBN 0 580 28372 0).

(19) This standard was approved by the European Committee for Standardization (CEN) on 15th April 2016. Under reference BS EN ISO 7027-1:2016, it is published as a UK standard by the British Standards Institution (ISBN 978 0 580 81961 2).

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## PART C

### Indicative dose

For each parameter in Table 3, the method of analysis used must be capable of measuring activity concentrations with at least the limit of detection specified for that parameter in the second column of the table.

**TABLE 3**

**Minimum performance characteristics: limit of detection**

Parameter	Limit of detection (in Bq/l) (Notes 1 and 2)	Notes
Tritium	10	Note 3
Radon	10	Note 3
gross alpha activity	0.04	Note 4
gross beta activity	0.4	Note 4
U-238	0.02	
U-234	0.02	
Ra-226	0.04	
Ra-228	0.02	Note 5
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 to Table 3

Note 1: The limit of detection must be calculated in accordance with the international standard ISO 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”(1), with probabilities of errors of 1st and 2nd kind of 0.05 each.

(1) 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) (“the 2008 Act”), schedule, Part 1. Paragraph 1A of schedule 2 was inserted by the 2006 Act, section 28 and amended by the 2008 Act, schedule, Part 1. The functions conferred on a Minister of the Crown under section 2(2) of the European Communities Act 1972 are, so far as they are exercisable within devolved competence, exercisable by the Scottish Ministers by virtue of section 53 of the 1998 Act. Section 2(2) is cited so far as is necessary (to supplement the other powers cited) for the



Note 2: Measurement uncertainties must be calculated and reported as complete standard uncertainties, or as expanded standard uncertainties with an expansion factor of 1.96, in accordance with international standard ISO/IEC Guide 98-3:2008 entitled “Guide to the expression of uncertainty in measurement”(2).

Note 3: The limit of detection for tritium and for radon is 10% of the corresponding prescribed concentration or value for the parameter.

Note 4: 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.

Note 5: 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.”

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purposes of implementing, or enabling the implementation of, obligations arising under or by virtue of [Directive 98/83/EC](#) and [Directive 2013/51/EURATOM](#). In particular, section 2(2) is cited so far as is necessary to enable the making of the provision in regulation 4(7) which confers a power of direction on the Drinking Water Regulator for Scotland.

(2) [S.S.I. 2014/364](#), as amended by [S.S.I. 2015/100](#) and [S.S.I. 2015/346](#).