

Drinking Water Inspectorate

# Guidance on The Water Supply (Water Quality) Regulations (Northern Ireland) 2007

April 2008

# INDEX

Part	Regulation	Subject	Page
		<b>Introduction</b>	1
		Regulatory Framework	1
		Associated Regulations and Related Guidance	2
		Definition of Health Authority	3
I		<b>General</b>	
	2	Interpretation - Pesticides Monitoring - Relevant Metabolites	4
II		<b>Water Supply Zones</b>	
	3	Identification of Water Supply Zones	5
III		<b>Wholesomeness</b>	
	4(3)	Definition of Consumer's Tap	7
	4(4)	Sampling on Transfer from a Water Treatment Works	8
	4(5)	Sampling on Transfer from a Service Reservoir	9
IV		<b>Monitoring of Water Supplies</b>	
	6(1)	Monitoring: Number of Samples	12
	6(2)	Monitoring for Pesticides	14
	6(3)	Monitoring: Sampling - Tankers	16
	6(6)	Monitoring: Copper, Lead and Nickel	17
	6(7)	Monitoring: Radioactivity	17
	7	Sampling Points - Random Selection	19
	8(1)	Automatically Authorised Supply Points	21
	8(2)	Authorisation of Parameters for Supply Point Monitoring	22
	9(1)	Monitoring: Numbers of Samples	24
	9(2)	Numbers of Samples - Reduced Frequency	25
	9(3)	Numbers of Samples - Regular Intervals	26
V		<b>Monitoring - Additional Provisions</b>	
	13	Sampling at Water Treatment Works	28
		Monitoring: Analysis Using Monitors	30
	14	Sampling at Service Reservoirs	32
	15	Sampling New Sources	32
	16	Collection and Analysis of Samples	33
VI		<b>Investigations, Authorisations of Departures and Remedial Action</b>	
	17(1)	Investigations: Schedule 1 Parameters	36
	17(2)	Schedule 1 - Failures Attributable to the Domestic Distribution System	37
	17(6)	Schedule 1 - Notifications to Consumers	41
	18	Investigations: Indicator Parameters	42
	19	Action by the Department (DWI)	44
	20	Authorisation of a Temporary Supply that is Not Wholesome	50
	21	Authorisations: Terms and Conditions	51
VII		<b>Water Treatment</b>	
	25	Interpretation: Definition of Spring	52
	26	Treatment of Raw Water	52
	27, 28	<i>Cryptosporidium</i> Requirements	52/53

<b>Part</b>	<b>Regulation</b>	<b>Subject</b>	<b>Page</b>
VII		<b>Water Treatment (cntd)</b>	
	29	Contamination from Pipes	53
	30	Application and Introduction of Substances and Products	55
	31	Use of Processes	55
VIII		<b>Records and Information</b>	
	32	Maintenance of Records	56
	33	Provision of Information	56
	34	Publication of Information	57
<b>APPENDICES</b>			
<b>Part</b>	<b>Regulation</b>	<b>Subject</b>	
VI	17, 18	<b>Appendix 1</b> Information Requirements Relating to Exceedence Notification and Investigation Reporting, Monthly Compliance Reporting and Other Reporting Matters	58
VI	17	<b>Appendix 2</b> Flow Chart for Schedule 1 Mandatory Parameter Investigations	62
VI	18	<b>Appendix 3</b> Flow Chart for Schedule 2 Indicator Parameter Investigations	63
IV	6(7)	<b>Appendix 4</b> Flow Chart for Monitoring of Gross Alpha and Gross Beta and Total Indicative Dose (TID)	64
		<b>Appendix 4A</b> Advice from the European Commission	66
VIII	33	<b>Appendix 5</b> Report to District Councils	69
VIII	34	<b>Appendix 6</b> Annual Water Quality Report	73

## INTRODUCTION

- 1 This document provides guidance on the implementation of The Water Supply (Water Quality) Regulations (Northern Ireland) 2007 (SR 147) which came into operation on 1 April 2007. These Regulations apply to the public supplier of water in Northern Ireland, Northern Ireland Water (NIW); a government owned company. This Guidance is available from: [www.ehsni.gov.uk/water/drinkwater/public\\_water/regulations-2/technical\\_guidance.htm](http://www.ehsni.gov.uk/water/drinkwater/public_water/regulations-2/technical_guidance.htm)
- 2 These Regulations replace the Water Supply (Water Quality) Regulations (Northern Ireland) 2002 (SR 331) and The Water Supply (Water Quality) (Amendment) Regulations (Northern Ireland) 2003 (SR 369). Interim Guidance on the 2002 and 2003 Regulations is available from the Inspectorate's website: [www.ehsni.gov.uk/interim\\_guidance\\_regs02.pdf](http://www.ehsni.gov.uk/interim_guidance_regs02.pdf).
- 3 Unless otherwise specified, reference within this document to the 'Regulations' means The Water Supply (Water Quality) Regulations (Northern Ireland) 2007.
- 4 The Drinking Water Inspectorate is a unit within the Environment and Heritage Service, an agency within the Department of Environment (DoE). The Inspectorate is one of the United Kingdom's regional regulatory bodies which have statutory duties in terms of drinking water quality.
- 5 Following legislative changes under The Water and Sewerage Services (Northern Ireland) Order 2006, on 1 April 2007, the Drinking Water Inspectorate in Northern Ireland became a statutory appointee acting on behalf of the Department for Regional Development in respect of public drinking water supplies.
- 6 This edition of the Guidance does not purport to offer any authoritative interpretation of the Regulations. It is recognized that it may contain omissions, and that some advice will need to be modified or updated as more experience is gained with implementing the new Regulations or further guidance is published by the European Commission.

### 7 **Regulatory Framework**

The following provide the regulatory framework for public drinking water supplies in Northern Ireland:

- Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption (European Drinking Water Directive) – sets standards for drinking water quality.

- The Water and Sewerage Service (Northern Ireland) Order 2006 (SR 3336 N.I. 21).
- The Water Supply (Water Quality) Regulations (Northern Ireland) 2007 (SR 147). A copy of these Regulations is available from the Office of Public Sector Information:  
[www.opsi.gov.uk/sr/sr2007/nisr\\_20070147\\_en\\_1](http://www.opsi.gov.uk/sr/sr2007/nisr_20070147_en_1).
- The Food Hygiene Regulations (Northern Ireland) 2006 (SR 2006 No 3) came into operation on 11 January 2006 - as well as applying the original EU Regulations (852/2004, 853/2004 and 854/2004), this SR also applied the provisions of the EU implementing and transitional measures and the EU Microbiological Criteria Regulation – from FSANI website:  
[www.food.gov.uk/northernireland/niregulation/regulationsni/foodhygregNI](http://www.food.gov.uk/northernireland/niregulation/regulationsni/foodhygregNI)

## 8 Associated Regulations and Related Guidance

- The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003 (SR No.544).
- The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations (Northern Ireland) 1996 (SR 603).
- The Water Regulations (Northern Ireland) 1991 (SR 50).
- The Private Water Supply Regulations (Northern Ireland) 1994 (SR 237).
- The Natural Mineral Water, Spring Water and Bottled Drinking Water Regulations (Northern Ireland) 2007 (SR 420).
- The Microbiology of Drinking Water Supplies (2002) in the series 'Methods for the Examination of Water and Associated Materials', published by the Standing Committee of Analysts.
- Principles of Water Supply Hygiene and Technical Guidance Notes (Water UK, 1998).
- Guide to the Microbiological Implications of Emergencies in Water Services (Water Authorities' Association, 1985).
- 'General Principles of Sampling and Accuracy of Analytical Results' in the 'Methods for the Examination of Water and Associated Materials', published by the Standing Committee of Analysts.

- Guidance for the Monitoring of *Cryptosporidium* in Treated Water Supplies in Northern Ireland (2003) which includes Standard Operating Protocols for the Monitoring of *Cryptosporidium* Oocysts. A copy of this document is available from:  
[www.ehsni.gov.uk/crypto\\_guidance\\_april05.pdf](http://www.ehsni.gov.uk/crypto_guidance_april05.pdf)
- Asbestos and Drinking Water – former Department of the Environment/ Welsh Office letter dated 20 February 1986 to Chief Executives of Water Authorities in England and Wales (DoE ref: WS/602/7). A copy of this letter is available in the HMSO document “Guidance on Safeguarding the Quality of Public Water Supplies” (ISBN 0 11 752262 7).
- Guidelines for Calibration in Laboratories, available on the Drinking Water Inspectorate for England and Wales website:  
[www.dwi.gov.uk/regs/infolett/2005/info0305guidance.pdf](http://www.dwi.gov.uk/regs/infolett/2005/info0305guidance.pdf)
- NI DWI Information Letter 02/08: Guidance on the Information to be Provided in Initial and Final Reports on Water Quality Events and Other Matters.

## 9 **Definition of Health Authority**

Where this Guidance refers to a ‘health authority’ this is defined as

- (i) the relevant Consultant(s) in Communicable Disease in the Department of Health, Social Services and Public Safety; and
- (ii) the Director of Public Health for the relevant local Health and Social Services Board(s).

- 10 Northern Ireland Water may enter into alternative local reporting arrangements with health authorities with the written agreement of the parties identified above. Such arrangements should be reviewed regularly.

## PART I

### GENERAL

#### Regulation 2 - Interpretation

#### Definitions - Regulation 2(1) Meaning of Relevant Metabolites

1.1 The Regulations set the following standards for pesticides and related products:

- aldrin 0.030µg/ l
- dieldrin 0.030µg/ l
- heptachlor 0.030µg/ l
- heptachlor epoxide 0.030µg/ l
  
- other pesticides 0.10µg/ l
  
- total pesticides 0.50µg/ l

1.2 Pesticides and related products are defined as any organic insecticide, herbicide, fungicide, nematocide, acaricide, algicide, rodenticide, slimicide and any product related to any of these including any growth regulator, and their *relevant* metabolites, degradation and reaction products. *Relevant* should be taken to mean any metabolites, degradation and reaction products that have similar pesticidal properties to their parent pesticides. This Guidance Document will be updated in the light of EC guidance on the definition and interpretation of related products and relevant metabolites, degradation and reaction products as it may apply to the EC Drinking Water Directive.

1.3 The standard for other pesticides applies to each individual pesticide, also including any *relevant* metabolite, degradation and reaction product. Total pesticides means the sum of the detected concentrations of the individual pesticides and any *relevant* metabolites, degradation and reaction products detected and quantified in the samples taken on a particular sampling occasion from a sampling point. This definition recognizes that more than one sample may be taken on a particular sampling occasion from a sampling point to enable all the pesticides of interest to be determined.

## PART II

### WATER SUPPLY ZONES

#### Regulation 3 – Identification of Water Supply Zones

##### Delineation and Designation of Water Supply Zones

- 2.1 Regulation 3(1) requires Northern Ireland Water to predesignate the names and areas of the supply zones within its supply area for the forthcoming calendar year. Regulation 3(2) specifies that the water supply zone should not supply more than 100,000 people. Regulation 3(3) requires that the designation of the water supply zone should **not** change through the year.
- 2.2 In the last quarter of each calendar year, Northern Ireland Water should review the designation of its water supply zones to ensure that the delineation remains appropriate, and assess revised estimated populations. The population estimates for water supply zones should relate to permanent residents only. During the review, Northern Ireland Water should identify any water supply zone where the revised estimate of resident population supplied exceeds 100,000. Regulation 3(2) and (3) provide that the delineation of such zones should be revised to produce zones with a population below 100,000 in the following year. In general, the number of changes to the designation of water supply zones should be kept to a minimum.
- 2.3 A consistent approach is needed in the delineation of water supply zones. Northern Ireland Water should, therefore, first identify which areas are supplied from single sources. A source could be the outlet of a water treatment works, a pumping station, a blending point or a service reservoir. A discrete area supplied from a single source should always be recorded as a single water supply zone unless it supplies more than 100,000 people. In such circumstances, the area should be subdivided into water supply zones, each with a population of less than 100,000.
- 2.4 The purpose of supply zone delineation is to identify areas of supply which do not have significant differences in water quality. The water quality indicated by sampling within the supply zone should be generally representative of the water quality supplied to the whole area of the zone. It is recognized that in some instances, the water quality indicated by a sample taken from the tap may be influenced by the domestic distribution system within a consumer's property.

- 2.5 Any discrete area whether supplied by one or more sources should be subdivided into separate supply zones if there are, or could be, significant differences in water quality within the area. Northern Ireland Water should also take into account the type of source, and only designate supply zones supplied by similar sources within the same water supply zone. Each supply zone would normally be served by an individual service reservoir or water tower, pumping or booster station or would be distinguished as a discrete pressure zone or by other appropriate features of the distribution system.
- 2.6 In areas where the variations in water quality are complex, or where the water supplied may be from a number of potential sources via transfer mains, the water supply zone should be delineated by reference to convenient geographical boundaries or by areas served by appropriate features of the distribution system.
- 2.7 Northern Ireland Water has delineated its supplies into district metered areas, which under normal operation, have a single supply inlet. In such circumstances, water supply zones should consist of related district metered areas which are supplied from common sources.
- 2.8 It is recognized that Northern Ireland Water may have to take temporary operational actions to maintain water supplies that may involve the introduction of water from sources not designated for that supply zone. Such temporary measures should not influence the annual designation of water supply zones. If permanent changes have to be made to the sources that supply a zone or to the delineation of that zone the designation of the zone can only be changed for the next calendar year.

## PART III

### WHOLESOMENESS

- 3.1 Part III (regulation 4) prescribes standards for wholesomeness in respect of water supplied by Northern Ireland Water, for cooking, drinking, food preparation and washing and other domestic purposes, and to premises for food production purposes. In particular, regulation 4 provides that water is wholesome if it contains concentrations or values in respect of various properties, elements, organisms and substances that do not contravene the prescribed maximum, and in some cases, minimum concentration or value (PCV). Some of the PCVs are specified in regulation 4, but more are included in Tables A and B of Schedule 1 to the Regulations.

#### **Regulation 4(3) - Definition of Consumer's Tap**

##### **Definition of Consumer's Tap**

- 3.2 The Regulations implement EC Directive 98/83/EC on the quality of water intended for human consumption. The Directive's standards must be complied with; in the case of water supplied from a distribution network, this is at the point within premises or an establishment at which the water emerges from the taps that are normally used for human consumption. Northern Ireland Water is not responsible for any deterioration in water quality that may arise as a result of the domestic distribution system (with the exception of plumbing metals [copper and lead] where specific regulations apply).
- 3.3 Regulation 4(3) states that the standards for wholesomeness are to be complied with at the consumer's tap except in the case of water supplied from a tanker. Part IV of the Regulations requires monitoring at sampling points and other points to establish whether the water supplied meets the standards for wholesomeness. A sampling point is defined in regulation 2 as being a consumer's tap that is selected for monitoring purposes. Further guidance on monitoring of public buildings was issued by DWI E&W Information Letter 10/2004 which is available on the website:  
[www.dwi.gov.uk/regs/infolett/2004/info1004.shtm](http://www.dwi.gov.uk/regs/infolett/2004/info1004.shtm).  
From 1 January 2005, Northern Ireland Water must select from all premises and establishments (i.e. including public buildings) within their area of supply in its random compliance monitoring programme for water supply zones. All samples taken at public buildings should be 'flagged' on Northern Ireland Water's data system to identify these public building locations.

- 3.4 The consumer's tap is not defined in the Regulations. Northern Ireland Water should assume that the consumers' taps to be used for monitoring to determine compliance with the standards are those taps that are normally used for drinking, cooking, food preparation or other domestic purposes. In a domestic property, this tap is the kitchen cold water tap that is used for drinking and food preparation purposes irrespective of whether upstream devices such as softeners or filters are present. Garden taps should not be used for regulatory samples. In non-domestic properties (including public buildings) the sampler should seek to determine from the occupier or owner which tap is normally used for drinking and food preparation (or supply to the public in the case of public buildings) and should sample from that tap. Where more than one appropriate tap is available in a building, the sampler will need to record accurately which tap was sampled.
- 3.5 It has long been established practice to disinfect the sample tap before sampling for microbiological parameters. Indeed, disinfection of the cold water tap is recommended prior to sampling for bacteriological parameters by the Microbiology of Drinking Water Supplies 2002. This arose because the intent was to measure the quality of water supplied and eliminate any deterioration caused by domestic plumbing.

#### **Regulation 4(4) - Sampling on Transfer from a Water Treatment Works**

##### **Water Treatment Works**

- 3.6 Regulation 4(4) defines the criteria for wholesomeness on transfer from a water treatment works. Regulation 13(1) requires Northern Ireland Water to ensure that samples for *E. coli*, coliform bacteria, colony counts, residual disinfectant, turbidity and nitrite are taken at the required frequency from the point at which water leaves each treatment works. Sampling for the other parameters within Table 3 of Schedule 3 to the Regulations may be sampled at the treatment works or other authorised supply point.
- 3.7 The sampling point should be located so as to provide a representative sample of the water flowing into distribution. The sample point must be downstream of all treatment processes, including blending, and any storage in final water storage reservoirs at the treatment works.

- 3.8 Where the treatment stream within a works divides in such a way that a single final water compliance point will not be representative of all water leaving the works (i.e. there are different treatment streams which leave the works through different outlet mains), then more than one sampling point will be required. Where there is a possibility of differences in water quality within different outlet mains leaving the treatment works, then separate sampling points are required for each different final water. Although on the same site, each treatment stream is regarded as a separate water treatment works for the purposes of the Regulations.
- 3.9 All treatment works outlets should be fitted with metal sampling taps of a hygienic design which do not have attachments or inserts and which are made from materials complying with BS6920. Water should be supplied to the sampling tap through a sample line of a suitable material, which if plastic, complies with BS6920. Sample lines should be kept as short as possible and the number of take-offs from the sampling line should be kept to a minimum.

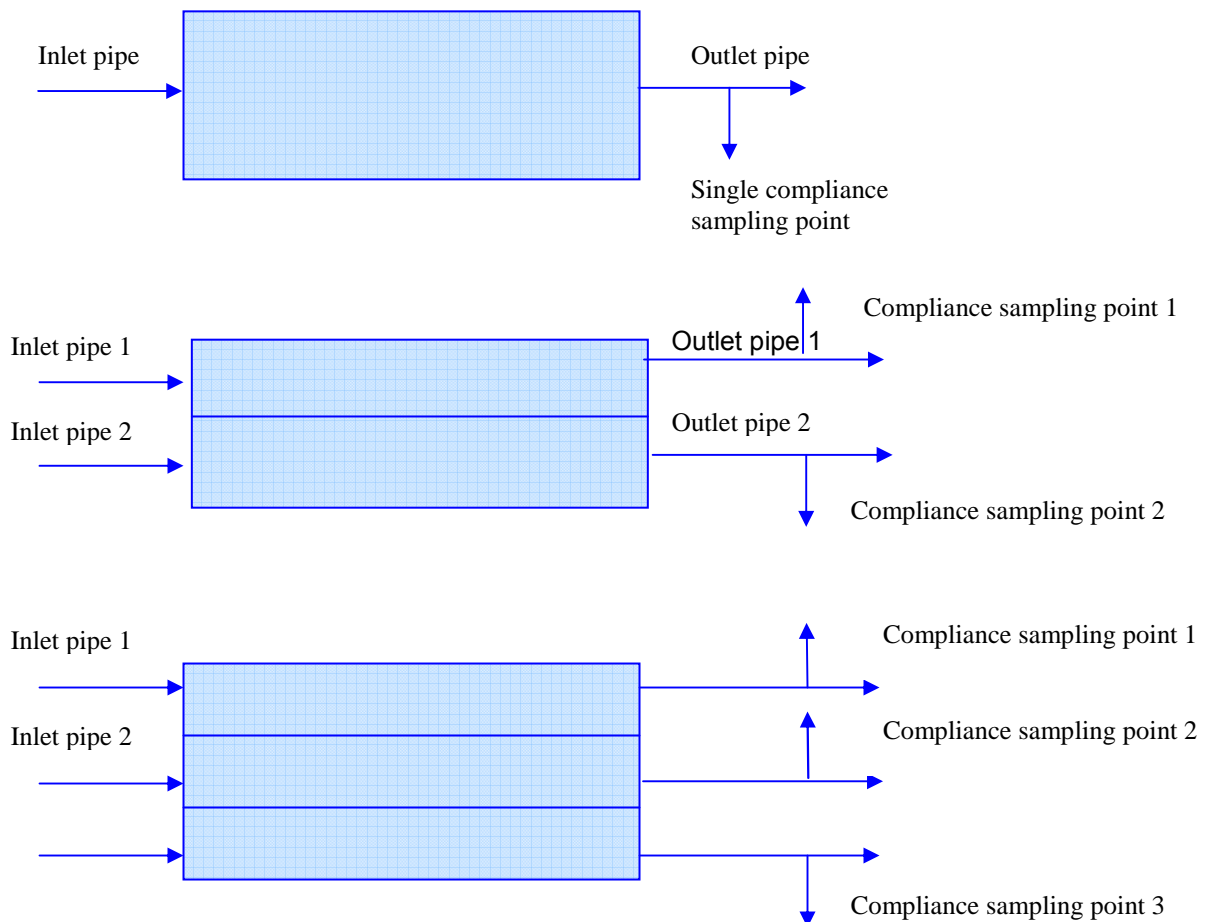
#### **Regulation 4(5) - Sampling on Transfer from a Service Reservoir**

##### **Service Reservoir**

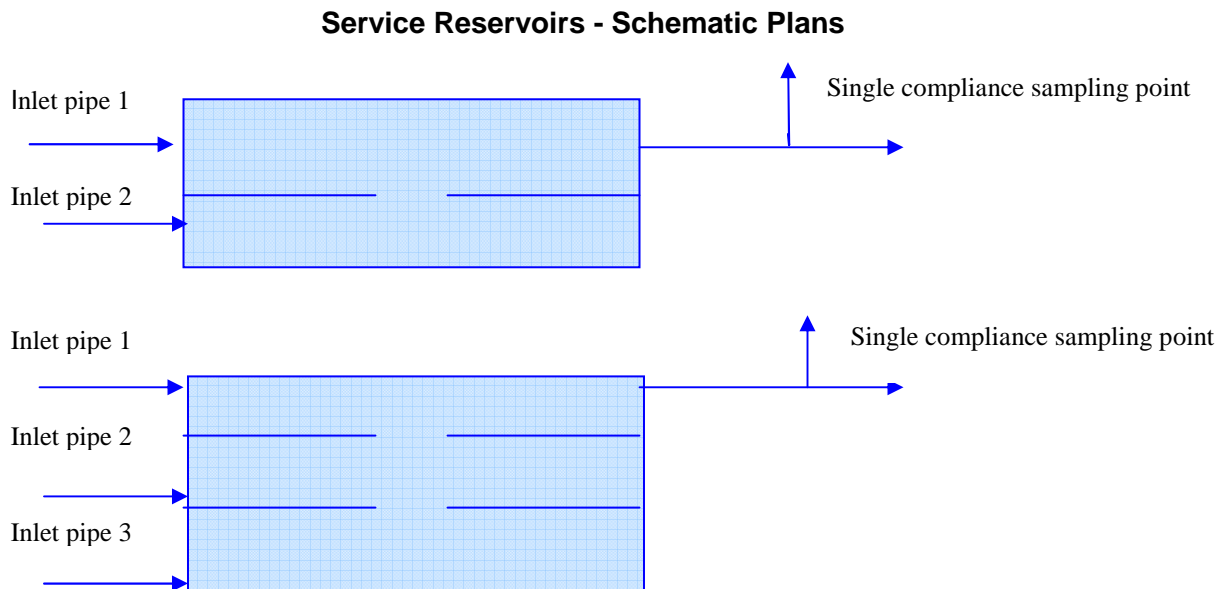
- 3.10 Regulation 4(5) defines the criteria for wholesomeness on transfer from a service reservoir. Regulation 14 requires Northern Ireland Water to ensure that a sample is taken for bacteriological analysis and determination of residual disinfectant, in each week the reservoir is in use. Northern Ireland Water should be confident that samples taken are representative of the water that leaves each service reservoir.
- 3.11 The Regulations define a service reservoir as any structure in which a reserve of treated water is contained and stored for the purposes of meeting a variable demand for the supply of water. The definition specifically excludes any structure at a water treatment works such as final water storage reservoirs.
- 3.12 The definition includes any temporary structure such as static tanks or tankers that are connected to the distribution system and are being used as service reservoirs. Accordingly, water from these structures should be sampled every week they are in use.

- 3.13 Break pressure tanks should not be designated as service reservoirs unless they are designed to provide strategic water storage. There is always a risk of ingress where the system is vented and Northern Ireland Water may be wise to conduct operational monitoring at break pressure tanks that do not provide strategic storage. Northern Ireland Water may have water retaining structures which are solely connected to further service reservoirs and do not supply consumers directly via distribution mains. If such water retaining structures contain strategic reserves of water, they should be classified as service reservoirs and sampled within the compliance sampling programme.
- 3.14 Where a service reservoir has more than one compartment with its own water inlet and outlet and the compartments are not connected hydraulically to any other compartments, then each compartment should be regarded as a single service reservoir. Sampling is required at the outlet main of each compartment unless the individual outlets subsequently combine into a single common outlet main. This is illustrated in the following schemata.

### Service Reservoirs - Schematic Plans



- 3.15 Where a service reservoir has more than one compartment but the compartments are hydraulically connected, then the connected compartments may collectively be regarded as a single service reservoir and be sampled accordingly. This is illustrated in the following schemata.



- 3.16 Where a service reservoir has a single common inlet and outlet main, Northern Ireland Water must have arrangements to ensure that samples are only taken when the main is acting as an outlet and the water quality is, therefore, representative of water that has been stored within the service reservoir. Where this is not practicable, alternative representative sampling arrangements should be made.
- 3.17 All service reservoir outlets should be fitted with metal sampling taps of a hygienic design which do not have attachments or inserts and which are made from materials complying with BS6920. Water should be supplied to the sampling tap through a sample line of a suitable material, which, if plastic, complies with BS6920. Sample lines should be kept as short as possible and the number of take-offs from the sample line should be kept to a minimum.

### **Other Sampling Arrangements at Water Treatment Works and Service Reservoirs**

- 3.18 It is not possible for this Guidance to describe all the possible arrangements for the siting of regulatory sampling points at water treatment works and service reservoirs. Where Northern Ireland Water is unsure about the number or siting of regulatory sampling points, it should submit details of its proposals to DWI for approval.

## PART IV

### MONITORING OF WATER SUPPLIES

#### Regulation 6(1) – Monitoring: Number of Samples

##### Monitoring: Number of Samples

- 4.1 Regulation 6(1) states that Northern Ireland Water shall take and analyse not less than the number of samples specified within the provisions of Part IV. Northern Ireland Water may programme and report more than the minimum number specified for any parameter to ensure that the minimum sampling and analysis requirement is met.
- 4.2 It is recognized that Northern Ireland Water may wish to carry out some additional sampling to provide additional information on the quality of water supplies. Northern Ireland Water may prefer to manage such monitoring within a separate non-compliance sampling programme, with individual samples identified by a separate sample reason code.
- 4.3 Northern Ireland Water may carry out sampling for both compliance and non-compliance purposes on the same sampling occasion provided that the samples taken are identified by separate unique sample numbers or other auditable process (with the appropriate sample reason).

#### Regulation 6(2) - Monitoring: General Provisions

##### Check and Audit Monitoring

- 4.4 Regulation 6(2), with reference to Table 1 of Schedule 3, sets out the criteria under which parameters should be monitored at check and audit frequency. These are:
  - (i) Parameters not listed in Table 1 must be monitored at audit frequency;
  - (ii) Parameters listed in Table 1 and with conditions specified in column 3 of the Table must be monitored at audit frequency, unless the conditions are met when they must be monitored at check frequency; and
  - (iii) Parameters listed in Table 1 that have no conditions specified must be monitored at check frequency.

The relevant frequencies are specified in Table 2 for water supply zones and Table 3 for supply points.

- 4.5 In practice this means that there are six parameters which can **either** be monitored at check monitoring frequency **or** at audit monitoring frequency, depending on the following circumstances.
- (i) **Aluminium and iron** are to be monitored at the lower audit monitoring frequency unless they are used as a flocculant or coagulant or the water originates from, or is influenced by surface waters, in which case the higher check monitoring frequency applies. The frequencies are specified in Table 2 of Schedule 3;
  - (ii) **manganese** is to be monitored at the lower audit frequency unless the water originates from, or is influenced by surface waters, in which case the higher check monitoring frequency applies. The frequencies are specified in Table 2 of Schedule 3;
  - (iii) ***Clostridium perfringens*** is to be monitored at the audit monitoring frequency unless the water originates from, or is influenced by surface waters, in which case the higher check monitoring frequency applies. Neither Table 2 nor Table 3 includes an audit frequency for *Clostridium perfringens*. The Inspectorate considers Northern Ireland Water should adopt the relevant audit frequency specified for other parameters listed in Table 2 for supply zones or Table 3 for supply points in respect of *Clostridium*. More information on this is set out in the DWI (E&W) Information Letter 16/2003 available from the website: [www.dwi.gov.uk/regs/infolett/2003/info1603.shtm](http://www.dwi.gov.uk/regs/infolett/2003/info1603.shtm)
  - (iv) **nitrite and nitrate** are to be monitored in water supply zones at the lower audit monitoring frequency unless chloramination is practised at the water treatment works, when the higher check monitoring frequency applies in the water supply zones. The frequencies are specified in Table 2 of Schedule 3. **In addition** there is a requirement to monitor for nitrite at the water treatment works, against the 0.1 mg/l standard. Nitrite is to be monitored at the water treatment works at the lower monitoring frequency (item 4 of Table 3) unless chloramination is practiced, in which case the higher monitoring frequency specified at item 16 in Table 3 applies; and
  - (v) Northern Ireland Water should consider undertaking additional operational monitoring at groundwater sources which have significant natural concentrations of iron/manganese.

## **Regulation 6(2) - Monitoring: General Provisions**

### **Monitoring for Pesticides – Monitoring Strategy**

- 4.6 It is not practical or necessary to monitor for every pesticide that is used within the catchment of a water source. The Drinking Water Directive recognizes this by noting that only those pesticides which are likely to be present in a given supply need to be monitored. The advice that follows assumes that Northern Ireland Water uses the option of sampling for pesticides at supply points, normally water treatment works, instead of in water supply zones.
- 4.7 To effectively implement the requirements of the Drinking Water Directive, Northern Ireland Water is required to develop a monitoring strategy for pesticides at each treatment works based on the likely risk of particular pesticides being present in the water source or sources from which water is abstracted for treatment at that treatment works. In developing a monitoring strategy, Northern Ireland Water is expected to:
- (i) assess, as far as is practicable, which pesticides are used in significant amounts within the catchment area of each water source;
  - (ii) assess, as far as is practicable on the basis of the properties and method of use of these pesticides, and local catchment knowledge, whether any of these pesticides are likely to reach each water source in the catchment area;
  - (iii) take into account the results of any monitoring for pesticides in water sources within the catchment area carried out by Environment and Heritage Service (Water Management Unit);
  - (iv) take into account the results of any operational monitoring of water sources or water supplies for pesticides carried out previously by Northern Ireland Water (or Water Service pre 1 April 2007); and
  - (v) take into account the results of the compliance monitoring of water supplies for pesticides carried out under the provisions of The Water Quality Regulations (Northern Ireland) 1994 (1994 Regulations).

- 4.8 On the basis of the strategy, the water leaving each treatment works (or supply point) should be monitored at the frequency specified in Table 3 of Schedule 3 to the Regulations, for each of the pesticides identified as likely to reach a water source from which water is abstracted to that treatment works. Where a treatment works has a treatment process installed to remove pesticides or reduce the concentration of pesticides, Northern Ireland Water must include in its monitoring strategy for that treatment works those pesticides for which the treatment process has been installed.
- 4.9 Aldrin, dieldrin, heptachlor and heptachlor epoxide must be included in the monitoring strategy for each treatment works unless Northern Ireland Water has convincing evidence that these pesticides are not detected in the water supplied from the treatment works. DWI recognizes that these pesticides have not had approved use for many years and that a monitoring programme for these pesticides may not be necessary. However, they can be persistent in the environment, and occasional detections in drinking water have occurred. If Northern Ireland Water is of the opinion that there is no need to monitor for these pesticides, it should submit to DWI a reasoned case, backed up with whatever data are available. Normally, this should include a minimum of three years' data from the most recent period when monitoring was conducted. The data must have a limit of detection well below the new standard. The frequency of monitoring should be at least that specified in the Regulations. Where appropriate, regulatory data can be supplemented by relevant operational data, or data from other organizations such as Environment and Heritage Service (Water Management Unit). More information is given in the DWI (E&W) Information Letter 8/2003 available from the website: [www.dwi.gov.uk/regs/infolett/2003/info0803.shtm](http://www.dwi.gov.uk/regs/infolett/2003/info0803.shtm)
- 4.10 If, at any time, Northern Ireland Water has any reasonable grounds for believing that a pesticide not included in its monitoring strategy for a particular works could be present at a concentration in excess of the standard, it must include that pesticide in its monitoring strategy for that works. It may also be appropriate and advisable for Northern Ireland Water to carry out operational monitoring for that pesticide in the water source or sources from which water is abstracted to the treatment works, in order to provide additional information about the behaviour of the pesticide.

- 4.11 Towards the end of each calendar year (by 31 October), Northern Ireland Water should review its monitoring strategy for each treatment works, using the guidance in paragraph 4.8 above. A particular pesticide may be omitted from the monitoring strategy if it has not been detected at significant concentrations in the water supplied from the works in the previous three calendar years' compliance monitoring under the 2002 Regulations. A pesticide for which a treatment process has been installed, can only be omitted from the monitoring strategy for that treatment works if Northern Ireland Water can show, from at least three years' operational monitoring of the water source or sources from which the water is abstracted, that the pesticide is no longer detected at significant concentrations in the water source or sources.
- 4.12 It is recognized that particular analytical methods for pesticides enable a suite of pesticides of similar chemical structure or properties to be determined. Northern Ireland Water may continue to monitor all the pesticides in the suite even if a particular pesticide could be omitted because it had not been detected in the previous three years.
- 4.13 The standards for pesticides apply at consumers' taps. However, regulation 8(1) allows Northern Ireland Water to monitor compliance with those standards by taking samples for pesticides from supply points because the results of the analysis of such samples are unlikely to differ in any material respect from the results of the analysis of samples taken from consumers' taps.

### **Regulation 6(3) - Monitoring: Sampling - Tankers**

#### **Monitoring: Sampling – Tankers**

- 4.14. Regulation 4(3) defines the point of compliance as the consumer's tap, or, in the case of water supplied by tanker, the point at which the water emerges from the tanker. Regulation 6(3) requires Northern Ireland Water to take samples from water tankers in specified circumstances. Within Northern Ireland, water is not normally distributed by tanker except on occasion for short term supplies associated with operational work or emergency provisions.
- 4.15 Regulation 6(3) does not apply to the use of tankers to fill service reservoirs. Northern Ireland Water should follow good operational practice for filling tankers and transporting water to service reservoirs, and weekly monitoring must continue at the service reservoir being supplied by the tanker.
- 4.16 For the purposes of these Regulations, water tankers are considered as any mobile water tank used to provide water supplies to consumers on a temporary basis, and include water bowsers. Water tankers should only be filled with wholesome water from a known source.

- 4.17 The Regulations require monitoring for *E. coli*, hydrogen ion and conductivity from each tanker that has been providing water for longer than 48 hours. Any tanker that has been providing water continuously for more than 96 hours must be sampled and analysed for full microbiological and chemical analysis. Further samples for full microbiological and chemical analysis must be taken every additional 48 hours that the tanker is in use. Provided tankers are collected or emptied before a 48 hour period has elapsed, there is no monitoring requirement. A tanker should only be filled and refilled with wholesome water.
- 4.18 In order to demonstrate that they have complied with these requirements, Northern Ireland Water should keep detailed records of the deployment of each tanker. These records should include: the material of the construction of the tanker or a reference that allows this to be determined; its cleaning; the source of the water used to fill it; the time of filling; the time of emptying; the time of refilling; and the source of water used to refill it. Not only will these records allow Northern Ireland Water to demonstrate that it has complied with the 48 hour and 96 hour sampling requirements specified in the Regulations, they will also provide valuable information necessary for the investigation of any failures that may occur.

#### **Regulation 6(6) - Monitoring: Copper, Lead and Nickel**

- 4.19 The Regulations require sampling of water supplies at the consumer's tap for copper, lead and nickel at the audit frequency specified in Table 2 of Schedule 3. Samples for these parameters must always be taken at consumers' taps. The sampling point should be selected from the random sampling programme and the sample should be the first one litre of water drawn from the tap without flushing.

#### **Regulation 6(7) – Monitoring: Radioactivity**

- 4.20 The Regulations require sampling of water supplies for the determination of radioactivity. Sampling is to be undertaken at the audit frequency specified in Table 2 or Table 3 of Schedule 3. Analysis is required for tritium as an individual radionuclide which is effectively a screening parameter for the presence of contamination by artificial radionuclides. Monitoring for total indicative dose (TID) is routinely achieved by analysis for gross alpha and gross beta activities, although it is calculated from the activities of individual radionuclides using the summation formula in the EC Guidance Document (see Appendix 4A). Calculation of TID is only required if any of the screening values for gross alpha, gross beta or tritium are exceeded. In many water supplies the gross beta activity is primarily due to the presence of potassium-40, a naturally occurring radioactive isotope of potassium. As potassium-40 is specifically excluded from the calculation of the total indicative dose,

it may be helpful to monitor for potassium alongside any monitoring for gross alpha and gross beta activity. [Note: For each mg/l of potassium, the beta activity due to potassium-40 is 0.03026Bq/l]. Appendix 4a contains the current advice from the European Commission. The paragraphs below and Appendix 4 contain guidance on how this advice should be implemented.

### **Routine Monitoring for TID (In Practice, Gross Alpha and Gross Beta Activity)**

4.21 Regulation 6(7) permits DWI to notify Northern Ireland Water that monitoring for radiological parameters is not required where the Inspectorate is satisfied that the water supply is well below the specification for the relevant parameters. The Inspectorate will inform Northern Ireland Water by **Notice** where it has been satisfied that there is sufficient information to establish that water supplies meet these criteria and there is no need for audit monitoring. Unless Northern Ireland Water has received a Notice under regulation 6(7) in respect of TID it must continue to monitor at its supply points (or in its zones) for gross alpha and gross beta at the relevant frequency.

4.22 Appendix 4 contains a flow chart which gives guidance on two key issues:

- (i) the need for statutory monitoring for total indicative dose; and
- (ii) how to respond to results for gross alpha and beta activity.

The flow chart attempts to deal with a variety of circumstances but does not attempt to specify the form of any more detailed analysis. This must be judged on a case by case basis. The flow chart does not apply to monitoring for tritium.

4.23 Where Northern Ireland Water considers that it may have met the requirements of Appendix 4 and has sufficient information to demonstrate that total indicative dose is well below the specification it may apply for a Notice under regulation 6(7). Details of how to apply are given in DWI (E&W) Information Letter 1/2005 which is available on the website: [www.dwi.gov.uk/reggs/infolett/2005/info0105.shtm](http://www.dwi.gov.uk/reggs/infolett/2005/info0105.shtm)

### **Monitoring for Tritium**

4.24 Monitoring of drinking water for tritium shall be necessary where a source of tritium is present within the catchment and it cannot be shown on the basis of other surveillance programmes or investigations that the level of tritium is well below its parametric indicator value of 100Bq/l. Where monitoring for tritium is required, it must be carried out at the audit frequency.

- 4.25 Tritium was included in the Drinking Water Directive on the basis that it provides an indication of other, potentially more harmful, artificial radionuclides discharged into the environment. In the UK, such discharges are subject to stringent controls and even where authorised discharges of artificial alpha and beta emitters occur within the water catchment, the concentrations of tritium are low and routinely below 10Bq/l.
- 4.26 In these circumstances, monitoring of tritium in drinking water would be a check on ongoing discharges of radioactivity to the environment. Environmental sampling programmes already exist, tailored to sample close to the source of discharges. Elevated concentrations of tritium have been associated with landfill leachates where the tritium probably derives from the disposal of gaseous tritium lighting devices and is not an indicator of other artificial radionuclides. In these cases, elevated gross beta activity has also been detected in the water, probably due to the presence of particulates and natural potassium-40. The relationship between tritium and landfill sites is best investigated by research projects rather than routine monitoring.
- 4.27 It is not considered necessary for Northern Ireland Water to carry out routine monitoring for tritium in drinking water sources unless there is evidence of elevated beta activity or Northern Ireland Water has reason to believe it may be significantly present. However, unless Northern Ireland Water has received a Notice under regulation 6(7) in respect of tritium it must continue to monitor at all of its supply points (or in its zones) at the relevant audit frequency. Where Northern Ireland Water considers it has sufficient information to demonstrate that tritium is well below the specification it may apply for a Notice under regulation 6(7). Details of how to apply are given in DWI (E&W) Information Letter 1/2005 which is available on the website:  
[www.dwi.gov.uk/regs/infolett/2005/info0105.shtm](http://www.dwi.gov.uk/regs/infolett/2005/info0105.shtm)

## **Regulation 7 - Sampling Points: Random Selection**

### **Random Selection of Sampling Points**

- 4.28 Regulation 7 requires all sampling points to be selected at random, except in relation to those parameters where monitoring from supply points has been authorised. Northern Ireland Water is expected to use a sampling programme that selects sample points at random from a comprehensive list of its consumers, including public buildings.
- 4.29 Northern Ireland Water's methods should ensure random selection from a consumer list to produce an individual target address or a sampling location such as a designated street or a designated postcode. If a sample cannot be obtained from the target sample address, a neighbouring property should be chosen and appropriate records amended accordingly. A check should **always** be made to

ensure that any alternative address is within the target water supply zone, **especially** when properties are close to the water supply zone boundaries.

- 4.30 DWI expects Northern Ireland Water to be able to obtain samples from randomly selected sample points in most circumstances. In **exceptional** circumstances, Northern Ireland Water may apply to DWI to use an alternative method of selection for sample points.
- 4.31 DWI is aware that Northern Ireland Water may have concerns regarding the security of samplers in some specific locations. Where Northern Ireland Water considers that these concerns prevent the implementation of sampling by random selection of sample points, it should provide DWI with information on its alternative method. DWI will indicate whether the alternative method is acceptable.

### **Regulation 8 - Authorisation of Supply Points**

- 4.32 The Drinking Water Directive permits the use of monitoring at supply point for parameters provided it can be demonstrated that there would be “no adverse change in the measured value” for the parameter between the supply point and the consumers’ taps. Under regulation 8(1) the Department automatically authorises the use of certain supply points for certain parameters. Under regulation 8(2) the Department has discretion to authorise supply points for other parameters, subject to certain criteria.
- 4.33 At any supply point, Northern Ireland Water should ensure that the sample points are fitted with metal sampling taps of hygienic design which do not have attachments or inserts, and which are made from materials complying with BS6920. They should be fitted in such a way as to ensure that the sample is representative of the water in the main.
- 4.34 When treatment works or service reservoirs are used as supply points they must be coded as supply points in the data returns for the applicable parameters.

## Regulation 8(1) – Automatically Authorised Supply Points

4.35 Regulation 8(1) authorises the use of supply points for monitoring specified parameters:

<i>Clostridium perfringens</i>	conductivity
benzene	boron
bromate	cyanide
1, 2 dichloroethene	fluoride
mercury	nitrite
pesticides and related products	trichloroethene and trichloroethane
tetrachloromethane	chloride
sulphate	total organic carbon
tritium	gross alpha and gross beta.

Since the level of nitrite can vary within the distribution system, it is the Inspectorate's view that Northern Ireland Water should not use supply point monitoring for nitrite in place for sampling zones against the 0.5 mg/l standard. Northern Ireland Water should continue to monitor at treatment works against the 0.1 mg/l standard.

4.36 Supply points authorized in the context of regulation 8(1) may be:

- treatment works
- service reservoirs (prior to supply to consumers)
- blending points.

4.37 A blending point means a point at which treated waters, originating from two or more sources, are combined under controlled conditions. In practice, blending is normally accomplished by the controlled mixing of treated waters in service reservoirs and specific sections of trunk main. The position of any sample tap at a blending point, used as a supply point, should be carefully selected to ensure that adequate mixing has taken place prior to the sample tap.

4.38 For any supply point used under regulation 8(1) Northern Ireland Water should be satisfied that there is no subsequent significant change in the value or concentration of the parameters between the supply point and consumers' taps.

4.39 Northern Ireland Water should apply the relevant monitoring frequencies in Table 3 of Schedule 3 and should remain on supply point monitoring for a full calendar year.

## Regulation 8(2) - Authorisation of Parameters for Supply Point Monitoring

- 4.40 Regulation 8(2) allows DWI to authorise sampling from either a supply point as specified in regulation 8(1) or another supply point instead of sampling points (consumers' taps), for parameters other than those specified in regulation 8(1). In this instance a supply point may be one of the types of point specified under regulation 8(1) or any other point.
- 4.41 Such authorisation will only be granted when DWI is satisfied that the results of the analysis of samples taken from the supply point are 'unlikely to differ in any material respect' for a particular parameter from the results that would be produced from the analysis of samples taken from sampling points. Where DWI authorises particular parameters to be monitored at supply points, the sampling frequency should be that applying to audit monitoring in Table 3 of Schedule 3. Northern Ireland Water should remain on supply point monitoring for a full calendar year unless the supply point authorization is revoked or modified.
- 4.42 In respect of the following parameters, it is unlikely that authorisation to sample from supply points will be given because the results may 'differ in a material respect':
- (i) **E. coli, coliform bacteria and colony counts** as these are likely to change in concentration through the distribution system;
  - (ii) **lead, copper, nickel and chromium** because these metals can be present from contact of the water supplied with plumbing materials;
  - (iii) **iron, manganese and aluminium** because these metals can be present in water leaving treatment works and picked up from deposits in the distribution system;
  - (iv) **polycyclic aromatic hydrocarbons and benzo (a) pyrene** because these substances can be present from contact of the water supplied with coal tar pitch linings within the distribution system;
  - (v) **colour, taste, odour and turbidity** because these characteristics of the water supply can be affected by the condition of the distribution system and consumers' plumbing systems;
  - (vi) **hydrogen ion** because this can change as the water passes through the distribution system, and by treatment equipment within consumers' premises;
  - (vii) **sodium** because this can increase when sodium hypochlorite is added during distribution and when treatment equipment is used within consumers' premises;

(viii) **ammonium and nitrite** because these concentrations are likely to change as the water passes through the distribution system due to microbiological reactions and when chloramination is practiced (see comment at paragraph 4. 35 above on nitrite);

(ix) **nitrate** should be sampled at the same time and place as nitrite because of the need to calculate the nitrate/nitrite formula; and

(x) **trihalomethanes** when the water supply originates from, or is influenced by surface water as the concentrations leaving the treatment works are likely to vary significantly as the water passes through the distribution system. Groundwaters are influenced by surface waters when water quality changes occur as a result of rainfall or changes in river flows.

4.43 Authorisation to sample from supply points could be considered in the following circumstances because the results may not differ in any 'material respect':

(i) **antimony, arsenic, cadmium and selenium** when Northern Ireland Water can demonstrate for a particular supply or supplies that these metals have not been detected at significant concentrations (significant would be >10% of PCV, e.g. for antimony with a PCV of 5.0µg/l, this would be values >0.5µg/l) in samples taken from consumers' taps for at least two years; and

(ii) **trihalomethanes** when the water supply zones are supplied with water that originates solely from groundwater and Northern Ireland Water can demonstrate that the concentrations at consumers' taps have been an average of 30µg/l or less for at least two years and not exceeded 50µg/l in that time.

4.44 The Regulations do not specify a supply point audit frequency for the parameters listed in paragraph 4.43. In the case where a supply point authorisation is granted for any of the parameters listed in paragraph 4.43 above, Northern Ireland Water will be expected to adopt the relevant supply point audit frequency specified for the other parameters, that is items 9-25 in Table 3 of Schedule 3.

4.45 The granting of an authorization under regulation 8(2) requires a written application from Northern Ireland Water. Guidance on how to apply is given in the DWI (E&W) Information Letter 9/2003 which is available at the website: [www.dwi.gov.uk/reg/infolett/2003/info0903.shtm](http://www.dwi.gov.uk/reg/infolett/2003/info0903.shtm).

## Regulation 9(1) - Monitoring: Numbers of Samples

- 4.46 Regulation 9(1) requires Northern Ireland Water to take the standard number of samples from its sampling points (consumers' taps) or, where appropriate, supply points for analysis for the parameters listed in Tables 2 and 3 of Schedule 3. The Inspectorate recognizes that this is a complex new sampling regime. The following examples are intended to illustrate the process for two or more complicated parameters, nitrite and nitrate. These cover the audit and check monitoring requirements outlined above at paragraphs 4.5 and 4.6. The output includes the monitoring for nitrite required at treatment works under regulation 13.

### **Example A**

A water treatment works, which practises chloramination, has an annual average output of 25,000 m<sup>3</sup>/d and supplies three water supply zones with populations of:

WSZ1 25,000                      WSZ2 35,000                      WSZ3 65,000.

#### Monitoring required at WTWs

Nitrite (against standard of 0.1mg/l) – 365 samples per annum  
(standard frequency)

#### Check monitoring required in water supply zones

Nitrite (against standard of 0.5mg/l) and nitrate (against standard of 50mg/l)

WSZ1 – 24 samples per annum (at standard frequency)

WSZ2 – 36 samples per annum (at standard frequency)

WSZ3 – 52 samples per annum (at standard frequency)

### **Example B**

A water treatment works, which does not practise chloramination, has an annual average output of 10,000 m<sup>3</sup>/d and supplies two water supply zones with populations of:

WSZ1 4,000                      WSZ2 56,000.

#### Audit monitoring required at WTWs

Nitrite (against standard of 0.1mg/l) – 8 samples per annum

#### Audit monitoring required in water supply zones

Nitrite (against standard of 0.5mg/l) and nitrate (against standard of 50 mg/l)

WSZ1 – 4 samples per annum

WSZ2 – 8 samples per annum

## Regulation 9(2) - Numbers of Samples: Reduced Frequency

### Reduced Frequency

- 4.47 Regulation 9(2) allows Northern Ireland Water to take a reduced number of samples for those parameters that are subject to check monitoring, provided specified conditions are met.
- 4.48 One of the conditions is that Northern Ireland Water is of the opinion that the quality of water supplied by it to a water supply zone is unlikely to deteriorate. Northern Ireland Water would be expected to take into account when reaching its opinion the following factors. Whether there:
- (i) has been any change in the activities within the catchment or the condition of the catchment which is likely to have an adverse effect on the quality of the raw water;
  - (ii) is any evidence of a general deterioration in the quality of the raw water, or the water supplied from the treatment works; and
  - (iii) is any evidence of a general deterioration in the quality of water as it passed through the distribution system to consumers' properties.
- 4.49 Another of the conditions is that the results of the analysis of samples in each of two successive years (or the results of the last 12 samples where fewer than this number have been taken in two years) show no significant variation, and, except for colony counts and pH value, the concentration or value is significantly lower than the prescribed concentration or value. The following paragraphs give guidance on specific parameters.
- (i) **Aluminium, ammonium, colour, conductivity, iron, manganese, nitrate, nitrite and turbidity** - a significant variation is when any result deviates from the arithmetic mean concentration or value, in either of the two years, (or in the results of the last 12 samples where fewer than this number have been taken in two years) by more than 20% of the prescribed concentration or value. For these parameters significantly lower is when all the values in each year (or in the results of the last 12 samples where fewer than this number have been taken in two years) are below 50% of the prescribed concentration or value.
  - (ii) **Taste and odour** - a reduced frequency can only be applied when all the results in the previous two years (or in the results of the last 12 samples where fewer than this number have been taken in two years) have been 1 dilution number.

- (iii) ***Clostridium perfringens* (including spores)** - a reduced frequency can only be applied when the organism has not been detected in any of the samples taken in the two years (or in the results of the last 12 samples where fewer than this number have been taken in two years).
- (iv) **Colony counts** - no significant variation and no abnormal change is when all the results obtained in the two years (or in the results of the last 12 samples where fewer than this number have been taken in two years) are within plus or minus one order of magnitude of the mean.
- (v) **Hydrogen ion** - no significant variation is when all the results for the pH value in the two years (or in the results of the last 12 samples where fewer than this number have been taken in two years) are within a spread of 1 pH unit. A reduced frequency cannot be applied when **any** result is below a pH value of 6.5 or above a pH value of 10.0.

### **Regulation 9(3) - Numbers of Samples: Regular Intervals**

#### **Regular Intervals**

- 4.50 Regulation 9(3) requires samples to be taken at regular intervals. Regular sampling means having a suitable spread of samples to detect possible variation in water quality. Variation could occur on long-term (seasonal) or more short-term (within a week or day due to operational changes) bases. The requirement for regular sampling does not mean that the sampling occasions have to be spread at exactly equal intervals.
- 4.51 For water supply zones, the most common sample frequencies are 12, 24 and 36 per annum. Samples should generally be taken at one, two or three times per month. It is important that there is a good spread between the sampling events. For sampling frequencies of 52 and 76 per annum, samples should be taken once and sometimes twice a week to meet the targets. Ideally, the day within each week that the sample is taken should be randomized. However, it is recognized that it may not be practicable to fully randomize the day of sampling. Where the sources of supply or operation of a works, service reservoir or zone are known to vary significantly over the period of a week, the sampling programme should be managed to ensure some variation in the day of the week in which the sample is taken.

- 4.52 For service reservoirs, samples should be taken in each week that the service reservoir is in operation. Ideally, the day within each week that the sample is taken should be randomized. However, it is recognized that it may not be practicable to fully randomize the day of sampling and, in such cases, the sampling programme should be managed to ensure some variation within the week in which the sample is taken.
- 4.53 If Northern Ireland Water fails to take or analyse a sample, through no fault of its own, it will be expected to reschedule a further sample as soon as possible. The resample should be taken well in advance of the next programmed sample. The Inspectorate considers that only in exceptional circumstances will it not be possible to resample in advance of the next programmed sample. Each case will be reviewed on its merits. Since the Regulations require the frequencies to be met on an annual basis, rescheduling does not constitute a shortfall. Provided the resampling is prompt, occasional occurrences of this type will not be regarded as a failure to meet the regulatory requirements.

## PART V

### MONITORING - ADDITIONAL PROVISIONS

#### Regulation 13 - Sampling at Water Treatment Works

- 5.1 Regulation 13(1) requires Northern Ireland Water to ensure that samples for *E. coli*, coliform bacteria, colony counts, residual disinfectant, turbidity and nitrite are taken at the required frequency from the point at which water leaves each water treatment works. The frequencies are set out in Table 3 of Schedule 3. All six parameters should be monitored at the flow related frequencies set out against items 1 to 6. In the event of chloramination not being practised, the frequency for nitrite should be that specified against item 16 rather than against item 4.
- 5.2 Regulation 13(2) provides for a reduced frequency of sampling for the colony counts parameter when there has been no significant increase in the counts in each of two successive years. Colony counts, particularly for surface water derived supplies, are likely to vary seasonally because of changes in quality and temperature. A significant increase should be regarded as a count which is more than one order of magnitude greater than that normally expected for the time of year the sample was taken for the works in question (for more detail on this, please refer to paragraph 4.49[iv] above).
- 5.3 Regulation 13(3) provides for a reduced number of samples for the coliform bacteria parameter and the *E. coli* parameter only when Northern Ireland Water is of the opinion:
- (a) that there is no foreseeable risk that the supply will exceed the maximum concentration for the parameter; or
- (b) that the treatment works is designed to secure that, in the event of a failure of the disinfection process, water that has not been disinfected cannot enter the supply.
- 5.4 In respect of 5.3 (a), Northern Ireland Water would be expected to take into account the following factors when reaching its opinion:
- (i) risk factors and activities in the catchment from which the water source is drawn;
  - (ii) the concentrations of the parameter in the raw water;
  - (iii) the nature and capability of the treatment processes at the works; and

(iv) the concentration of the parameter in the water leaving the treatment works over the previous two years.

5.5 In respect of 5.3(b), this requirement would be met when:

- (i) a treatment works automatically shuts down almost immediately after a disinfection failure is detected; or
- (ii) procedures are in place for a treatment works to be manually shut down almost immediately after an alarm is received warning of a disinfection failure.

5.6 It is unlikely that a reduced frequency could be applied to only one of the coliform bacteria or *E. coli* parameters.

5.7 Regulations 13(2) and 13(3) deal with the adoption of reduced frequency monitoring. Where there is a failure to meet the PCV or an exceedence of an indicator parameter value occurs at a treatment works where reduced frequency monitoring has been adopted, sampling should be increased to the standard frequency on a pro rata basis for the remainder of that year and the following two calendar years.

5.8 Sampling frequencies are normally based on the volume of water supplied in m<sup>3</sup>/day. Sampling frequencies should be based on the average daily output from the works during the previous calendar year, except where it is known that the current year's average daily output will be significantly different from the previous year's average daily output. Where there is more than one outlet at a works requiring separate sampling points (as explained in paragraph 3.8), the sampling frequency should be determined separately for each sampling point based on the average daily output at each point.

5.9 Normally, Northern Ireland Water would be expected to establish, prior to the start of the calendar year, its annual sampling frequency for each works based on the previous year's average daily output from the works, or the anticipated average daily output for the current year. Where a treatment works, whose output may vary considerably at different times of the year for extended periods, Northern Ireland Water should consider adjusting the frequencies in accordance with the average daily output for those periods.

- 5.10 Regulation 13(4) requires samples to be taken at regular intervals. For water treatment works, sampling frequencies may range from 2 to 2,190 per annum. A sample frequency of 365 per annum requires a sample to be taken on each calendar day of the year (and should include February 29 in each leap year). For sample frequencies in excess of 365 per annum, samples should be taken over as large a daily span as is possible. They do not have to be spread at exactly equal intervals but should be broadly spread to be representative of any potential changes in water quality during the day. There must be a mechanism to pre-determine the time of sampling.
- 5.11 For works on daily sampling, if Northern Ireland Water fails to take or analyse a sample through no fault of its own, it will be expected to reschedule a further sample for the same day if possible or the following day. On the following day the resample should be taken at a significant time interval before or after the sample programmed for that day. Since the Regulations require the frequencies to be met on an annual basis, rescheduling does not constitute a shortfall provided the resampling is as described above. An occasional occurrence will not be regarded as a failure to meet the regulatory requirement.
- 5.12 For sampling purposes, a treatment works is considered to be in service on every day (midnight to midnight) that any treated water is supplied from the works.

### **Monitoring: Analysis Using Monitors**

- 5.13 Regulation 16(3) extends the scope of the term “laboratory” to a person who may undertake analysis at the time and place at which the samples are taken. This allows the potential use of results from continuous water quality monitors for certain parameters, e.g. turbidity, conductivity and residual disinfectant.
- 5.14 In general, on-line monitors at water treatment works and service reservoirs may be used for regulatory analysis provided it can be shown that the particular monitor is:
- (i) capable of providing fit for purpose data (as defined in Regulation 16 of this Guidance);
  - (ii) sited to ensure that the results are representative of the water being supplied;
  - (iii) maintained and operated to a demonstrably high standard at all times;
  - (iv) calibrated in a way that is valid, appropriate and traceable;

- (v) subject to reliable quality checks at an appropriate frequency;
  - (vi) the date and time of each compliance reading is specified in advance of the start of the compliance year;
  - (vii) there is a traceable means of demonstrating that the recorded reading is a true reading of the instrument at that time; and
  - (viii) there are robust and effective means for sampling and analysis whenever the monitor is out of service or performing unreliably.
- 5.15 Existing monitors for total chlorine, free chlorine, turbidity and conductivity may be demonstrated as meeting requirements (i) and (ii) above by comparing results of analysis using the current regulatory method with the instrument readings at the times of sampling. Provided the difference between the means is not greater than 10% of the result or 5% of the PCV, whichever is the greater, and the 95% confidence interval for the difference of an individual pair of results (difference between paired instrument result and compliance method result) is not greater than 20% of the result or 10% of the PCV, whichever is the greater, the results will be acceptable. Not fewer than 20 pairs of results covering at least one year should be used for the comparison. Only installations which satisfy these requirements may be used.
- 5.16 Quality control checks should take the form of comparisons of instrument readings with results obtained using the compliance method at a frequency of 1 check for every 10 compliance results reported. For high frequency measurements, fewer checks may be carried out (up to 1 in 50) provided the suitability of the selected frequency can be demonstrated. A separate difference type control chart must be set up for each monitor, with standard rules of interpretation of the chart and action in the event of evidence of loss of control.
- 5.17 Fully documented and controlled procedures and records, to the standards required in laboratories, are requisite to demonstrate compliance with the other requirements. These records must be sufficient to satisfy the requirements of regulation 16(4).
- 5.18 Should Northern Ireland Water wish to use monitors for other parameters, or new types of monitors for any parameter, it must demonstrate that the monitor is capable of achieving all the performance requirements set out in the Regulations or, for chlorine and total organic carbon, the requirements set out in Appendix 1, A8.6 of the 2002 Regulatory Interim Guidance Document which is available from the website: [www.ehsni.gov.uk/interim\\_guidance\\_regs02.pdf](http://www.ehsni.gov.uk/interim_guidance_regs02.pdf) before demonstrating that all the other requirements are met. Only once this has been done can the monitor be used for compliance purposes.

- 5.19 Monitors, installations, staff training, procedures, records, results and all other relevant data will be subject to audit by the Inspectorate.

#### **Regulation 14 – Sampling at Service Reservoirs**

- 5.20 Regulation 14 requires Northern Ireland Water to take a sample from every reservoir every week it is in use. These samples must be analysed for coliform bacteria, *E. coli*, colony counts and residual disinfectant.
- 5.21 Ideally the day within each week that the sample is taken should be randomized. However it is recognized that it may not be practicable to fully randomize the day of sampling and, in such cases, the sampling programme should be managed to ensure some variation in the day of the week in which the sample is taken.
- 5.22 If Northern Ireland Water fails to take or analyse a sample through no fault of its own, it will be expected to reschedule a further sample for the same week. In exceptional circumstances, if a sample cannot be programmed the same week the Inspectorate may take a lenient view of the shortfall, provided the resample is scheduled for the following week on a day separate from and not consecutive to the day of the sample programmed for that week.

#### **Regulation 15 – Sampling New Sources**

- 5.23 Regulation 15 outlines the sampling requirement for:
- (i) sources that have not been used since 1 January 2004; and
  - (ii) sources that have not been used for a period of six months.

Those in category (i) must be sampled before they are put into supply and those in category (ii) must be sampled as soon as practicable after the source is put into supply.

- 5.24 The sampling for category 5.23(i) sources must include all the parameters in Schedules 1 and 2 to the Regulations and any other element, substance or organism likely to make the supply unwholesome. The sampling for category 5.23(ii) sources must include the parameters listed in Table A of Schedule 1, conductivity, hydrogen ion and turbidity, and any other parameter that Northern Ireland Water considers is likely to have changed since the supply was last used.

- 5.25 There is no regulatory requirement to sample sources which have been out of supply for less than six months when they are first used again. However, it would be prudent for Northern Ireland Water to carry out some operational monitoring for key parameters prior to the introduction of such sources, dependent on the time since the source was last in use and taking account of any risks perceived in the water safety plan.
- 5.26 Sources that have not been used for over six months but have been used after 1 January 2004 must be subject to limited monitoring after the return to supply. Again it may be prudent for Northern Ireland Water to conduct some operational monitoring of the source prior to the return to supply, though the Inspectorate recognizes that in an emergency situation this may not be possible.
- 5.27 Sources not used since 1 January 2004 must be subject to full monitoring prior to introduction of the supply.

#### **Regulation 16 - Collection of Samples**

- 5.28 Regulation 16 specifies the minimum quality requirements for the taking, handling, storage and analysis of samples taken for the regulatory monitoring of water supplies. These requirements are set out in regulations 16(2) and 16(5). Regulation 16(4) sets out the requirement for the retention of records to demonstrate that the sampling, transport, storage and analysis of each sample complies with the requirements. Other paragraphs cover definitions and the procedure for authorising the use of alternative methods for microbiological analysis.
- 5.29 This regulation does not apply to *Cryptosporidium* analysis for the purposes of Part VII of the Regulations. For the collection of *Cryptosporidium* samples, refer to paragraph 7.3.

#### **Regulation 16(2) – Collection and Analysis**

- 5.30 Subparagraphs 16(2)(a) and 16(2)(b) require that the sample is representative of the quality of the water being sampled at the time of sampling and that the sample is not contaminated when being taken. Subparagraph 16(2)(c) specifies that samples must be kept in conditions that will ensure that the sample does not deteriorate in any significant way between sampling and the commencement of analysis.
- 5.31 Northern Ireland Water, or its sampling contractor, should produce a comprehensive sampling manual setting out the procedures and precautions to be adopted for each parameter or group of parameters.

## **Sampling Manual for Microbiological Parameters**

- 5.32 As a minimum requirement, the sampling manual should include relevant information on the types of sample bottle, the preparation of sample bottles, the sampling procedures and the transportation of samples. Details of recommended sampling procedures are given in 'The Microbiology of Drinking Water 2002, Part 2.'

## **Sampling Manual for all Other Parameters**

- 5.33 The nature of parameters varies widely, and a range of sample containers, cleaning regimes, and methods of sample preservation and storage will be required. For example, mercury is highly volatile even at low temperatures, and requires the addition of preservative at the time of sampling. Polycyclic aromatic hydrocarbons react with chlorine and are light-sensitive and therefore require the immediate destruction of chlorine and storage in the dark. Other parameters are volatile or subject to biological degradation and require immediate refrigeration.
- 5.34 As a minimum requirement, the sampling manual should specify:
- (i) the types of bottles or containers, their closures and the purposes for which they are to be used;
  - (ii) where relevant, the cleaning procedure and shelf life for bottles, containers and closures used for each parameter, including the amount and type of preservative to be added;
  - (iii) the sampling procedure for each parameter, including the type of sample to be collected (e.g. first draw, flushed, stagnation) and the procedure for collecting samples for different parameters;
  - (iv) the order of sampling; and
  - (v) the conditions of storage and transport of samples and the maximum time that can elapse before analysis should commence for each parameter.
- 5.35 Further general information on sampling procedures is given in 'General Principles of Sampling and Accuracy of Analytical Results' in the series 'Methods for the Examination of Water and Associated Materials' published by the Standing Committee of Analysts. Detailed information for individual parameters or groups of parameters is given in the individual booklets in the same series.

## **Training of Samplers**

- 5.36 In order to carry out sampling correctly, it is essential that all samplers are fully trained and competent before they are allowed to work unsupervised. Northern Ireland Water or its sampling contractor should produce a comprehensive sampler training programme to cover all aspects of sampling.
- 5.37 Once trained, all samplers' performance should be monitored and subject to regular audit. Monitoring and audit procedures, and criteria for satisfactory performance, and policy on retraining, should be documented.
- 5.38 A training record should be produced for each sampler, detailing the training given, with dates and assessment of competence, results of any audits, any retraining or further training given and any re-assessment of competence.
- 5.39 Subparagraph 16(2)(d) requires that all samples are analysed as soon as possible after they have been taken, by and under the supervision of a competent person using suitable equipment.

## **Regulation 16(2)(d)(i) – Competent Person**

- 5.40 Regulation 16(2)(d)(i) of The Water Supply (Water Quality) Regulations (Northern Ireland) 2007 requires Northern Ireland Water to ensure that samples are analysed by or under the supervision of a person who is competent to perform that task.
- 5.41 UK wide guidance on the implementation of this regulation has been developed following dialogue between the UK Drinking Water Quality Regulators and a group of experts from laboratories undertaking drinking water quality analysis. The guidance detailed in the DWI (E&W) Information Letter 08/2007 should be followed by Northern Ireland Water in formulating its analyst training procedures and development programmes and should be implemented in line with the timescale included in the guidance. The guidance can be downloaded from the following link:  
[www.dwi.gov.uk/regs/infolett/2007/info0807.shtm](http://www.dwi.gov.uk/regs/infolett/2007/info0807.shtm)

## **Regulation 16 - Analysis of Samples**

- 5.42 Detailed advice on this part of the Regulations is given in Appendix 1 of the Interim Guidance Document to the Water Supply (Water Quality) Regulations (Northern Ireland) 2002 which is available on the website:  
[www.ehsni.gov.uk/interim\\_guidance\\_regs02.pdf](http://www.ehsni.gov.uk/interim_guidance_regs02.pdf)

## PART VI

### INVESTIGATIONS, AUTHORISATIONS OF DEPARTURES AND REMEDIAL ACTION

#### Regulation 17(1) – Investigations

##### Schedule 1 Parameters

- 6.1 A summary of the investigations for Schedule 1 parameters is given in Appendix 2. Note that where the Inspectorate agrees the exceedence is trivial and unlikely to recur, then no further action is necessary.
- 6.2 DWI will be notified electronically by Northern Ireland Water (Asset Management Directorate – Quality and Compliance/Environmental Regulation) of all contraventions of the standards for compliance monitoring, as soon as the result is known. This initial notification will be followed up with an investigation report that presents the cause and extent of the failure: whether there is confirmation that any remedial action identified has been satisfactorily completed, or that a date for completion of remedial action has been identified. The information reporting requirements are contained within Appendix 1.
- 6.3 In addition, regulation 33 (8 and 9) requires Northern Ireland Water to notify DWI regarding the occurrence of any event which gives rise, or is likely to give rise to a significant risk to health. Events and incident reporting procedures are contained within the Information Letter which is available from the Inspectorate's website:  
[www.ehsni.gov.uk/dwi\\_ni\\_information\\_letter\\_02\\_08\\_2007\\_regulation\\_33\\_event-incident\\_reporting.doc.pdf](http://www.ehsni.gov.uk/dwi_ni_information_letter_02_08_2007_regulation_33_event-incident_reporting.doc.pdf)
- 6.4 Regulation 17(1) requires that when Northern Ireland Water has reason to believe that the water supplied fails, or is likely to fail to meet the standards of wholesomeness specified in regulation 4 and Schedule 1, that it shall investigate the cause of that failure or likely failure. Similarly, regulation 17(3) requires Northern Ireland Water to investigate the cause of any failure or likely failure to meet the concentration or value specified in an authorisation.
- 6.5 The definition of a failure is clear. It is when the analysis of a sample taken as required by the Regulations exceeds a concentration or value specified for the parameters in Schedule 1 of the Regulations. However, the terms of "likely to fail" or "likely failure" are not defined in the Regulations.

- 6.6 Northern Ireland Water may have reason to believe that the water supplied is **likely to fail** in the following circumstances:
- (i) there is evidence from the analysis of samples taken as required by the Regulations that the trend in the concentration or value of a particular parameter is generally and steadily increasing (or decreasing) towards the prescribed concentration or value, and if that trend continues, the water will fail to meet the prescribed concentration or value in the future, say within five years. Such evidence may be available for the nitrate parameter, for example;
  - (ii) where no regulatory samples have exceeded the prescribed concentration or value for a particular parameter, but, there is evidence from the analysis of non-regulatory samples such as for operational control purposes\* or samples taken in response to consumer complaints or consumer requests, that the prescribed concentration or value has been breached; and
  - (iii) where no regulatory samples have exceeded the prescribed concentration or value for a particular parameter, but, there is evidence from the analysis of non-regulatory samples such as operational control purposes\* or samples taken in response to consumer complaints or consumer requests, that the concentration or value is generally and steadily increasing (or decreasing) towards the prescribed concentration or value, and if that trend continues, the water will fail to meet the prescribed concentration or value in the future, say within five years.

*\* Operational control samples mean all samples collected and brought into the laboratory for analyses, to check the quality of source water and to validate the operation of the water treatment works, the distribution network and the domestic distribution system.*

### **Regulation 17(2) - Failures Attributable to the Domestic Distribution System**

- 6.7 Regulation 17(2) requires Northern Ireland Water to investigate whether a failure to achieve the prescribed concentration or value may be attributable to the domestic distribution system or its maintenance, or neither.

6.8 Bacteriological parameters may be influenced by the condition of the domestic distribution system and particularly the design and hygienic status of the consumer's tap. Where a failure to achieve the prescribed concentration for enterococci and *E. coli* occurs, Northern Ireland Water should investigate the cause by taking further samples which may include:

- the original sample point;
- alternative consumer taps (only taps directly connected to the supply main) at the same property and at adjacent or nearby properties; and
- further sampling from related points upstream and downstream in the distribution main.

6.9 Additional information may be obtained by:

- reviewing the outcome of analysis from other samples that may have been taken from related water supply areas at a similar time to the original sample;
- taking a sample prior to and after disinfection of the consumer tap; and
- taking a swab sample from the surfaces of the tap that come in contact with the water supply.

6.10 The outcome of the further analysis provides important information on the likelihood that the failure to achieve the prescribed concentration is attributable to the domestic distribution system. There is a strong indication that the failure is attributable to the domestic distribution system in any of the following circumstances:

- (i) the failure to meet the prescribed concentration recurs at the original consumer's sample tap but all other samples meet the relevant prescribed concentrations;
- (ii) the failure to meet the prescribed concentration recurs in a sample taken before disinfection of the original consumer's sample tap but a sample taken following disinfection meets the relevant prescribed concentrations, and all other samples meet the relevant prescribed concentrations;

- (iii) the failure to meet the prescribed concentration does not recur at the original consumer's sample tap, but enterococci or *E. coli* are recovered from a swab sample taken from the surfaces of the tap, and all other samples meet the prescribed concentrations; or
  - (iv) the exceedence is clearly attributable to an upstream device, e.g. softener, filter or point of use treatment device or from some other unit connected to the domestic plumbing, e.g. washing machine or dishwasher.
- 6.11 Where Northern Ireland Water can demonstrate that failures to meet the prescribed concentrations for enterococci or *E. coli* were likely to be attributable to the domestic distribution system, then the individual results on the public record should be qualified by appropriate comments.
- 6.12 The quantitative standards for taste and odour are mandatory national standards and, consequently, failure to meet these standards must be investigated to determine the cause and extent of the failure. Where background levels of taste and odour are low and change levels are small, use of the Standing Committee of Analysts' dilution number method is appropriate. Most waters will exhibit no or very low taste and odour. Northern Ireland Water should establish the baseline level of taste and odour in each distribution system, including where appropriate the seasonal variations. Dilution number methods are not a useful technique if a qualitative assessment of an unexpected odour is required. All taste and odour customer complaint samples should receive qualitative taste and odour tests where appropriate, and additional tests should be undertaken to characterize the intensity and/or source of the taste or odour. As part of the investigation of the failure, Northern Ireland Water should carry out appropriate investigation of domestic plumbing to determine whether the domestic plumbing is the cause.
- 6.13 Failures to achieve the prescribed concentration for copper, lead and nickel at the consumer's tap are commonly associated with the domestic distribution system as the water interacts with copper or lead pipes (or solders) and brass fittings which contain nickel. Northern Ireland Water should investigate the extent of these interactions by taking additional 'unflushed' samples following defined periods of stagnation and collect further samples from nearby properties. Visual checks should also be carried out for any lead piping supplying the tap in case of a lead failure.

- 6.14 Failure to achieve the prescribed concentration for copper may occur in houses with new copper plumbing or where a significant amount of copper pipe has been replaced. Following a failure to achieve the prescribed concentration for copper, the domestic distribution system should be inspected to ensure that it meets the requirements of the Water Regulations (Northern Ireland) 1991.
- 6.15 Unless Northern Ireland Water can demonstrate that the failure to achieve the prescribed concentration for copper or lead was due to exceptional circumstances and was therefore unlikely to recur, regulation 17(9) requires Northern Ireland Water to modify or replace its pipes or fittings that have potential for contributing to copper or lead in the water supplied to the premises.
- 6.16 Between 25 December 2003 and 25 December 2013, the Regulations require Northern Ireland Water to modify or replace its pipework when a sample exceeds 25µg/l. In addition to these requirements, regulation 29 contains additional requirements for Northern Ireland Water regarding lead pipe replacement. Up until 25 December 2013, when a sample is between 10 and 25µg/l and a request is received from the consumer who has replaced his/her pipework; Northern Ireland Water is required to replace its pipework. The Inspectorate encourages Northern Ireland Water to continue to use its discretion to replace its lead pipework where a sample exceeds 10µg/l. After 25 December 2013, any sample that exceeds 10µg/l will require Northern Ireland Water to replace its pipework irrespective of whether or not the owner replaces his/hers.

Further guidance on the lead parameter is given in paragraphs 7.9 to 7.13.

### **Regulation 17(3) – Exceedence of Authorised Departure Value**

- 6.17 Where a departure has been authorised and a sample fails or is likely to fail to meet the concentration or value required by the authorisation, Northern Ireland Water shall immediately take steps as are necessary to identify the following:
- cause and extent of failure; and
  - whether failure is attributable to the domestic distribution, its maintenance or other reasons.

## **Regulation 17(5) – Notification of Failure, or Likely to Fail**

- 6.18 Regulation 17(5) requires Northern Ireland Water to notify the Department (in practice, DWI) **‘as soon as maybe after’** the investigations regarding the cause and extent of failure have been completed. The Inspectorate’s information requirements are contained within Appendix 1.

## **Regulation 17(6) - Notification to Consumers**

### **Notices to Consumers**

- 6.19 Regulation 17(6) requires Northern Ireland Water, when it has identified by its investigation that a failure is due to the domestic distribution system or to the maintenance of that system, to notify **‘affected’** consumers, in writing, of the nature of the failure and to relay steps (if any) that Northern Ireland Water or health authorities consider desirable for the consumers to take in the interests of their health. Northern Ireland Water should provide appropriate technical advice and may refer consumers to their local Environmental Health Officers or Health and Social Services Boards for advice on health matters. ‘Affected’ consumers are not defined in the Regulations. Where the failure is regarding lead, the Inspectorate has defined 'affected' as the number of properties as referenced by the last two letters of a postcode. For practical purposes, Northern Ireland Water should take into consideration the specific location circumstances of where the lead exceedence occurred and notify the ten most adjacent properties.

Where a sample has been collected for the purposes of mains rehabilitation zonal studies or for customer complaints/request purposes, and the sample exceeds, the ‘affected’ consumers requiring notification under these circumstances will be taken to mean the specific house where the sample was lifted.

- 6.20 The notification from Northern Ireland Water should inform the consumer in simple laymen’s terms of:
- (i) the parameter that has failed;
  - (ii) the concentration or value of that parameter in the sample taken from the consumer's premises;
  - (iii) the prescribed concentration or value of that parameter;
  - (iv) the significance of the failure (e.g. if Northern Ireland Water considers that advice on health matters should be sought); and
  - (v) the reason for the failure.

- 6.21 The notification must also inform the consumer of the steps he/she should take. These steps will depend on the nature of the parameter and the cause of the failure. Examples of the steps that Northern Ireland Water may consider are:
- (i) **failures of microbiological parameters**
    - if necessary, following discussion with health authorities, advise that water be boiled for drinking and food preparation.
    - a plumbing inspection may assist in the investigation.
    - where the failure is associated with an individual fitting, advise of repair or replacement of the pipework or fitting causing the problem.
  - (ii) **failures of the lead parameter (or other plumbing metals)**
    - advise drawing off the water standing in the pipework and using for purposes other than drinking or food preparation.
    - advise consideration of replacing the pipework within the premises contributing to the failure.
  - (iii) **failures of other parameters** are likely to be caused by ingress to the pipework within the consumer's premises (by permeation, leaking pipes or back siphonage)
    - if necessary, following discussion with health authorities, advise that water be boiled for drinking and food preparation, or not to use water for drinking and food preparation.
    - advise a plumbing inspection.
    - where the failure is associated with an individual fitting, advise of repair or replacement of the pipework or fitting causing the problem.

### **Regulation 18 – Investigations: Indicator Parameters**

- 6.22 A summary of the investigations for Schedule 2 Indicator Parameters is given in Appendix 3.
- 6.23 The Inspectorate will be notified electronically by Northern Ireland Water where the specification for indicator parameters has not been met, as soon as the result is known.
- 6.24 The information reporting requirements are contained within Appendix 1.

- 6.25 In addition, Regulation 33 (8 and 9) requires Northern Ireland Water to notify the Inspectorate of the occurrence of any event which gives rise, or is likely to give rise to a significant risk to health. Events and incident reporting procedures are contained within the Information Letter which is available from the Inspectorate's website:  
[www.ehsni.gov.uk/dwi\\_ni\\_information\\_letter\\_02\\_08\\_2007\\_regulation\\_33\\_event-incident\\_reporting.doc.pdf](http://www.ehsni.gov.uk/dwi_ni_information_letter_02_08_2007_regulation_33_event-incident_reporting.doc.pdf)
- 6.26 Regulation 18(1) requires Northern Ireland Water, when it has reason to believe that the water supplied does not meet the specification for indicator parameters, to investigate why the specifications were not met, whether the cause was the domestic distribution system or the maintenance of that system or neither. Such an investigation must be carried out when a sample, taken in accordance with the Regulations, does not meet the specification for an indicator parameter. Investigation should also be carried out when an operational sample or a sample taken to investigate a consumer complaint does not meet the specification for an indicator parameter.
- 6.27 Regulation 18(2) requires Northern Ireland Water '**as soon as maybe after**' its investigations are complete, to notify the Inspectorate of results of the investigations and whether the inability to meet the specification is likely to recur.
- 6.28 If a particular parameter for a particular water supply zone or group of water supply zones supplied by the same water treatment works does not meet the specification for indicator parameters, and Northern Ireland Water notifies the Inspectorate that it has not met the specification and the inability to meet it is likely to recur, then Northern Ireland Water needs not investigate nor notify on each subsequent occasion that the specification is not met, provided it is clear that the cause is the same and there are no changes in circumstances. If it is likely that the cause is different or there has been a change in circumstances, Northern Ireland Water must carry out the investigations and the notification. This paragraph only applies to those indicator parameters that are unlikely to be affected by the domestic distribution system or the maintenance of that system: chloride, *Clostridium perfringens* (including spores), conductivity, sulphate, total indicative dose (for radioactivity), total organic carbon (TOC), tritium (for radioactivity), and turbidity.

6.29 All occasions when the specifications for indicator parameters are not met at consumers' taps must be investigated. In particular, investigations for coliform bacteria or colony count failures must address whether the inability to meet the specification is due to the domestic distribution system or the maintenance of that system. When it is due to the domestic distribution system, Northern Ireland Water must notify the affected consumers and inform them of the nature of the problem and any steps that Northern Ireland Water or the health authorities consider desirable for the consumers to take in the interests of their health. Northern Ireland Water should provide appropriate technical advice and may refer consumers to their local Environmental Health Officers or Health and Social Services Board, for advice on health matters. For the microbiological parameters, that advice could be to boil water for drinking and food preparation and to get a plumbing inspection to identify the cause of the problem and to rectify that cause.

#### **Regulation 19 - Action by the Department (in practice, DWI)**

- 6.30 Where DWI is satisfied that a contravention is not trivial, and Northern Ireland Water has not taken, or initiated adequate action to prevent a recurrence, the Inspectorate will send Northern Ireland Water a letter indicating that consideration is being given to appropriate 'enforcement action'.
- 6.31 Regulation 19(1) permits DWI to require Northern Ireland Water to seek an Authorised Departure following a non-trivial failure in respect of a Schedule 1 parameter that is likely to recur. Authorised Departures are not permitted for the *E. coli* and enterococci parameters and DWI may serve a **notice** to Northern Ireland Water to take such steps (as may be determined) following non-trivial failures that are likely to recur.
- 6.32 DWI will proceed with a **notice** where the extent of any failure of any other Schedule 1 parameter constitutes a potential danger to human health.
- 6.33 Regulation 19(4) permits DWI to require Northern Ireland Water to take steps following a notification from Northern Ireland Water (under regulation 18[2]) that there is a continued inability to meet the specification of an indicator parameter. Steps only need to be taken where the inability to meet the specification poses a risk to health. DWI may consider it necessary to serve a **notice** under these circumstances.

6.34 Most indicator parameters do not have a direct influence on health but are included in the monitoring programme because they may indicate a problem, or potential problem with the treatment or distribution of drinking water. In all cases, exceedence of an indicator parameter value must be followed by an investigation by Northern Ireland Water. In many cases, a change in the level of indicator parameter may be more significant than the exceedence of a particular value. The nature of the raw water source in many cases may influence the significance of changes and exceedences of an indicator parameter specification or value.

- **Ammonium** (specification: 0.50mgNH<sub>4</sub>/l)

The presence of ammonium in raw waters is usually associated with organic contamination (animal waste and sewage) of surface waters or from the desorption of ammonium within anaerobic groundwaters. The exceedence of the indicator value in treated waters usually indicates that treatment of anaerobic groundwater or contaminated surface water has failed. The presence of ammonium in raw water may also compromise the efficiency of chlorination and, therefore, investigations into the exceedence of the indicator parameter value should include checks to establish the adequacy of disinfection. Unpleasant tastes and odours may be associated with high concentrations of dichloramine and trichloramine that may be caused by high concentrations of ammonium. In some cases, elevated concentrations of ammonium may be associated with cement-mortar pipe linings.

- **Chloride** (specification: 250mgCl/l)

The presence of chloride in raw waters results from diverse inputs which include leaching from soils, sewage or industrial discharges, run-off from de-icing and saline intrusion. In the latter two cases, there is also an associated increase in the concentration of sodium. Increased chloride content may also increase the aggressivity of water. In rare cases, increases in the concentration of chloride have been associated with contamination by sodium chloride used as a regenerant for the ion-exchange removal of nitrate. As the concentration of chloride increases above the indicator concentration, it is likely that there will be an increasing detection of taste by consumers. Typical taste thresholds are between 250 and 300 mg/l.

- ***Clostridium perfringens*, including spores** (specification: 0/100ml)

*Clostridium perfringens* are commonly found in human and animal faeces. As *Cl. perfringens* is generally present in faeces in much lower numbers than *E. coli* and enterococci, it is less sensitive as an indicator of faecal contamination. The spores of *Cl. perfringens* are capable of surviving for significantly longer periods than vegetative bacteria such as coliforms or enterococci. *Cl. perfringens* are removed from water by coagulation and filtration, but the spores of these bacteria can be resistant to chlorine at the concentrations normally used in water treatment. Low numbers may occasionally occur in water supplies but their presence (in the absence of other faecal indicators) does not represent a risk to health. The main value of monitoring for *Cl. perfringens* at a point where the water leaves the water treatment works is to assess the efficiency of the treatment process. The presence of *Cl. perfringens* in treated water derived from groundwaters could indicate bacteriological contamination of the source. A change in the number of *Cl. perfringens* in treated water against the normal range for that supply is more significant than the exceedence of a particular value. Investigations into the exceedence of the indicator value should include checks to establish the quality of the source and the adequacy of treatment.

- **Coliform bacteria** (specification: 0/100ml)

This indicator value applies only to samples taken at consumers' taps; the coliform parameters at treatment works and service reservoirs are mandatory national parameters. Coliform bacteria are a diverse group known to be present in soil, environmental waters and other environmental materials. Some members are also capable of growth in nutrient-rich water and biofilms. As a result they are not considered to be specific indicators of faecal contamination. A few members of the coliform group can be associated with human infection as opportunistic pathogens or as hospital acquired infections. Whenever coliforms are isolated from a drinking water supply, investigations need to be carried out to establish the source of contamination. Coliforms detected from samples taken within consumers' premises may be associated with domestic distribution systems such as kitchen taps and sinks. Other potential sources of coliforms in water supplies are sub-optimal operation of water treatment processes or ingress of contamination from breaches in the integrity of the distribution system (via hatches on service reservoirs, air valves, stop valves, cross connections and backsiphonage). In some cases additional information on the identity of coliform species present may prove useful in determining the sources and significance of the coliforms detected. Low numbers may occasionally occur in water supplies but their presence (in the absence of other faecal indicators) does not represent a risk to health.

- **Colony counts** (specification: no abnormal change)

Colony counts are enumerations of the general population of heterotrophic bacteria present in a water supply. In environmental waters these represent bacteria whose natural habitat is the water environment or those that may have been washed from soil or vegetation. It is well recognized that only a small fraction of the viable heterotrophic bacteria population is estimated by enumeration on nutrient rich media with incubation at 22°C and 37°C. However, monitoring of water supplies for colony count bacteria can be useful for monitoring trends in water quality and detecting potential sudden deterioration in water quality. The colony count at 22°C generally represents those bacteria naturally present in water and is not of sanitary significance. They may, however, be of greater relevance to the food and drinks industries where high numbers may impact on the quality of products. An increase in the colony count at 37°C can be a sensitive indicator of ingress and further investigations should be undertaken to establish the source. Colony counts may be useful in assessing the efficiency of water treatment and the cleanliness and integrity of the distribution system. In all cases the value of monitoring is to establish data which characterizes a water supply in terms of seasonal and longer term changes. Drinking water supplies derived from surface waters tend to support higher numbers of heterotrophic bacteria than those derived from groundwater sources. The onset of significant change in colony count results against the normal range established for that water supply is much more significant than the absolute values of individual results.

- **Conductivity** (specification: 2500 µS/cm at 20°C)

Conductivity is a measure of the extent of dissolved inorganic ions that are present. It is a non specific measurement although a high value may indicate an undesirable high concentration of ions. Increased values of conductivity in samples taken from consumer premises may indicate potential backflow or cross connections. A change in the concentration of conductivity against the normal range for that water supply is more significant than exceedence of a particular value. Further investigation and analysis is required to identify the predominant elements present. All of the significant individual elements have either standards or indicator values against which the need for action can be assessed.

- **Hydrogen ion** (specification: pH 9.5)

This parameter has in addition a mandatory maximum value of pH 10.0. DWI considers that 9.5 is an appropriate action value. Although a pH greater than 9.5 value may not pose a direct risk to health, it may, depending on the buffering capacity of the water, increase the solubility of metals and may adversely impact the aesthetic quality. Exceedence of the specification values may arise as a consequence of poor acid or alkali dosing control at treatment works or from the affects of cement mortar lined pipes.

- **Sulphate** (specification: 250 mgSO<sub>4</sub>/l)

High concentrations of sulphate may affect the taste of a water supply and there is also some evidence to suggest that it may have a laxative effect in vulnerable groups such as bottle fed infants. The Regulations require Northern Ireland Water to take further action to investigate the origin of the concentrations that exceed the indicator value. Northern Ireland Water should work closely with the local health authority to ensure that there are no risks to health.

- **Total organic carbon** (specification: no abnormal change)

Total organic carbon is a non specific index of the organic material in a water supply. The significance of an increase in the concentration of total organic carbon will require further investigation. In some cases the increase may be associated with increases in the concentration of assimilable organic carbon. As assimilable organic carbon provides a potential nutrient source for bacteria, Northern Ireland Water should investigate whether there is increased potential for the growth of biofilms.

- **Total indicative dose (TID)** (for radioactivity, specification: 0.10 mSv/year)

Where monitoring is being undertaken, the level of gross  $\alpha$  activity should be assessed against a screening level of 0.1 Bq/l and the level of gross  $\beta$  activity assessed against a screening level of 1 Bq/l. If either screening value is exceeded, additional analysis should be undertaken to establish which radionuclides are present. The range of radionuclides analysed should take into account relevant information on potential sources. The total indicative dose (TID) is then calculated from the individual isotope concentrations excluding any activity from tritium, potassium-40, radon and radon decay products. If the TID exceeds the indicator value of 0.10 mSv/year, appropriate medical advice should be sought. The specification for TID is expressed in terms of the dose over a year. In interpreting the results of radioactivity monitoring, it is necessary to take into account the variability of the

activity levels over time. Some water sources are likely to show seasonal variation due to natural processes. In addition, any short term increase in radionuclides that may results from radiological incidents should be assessed against guidance for food and liquids within Guidance published by the former Department of the Environment (Civil Emergencies involving radioactive substances). See also paragraphs 4.21-4.23 and Appendices 4 and 4A.

- **Tritium** (specification: 100 Bq/l)

Tritium is naturally present in the environment but only at very low concentrations. Tritium can be an indication of contamination from artificial sources, and Northern Ireland Water should take actions to investigate the source of any exceedence of the indicator value. If the indicator value is exceeded, additional analysis should be undertaken to establish which isotopes are present and the total indicative dose calculated from the individual isotope concentrations. If the total indicative dose exceeds the indicator value of 0.10m Sv/year, appropriate medical advice should be sought. The specification for total indicative dose is expressed in terms of the dose over a year. In interpreting the results of radioactivity monitoring it is necessary to take into account the variability of the activity levels over time. Some water sources are likely to show seasonal variation due to natural processes. In addition, any short term increase in radionuclides that may results from radiological incidents should be assessed against guidance for food and liquids within Guidance published by the former Department of the Environment (Civil Emergencies involving radioactive substances). See also paragraphs 4.24-4.27 and Appendices 4 and 4A.

- **Turbidity** (specification: 1 NTU)

The indicator value only applies at water treatment works. For this parameter there is in addition a mandatory maximum value of 4 NTU that applies at the consumer's tap. Exceedence of the indicator parameter value does not represent a direct risk to human health.

The World Health Organization has issued guidance on the level of turbidity required to allow satisfactory disinfection. Significant increase in the level of turbidity at the water treatment works may compromise the effectiveness of disinfection. There should be sufficient preliminary treatment\* to prepare raw water for disinfection.

*\* Preliminary treatment is defined in terms of particle removal (<1 NTU) and in terms of the need to remove any specific substance, property or element which would interfere with the performance of disinfection.*

The importance of optimizing the operation of water treatment works to effectively remove *Cryptosporidium* oocysts has been identified by the Expert Groups on *Cryptosporidium* in water supplies. An important element of this is controlling the effectiveness of particle removal by reference to the turbidity of filtered and final waters. DWI considers that any exceedence of the indicator value at a treatment works should initiate an investigation into the cause, in line with the recommendations in the reports of the Expert Groups on *Cryptosporidium* in water supplies.

- 6.35 A summary of the investigations for Schedule 2 indicator parameters is given in Appendix 3.

### **Regulation 20 – Authorisation of a Temporary Supply of Water that is Not Wholesome**

- 6.36 Regulation 20 allows the Department (in practice, DWI) to authorise a departure from the provisions of Part III of the Regulations upon written request from Northern Ireland Water. Authorised Departures are only applicable for parameters in Part II of Table A and Table B in Schedule 1. In practice, this means Authorised Departures will not be granted for *E. coli*, enterococci or indicator parameters at customers' taps.
- 6.37 Authorised Departures can only be granted subject to criteria set out in Regulation (20)(2). One of these is that the Department (in practice, DWI) must be satisfied that the Departure does not constitute a risk to human health. The Inspectorate will consider applications on a case by case basis. It will seek medical advice from the Chief Environmental Health Officer (DHSSPS) and will have due regard to representations made by local authorities who have knowledge of the local community and have responsibility to protect its health.
- 6.38 The information that shall be provided with an application for an Authorised Departure is detailed in regulation 20(3). An application form and notes on its completion are on the Inspectorate's website: [www.ehsni.gov.uk/water/drinkwater/public\\_water/improvement\\_programmes.htm](http://www.ehsni.gov.uk/water/drinkwater/public_water/improvement_programmes.htm) Northern Ireland Water may submit additional information in support of its case should it wish. Such information should include the likely maximum concentration, details of the time period of the exceedence (for example, if seasonal), details of any vulnerable consumers affected and the outcome of any discussions with the health authority. The Inspectorate expects Northern Ireland Water to be actively engaged with the appropriate health authorities in advance to allow the authorities to assess any risk to the health of the communities in their care. Equally, the Inspectorate is happy to discuss draft applications with Northern Ireland Water before the formal application is made.

- 6.39 The formal application must be copied to every appropriate district council and Health and Social Services Board, who have 30 days to make any representations on the application. In its covering letter to these bodies, Northern Ireland Water should remind them that they have 30 days to make representations and advise them of the contact within the Inspectorate who is dealing with the case.

### **Regulation 21 – Authorisations: Terms and Conditions**

- 6.40 Where the Department (in practice, DWI) considers that the failure to meet the prescribed concentration is trivial and that the PCV will be met within 30 days a shortened application as specified in regulation 21(4) is required. The period of 30 (working) days begins with the day on which the parameter was contravened: this means in effect, the date that the sample was collected.
- 6.41 An Authorised Departure may be granted for a maximum of three years and in each case will specify the extent to which any parameter may depart from the PCV specified in Schedule 1. In line with the Directive, the Inspectorate's approach will be to issue the Departures for as short a period as is reasonably required to complete the associated programme of work. The Inspectorate's general view is that in most cases it will be possible to restore a wholesome water supply within three years. In general, long term schemes such as distribution programmes are being dealt with through 'undertakings'.
- 6.42 Regulation 21(5) allows the Department (in practice, DWI) to authorise a further Departure again for up to a maximum of three years. It is only envisaged that this provision will be used in exceptional circumstances. A third Departure can be granted under regulation 21(7) but only with the approval of the Commission.

## PART VII

### WATER TREATMENT

#### Regulation 25 – Interpretation

- 7.1 The interpretation confirms that ‘surface water’ does not include water from a spring. In the context of regulation 26, a spring is regarded as underground water arising at the surface, under its own head, at the outcrop of the junction between impermeable and permeable strata. The quality of water from springs can be variable. Water derived from springs that issue from deep-seated aquifers can be of good quality, while water arising from perched water tables or supported by fissure flows is more variable.

#### Regulation 26 – Treatment of Raw Water

- 7.2 The current regulation 26 defines water treatment by reference to the Surface Water Abstraction Directive which is repealed by the Water Framework Directive. As a consequence, the categories of water for abstraction and treatment in regulation 26(3) and (4) became obsolete with effect from 22 December 2007. The Inspectorate expects Northern Ireland Water to liaise with Environment and Heritage Service’s Water Management Unit, Freshwater Monitoring and Assessment Team regarding the raw water monitoring requirements of The Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003.

#### Regulation 27 - Risk Assessment for *Cryptosporidium*

- 7.3 Regulation 27 introduces a requirement for Northern Ireland Water to undertake an annual risk assessment at all of its water treatment works which are intended to be used to supply water for regulation 4(1) purposes. Northern Ireland Water is required to submit to DWI by 1 October each year, a report of that assessment which sets out the results of the assessment and a statement that the assessment established that there is a significant risk from *Cryptosporidium*, or that there is no such risk. The risk assessment should be undertaken according to the Guidance on assessing the risk from *Cryptosporidium* oocysts in treated water supplies, to satisfy the ‘Guidance for Monitoring of *Cryptosporidium* in Treated Waters in Northern Ireland, May 2002, Revised February 2003’ which is available on the website: [www.ehsni.gov.uk/water/drinkwater/public\\_water/regulations-2/technical\\_guidance.htm](http://www.ehsni.gov.uk/water/drinkwater/public_water/regulations-2/technical_guidance.htm)

## ***Cryptosporidium* Monitoring Requirements**

- 7.4 Monitoring requirements to establish the concentrations of *Cryptosporidium* oocysts are contained within the Guidance Document. Details of the approved collection devices, approved sampling equipment, approved analysis and approved laboratories are given in the Guidance Document in the Standard Operating Protocols (SOPs). The DWI for England and Wales maintains these protocols, and the most recent versions of the SOPs are available on the website: [www.dwi.gov.uk/regs/crypto/amendments.htm](http://www.dwi.gov.uk/regs/crypto/amendments.htm)

## ***Cryptosporidium* Reporting Requirements**

- 7.5 Northern Ireland Water is required to notify DWI of the results of *Cryptosporidium* monitoring in accordance with the reporting procedures contained within the Guidance Document.

## **Regulation 28 - Procedure Following Risk Assessment**

- 7.6 Regulation 28 details the process following the risk assessment. Should the Department (in practice, DWI) consider the risk assessment unsatisfactory, Northern Ireland Water shall be notified and required to submit a further risk assessment report by a specified date.

## **Regulation 29 - Contamination from Pipes**

- 7.7 Regulation 29 deals with contamination of the water supply by copper or lead as a result of the supply and domestic pipework. Further guidance on the way in which Northern Ireland Water should develop their plumbosolvency (and cuprosolvency, if appropriate) treatment and control strategies has been provided in a DWI NI letter to Water Service (15 February 2001) which incorporates the DWI for England and Wales Information Letters 12/2000 and 3/2001. These are available on the website: [www.dwi.gov.uk/regs/infolett/2000/info1200.htm](http://www.dwi.gov.uk/regs/infolett/2000/info1200.htm) and [www.dwi.gov.uk/regs/infolett/2001/info0301.htm](http://www.dwi.gov.uk/regs/infolett/2001/info0301.htm). The risk (the prescribed risk) relates to the supply of water to any individual premises and arises when copper or lead is the major component of the service pipe.
- 7.8 Regulation 29(4) requires Northern Ireland Water to modify or replace its part of any lead service pipe when it has reason to believe that the concentration of lead at the consumer's tap exceeds 10µg/l. Between 25 December 2003 and 25 December 2013, the Regulations require Northern Ireland Water to modify or replace its pipework when a sample exceeds 25µg/l. In addition to these requirements, regulation 29 contains additional requirements for Northern Ireland Water regarding lead pipe replacement. Up until 25 December 2013, when a sample is between 10 and 25 µg/l and a request is received from the

consumer who has replaced his/her pipework, Northern Ireland Water is required to replace its pipework. The Inspectorate encourages Northern Ireland Water to continue to use its discretion to replace its lead pipework where a sample exceeds 10µg/l. After 25 December 2013, any sample that exceeds 10µg/l requires Northern Ireland Water to replace its pipework, irrespective of whether the owner replaces his/hers or not.

### **Further Guidance on the Lead Parameter**

- 7.9 Regulation 17(9) applies to failure of the lead standard in force at that time. On that basis, the trigger for action under this regulation relates to 25µg Pb/l until 25 December 2013, at which time the trigger will reduce to 10µg Pb/l.
- 7.10 Any compliance, random daytime survey or samples taken specifically at the request of consumers, but excluding samples taken for research or operational purposes, particularly those involving stagnation sampling techniques, which exceeds 25µg Pb/l at a consumer's tap should trigger the obligation to replace lead communication pipes.
- 7.11 Where a relevant sample is taken which triggers a potential obligation under regulation 17(9), a simple follow-up investigation should occur. This would include as a minimum:
- (i) a check to see whether a Northern Ireland Water lead communication pipe is present;
  - (ii) identification of any special factors, e.g. very long consumer lead pipe; and
  - (iii) a repeat sample based on either random daytime sampling or 30 minutes Stagnation, as deemed appropriate in the circumstances.
- 7.12 If the second sample also exceeds 25µg Pb/l or there are particular high risk factors which mean that 25µg Pb/l is likely to be exceeded in the future then Northern Ireland Water will undertake the following actions:
- (i) institute a replacement of its part of the lead service pipe; and
  - (ii) notify the customer of the situation in writing.
- 7.13 Immediate action will not be required if the lead communication pipe to that property is scheduled to be replaced as part of an agreed strategic programme within the next three months, or where a mains rehabilitation programme is planned within the next three months and any lead communication pipes would be replaced as part of that work.

## **Regulation 30 - Application and Introduction of Substances and Products**

- 7.14 Regulation 30 specifies the circumstances in which Northern Ireland Water may apply or introduce substances or products into water supplied for drinking, washing, cooking or food preparation. Paragraphs (3) and (3)(a) refer to appropriate CE marking and other appropriate European technical specifications. Paragraph (3)(b) lists equivalent national measures that may be considered in the absence of European specifications. Paragraph (3)(i) requires Northern Ireland Water to adhere to national conditions of use that apply to substances and products applied or introduced under (3)(a) and (b). Paragraph (3)(ii) confirms that the UK will comply with the requirements of the 98/34/EC Directive – The Technical Standards and Regulations Directive on the notification of national conditions of use as new technical requirements.
- 7.15 Regulation (30)(2) provides for the use of substances and products approved by the Secretary of State under regulation 31(4) of the Water Supply (Water Quality) Regulations 2000, which apply in England and Wales (and subsequently the Water Supply (Water Quality) Regulations 2000 (Amendment) Regulations 2007). The Drinking Water Inspectorate for England and Wales provides a technical resource to approve nationally the use of chemicals and ‘materials of construction’. The list of approved chemicals and products is available as the Secretary of State’s list which can be obtained from the website: [www.dwi.gov.uk/31/approvedproducts/soslist.shtm](http://www.dwi.gov.uk/31/approvedproducts/soslist.shtm)

For further information on the approval of products, please refer to the Drinking Water Inspectorate for England and Wales website: [www.dwi.gov.uk/31/approvedProducts.shtm](http://www.dwi.gov.uk/31/approvedProducts.shtm)

## **Regulation 31 - Use of Processes**

- 7.16 Regulation 31 provides for the Department (in practice, DWI) to give notice to Northern Ireland Water, requiring it to make an application for approval of any process. The notice may also prohibit use of the process for a specified period. Regulation 31 also provides for attaching conditions to an approval and for revocation of approval and modification of conditions of approval and publication of a list of approved processes.

The Drinking Water Inspectorate for England and Wales no longer approves the use of processes. Further information is provided in DWI (NI) Information Letter 03/08 which is available from the website: [www.ehsni.gov.uk/dwi\\_info\\_letter\\_03-9.pdf](http://www.ehsni.gov.uk/dwi_info_letter_03-9.pdf)

## PART VIII

### RECORDS AND INFORMATION

#### Regulation 32 - Maintenance of Records

- 8.1 Regulation 32 details the information to be provided in the public record. The public record, which may be in hard copy or electronic format, should be made available to the public within at least one of the Northern Ireland Water's offices, at reasonable office hours. The entries for the results of compliance analysis should be reported in the units of the Regulations.

#### Regulation 33 - Provision of Information

- 8.2 Regulation 33 specifies the information to be supplied to the appropriate district council. The regulation requires Northern Ireland Water to provide information on the results of analysis of samples taken from water treatment works, service reservoirs, supply points and water supply zones that relate to the quality of water supplied to premises in the district council's area.
- 8.3 Information should be provided as a summary for each water treatment works, service reservoir, supply point and water supply zone. The format of information is not specified and Northern Ireland Water is encouraged to liaise with its respective local authorities to develop systems of reporting that are acceptable. It is envisaged that Northern Ireland Water may agree to supply the information in either hard copy or an agreed electronic format. Details of the type of information required by regulation 33 are summarized in Appendix 5.
- 8.4 In order to facilitate the interpretation of the information provided for supply points, Northern Ireland Water should provide details of the relationships between the supply points and the water supply zones to which they relate.
- 8.5 The need to report the mean concentrations for microbiological parameters has not been retained in the Regulations. This would facilitate the use and reporting of presence/absence testing for microbiological parameters at weekends and bank holidays.

## **Regulation 34 - Publication of Information**

- 8.6 Regulation 34 specifies the information to be provided in the annual report. The format of the report is not specified to allow Northern Ireland Water to adopt reporting formats that are readily informative. DWI considers that making the report accessible in an electronic format may fulfil the requirement for publication. The regulation also requires copies of the report to be sent to the relevant local authorities. DWI considers that copies of the report could be sent in electronic format.
- 8.7 In contrast to the information to be provided to district councils, the annual report is a summary of the total numbers of samples taken at all water treatment works, all service reservoirs, all supply points and all water supply zones. It should also include the number and percentage of samples that fail to meet the relevant PCV and the value specified in an Authorised Departure. In the case of indicator parameters, the number of samples that exceed the indicator parameter value shall be recorded. Details of the type of information required by regulation 34 is summarized in Appendix 6.

**INFORMATION REQUIREMENTS RELATING TO EXCEEDENCE NOTIFICATION AND INVESTIGATION REPORTING, MONTHLY COMPLIANCE REPORTING AND OTHER REPORTING MATTERS**

***Definitions:***

‘the 2007 Regulations’ – means The Water Supply (Water Quality) Regulations (Northern Ireland) 2007.

‘compliance samples’ – means all samples lifted for compliance monitoring purposes as contained within Schedules 1 and 2 to the 2007 Regulations.

‘operational control samples’ – means all samples collected and brought into the laboratory for analyses to check the quality of source water and to validate the operation of the water treatment works, the distribution network and the domestic distribution system.

‘non-regulatory samples’ – means all operational samples, consumer complaint samples and samples lifted as part of the mains rehabilitation zonal studies.

‘Northern Ireland Water’ (NIW) - means the board level contact (Asset Management Directorate) or person otherwise designated by NIW.

**1 Provision of Information Where a Standard has Been Contravened**

**1.1 Immediate Notification Requirements Once a Standard has Been Contravened for Compliance Monitoring Purposes**

Northern Ireland Water shall, in respect of any samples taken under Parts IV and V of the 2007 Regulations, which exceed the prescribed concentration or values of any parameter listed in Schedule 1 or the specification of any indicator parameter listed in Schedule 2, or where an Authorised Departure value granted under Part VI of the 2007 Regulations has been exceeded, provide the Drinking Water Inspectorate with a report of the exceedence (no later than 3 working days after the result is known) with the following information:

- (a) the site reference and identifier number from where the sample was taken (water supply zones, service reservoirs/water towers, water treatment works and water supply points);
- (b) location address where the sample was taken from a water supply zone;
- (c) the potential population affected (or number of properties);

- (d) the date the sample was taken;
- (e) sample reference number;
- (f) the parameter concerned;
- (g) the numerical result;
- (h) the units of measurement; and
- (i) whether the sample point refers to a supply point.

## **1.2 Provision of Exceedence Investigation Information Relating to Non-compliance with the 2007 Regulations**

Northern Ireland Water shall, in respect of any samples taken under Parts IV and V of the 2007 Regulations, which exceed the prescribed concentration or values of any parameter listed in Schedule 1, or the specification of any indicator parameter listed in Schedule 2, or where an Authorised Departure value granted under Part VI of the 2007 Regulations has been exceeded, provide the Drinking Water Inspectorate with a report **'as soon as maybe after' (no later than 20 working days)** the investigations have been carried out, of the exceedence with the following information:

- (a) site reference and identifier number from where the sample was taken;
- (b) sample reference number;
- (c) details of the investigations carried out under Part VI of the 2007 Regulations;
- (d) Northern Ireland Water's opinion whether the exceedence is likely to recur; and
- (e) details of the remedial/corrective action which Northern Ireland Water intends to take, or has taken to effect compliance.

### **1.3 Provision of Monthly Exceedence Information Relating to Non-regulatory Samples**

Northern Ireland Water is required to provide monthly information relating to non-regulatory sample exceedence reporting (such as for operational control, consumer complaints and mains rehabilitation zonal studies) in respect of any parameter listed in Schedule 1 or the specification of any indicator parameter listed in Schedule 2, on or before 21 March 2008 for samples taken during January 2008 and on the 21<sup>st</sup> day of each subsequent month.

The monthly summary report should provide the following information:

- (a) site reference and identifier number;
- (b) location address where the sample was taken from a water supply zone;
- (c) the date the sample was taken;
- (d) sample reference number;
- (e) the parameter concerned;
- (f) the numerical result;
- (g) the units of measurement; and
- (h) whether the results exceeded an authorisation under Part VI of the 2007 Regulations.

### **1.4 Provision of Exceedence Investigation Information Relating to Non-regulatory Sample Reporting**

In relation to non-regulatory sample exceedences, Northern Ireland Water is required to provide the Drinking Water Inspectorate with a report of the investigations that have been carried out of the exceedence, with the following information:

- (a) site reference and identifier number;
- (b) sample reference number;
- (c) details of investigations carried out under Part VI of the 2007 Regulations; and
- (d) Northern Ireland Water's opinion as to whether the exceedence is likely to recur.

## **2 Provision of Monthly Summary Information Relating to all Compliance Samples (Schedule 1 and Schedule 2 Parameters)**

Northern Ireland Water is required to provide monthly summary information relating to all compliance samples in respect of any parameter listed in Schedule 1, or the specification of any indicator parameter listed in Schedule 2, on or before 21 March 2008 for samples taken during January 2008 and on the 21<sup>st</sup> day of each subsequent month. The details required in the monthly summary report are contained in Appendix 6.

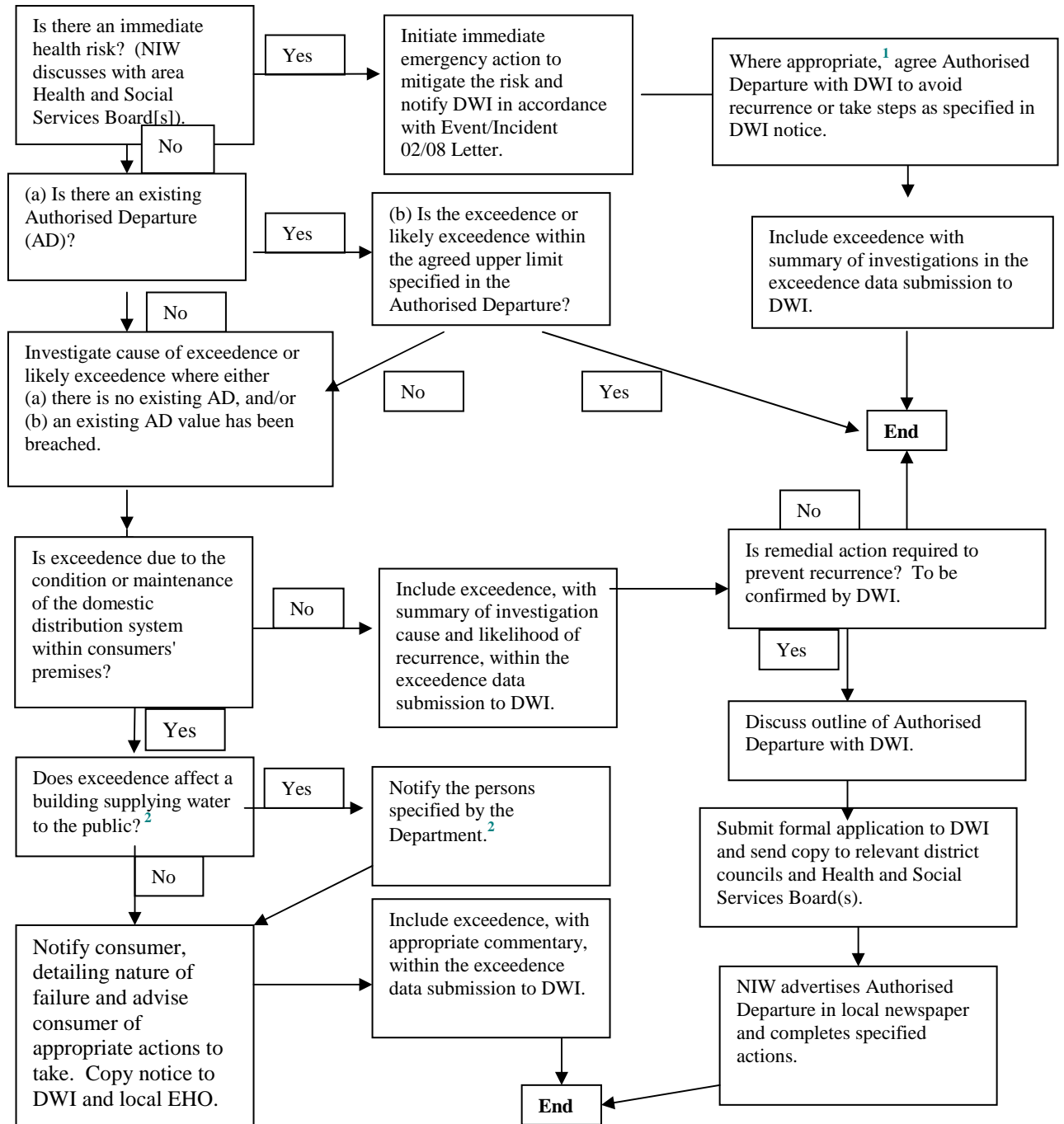
## **3 Provision of Information Relating to Compliance with Regulations 33 (8 and 9)**

### **Events/Incident Samples**

Northern Ireland Water is required to provide the information as required in the Guidance Letter 'Information to be Provided in Initial and Final Reports on Water Quality Events and Other Matters – Regulation 33 (8 and 9)'. This Information Letter is available on the Inspectorate's website:

[www.ehsni.gov.uk/dwi\\_ni\\_information\\_letter\\_02\\_08\\_2007\\_regulation\\_33\\_event-incident\\_reporting.doc.pdf](http://www.ehsni.gov.uk/dwi_ni_information_letter_02_08_2007_regulation_33_event-incident_reporting.doc.pdf)

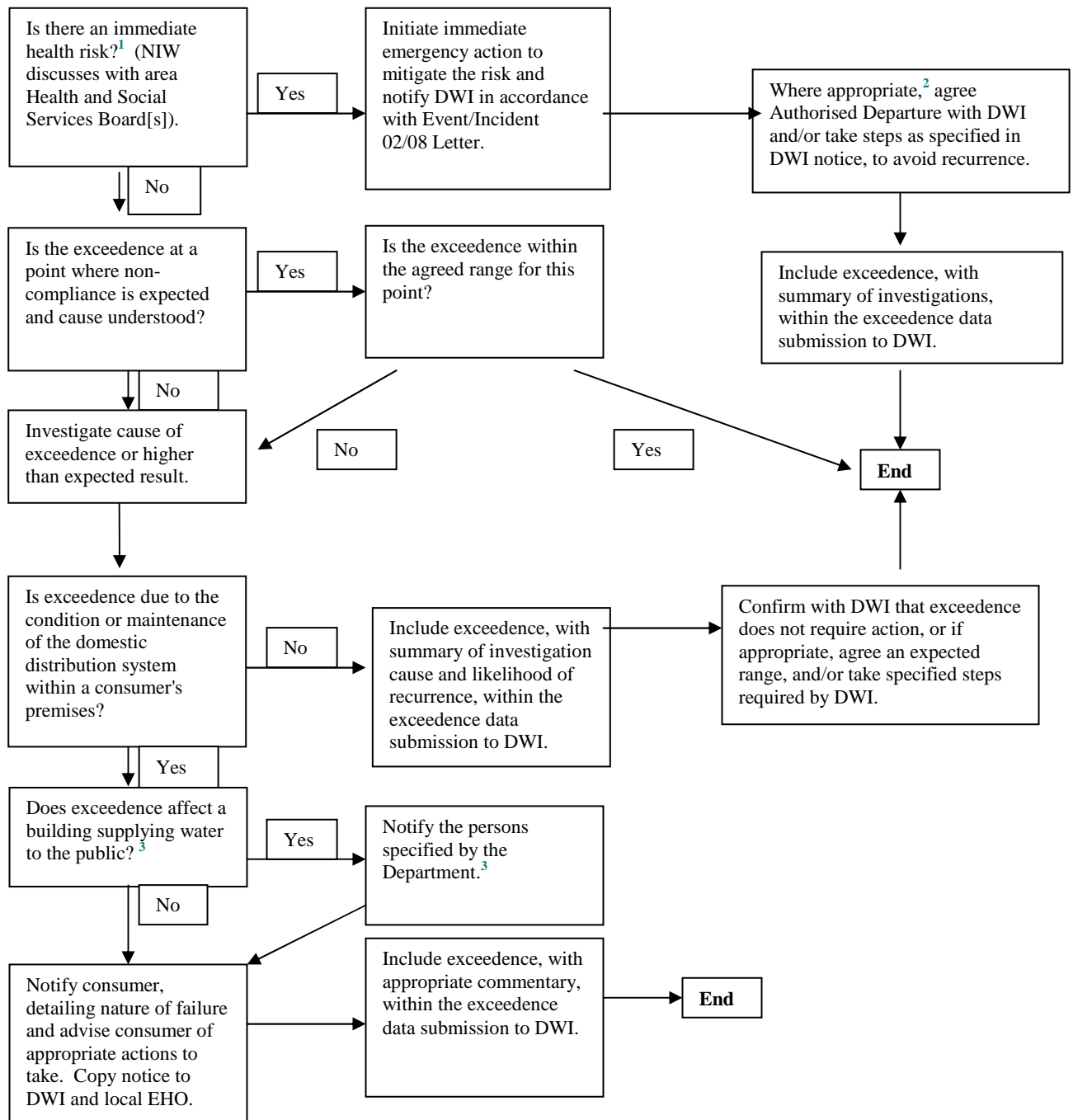
**PROCEDURE TO BE FOLLOWED IF SCHEDULE 1 (MANDATORY) PARAMETER FAILS, OR IS LIKELY TO FAIL A PRESCRIBED CONCENTRATION OR VALUE**



<sup>1</sup> *This is only likely to be considered in exceptional circumstances.*

<sup>2</sup> *Details to be confirmed when Regulations on the quality of water supplied to public buildings are in place.*

**PROCEDURE TO BE FOLLOWED IF SCHEDULE 2 (INDICATOR) PARAMETER DOES NOT MEET A SPECIFICATION**

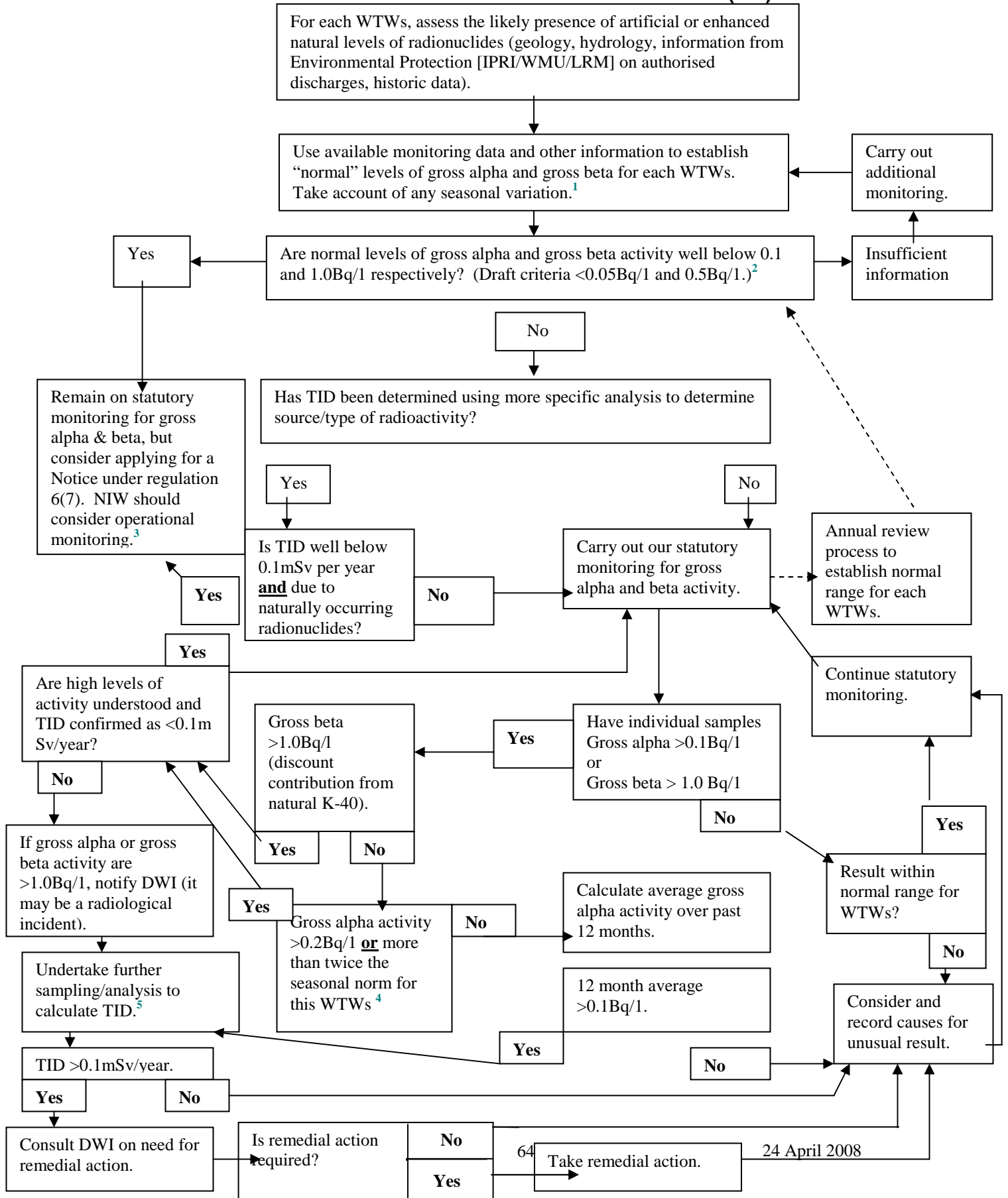


<sup>1</sup> *An immediate health risk for an indicator parameter is unlikely but possible (e.g. very high levels of radioactivity).*

<sup>2</sup> *This is only likely to be considered in exceptional circumstances.*

<sup>3</sup> *Details to be confirmed when Regulations on the quality of water supplied to public buildings are in place.*

**RADIOACTIVITY FLOW CHART FOR MONITORING OF GROSS ALPHA AND GROSS BETA ACTIVITY AND TOTAL INDICATIVE DOSE (TID)**



**RADIOACTIVITY FLOW CHART FOR MONITORING OF GROSS ALPHA AND GROSS BETA ACTIVITY AND TOTAL INDICATIVE DOSE (TID)****Footnotes for the Flow Chart**

- <sup>1</sup> *Seasonal increases in river flow may dilute any inputs of artificial radionuclides or those associated with water reuse (e.g. potassium-40) but flood conditions may encourage an increase in soil run-off and increase the input of some naturally occurring radionuclides.*
- <sup>2</sup> *Excluding tritium, potassium-40, radon and radon decay products.*
- <sup>3</sup> *As radioactivity is now a feature of the Drinking Water Regulations, it is therefore prudent for Northern Ireland Water to carry out an operational monitoring programme to demonstrate that there have been no significant changes over time.*
- <sup>4</sup> *The use of 0.2Bq/l is a tentative proposal in recognition of the fact that the World Health Organization is likely to increase its screening value for gross alpha (possibly to 0.5Bq/l). Using 0.2Bq/l will minimize the need for more detailed analysis on those supplies that show seasonal variations that take occasional samples just above 0.1Bq/l.*
- <sup>5</sup> *Further analysis should not necessarily involve comprehensive analysis for all radionuclides. In the first instance, the presence of naturally occurring radionuclides such as uranium-238 or radium-226 should be considered. If these substances account for the vast majority of the recorded activity (i.e. the unaccounted for activity is <0.05Bq/l or 0.5Bq/l), then the total indicative dose calculation should be based on these substances alone. It should be noted that ICP-MS methods can be used to give an initial and rapid indication as to what substances might be contributing to the elevated levels of radioactivity.*

## ADVICE FROM THE EUROPEAN COMMISSION

- 1 Monitoring of drinking water for total indicative dose (TID) shall be necessary where a source of artificial or enhanced natural radioactivity is present within the catchment and it cannot be shown on the basis of other surveillance programmes or investigations that the level of TID is well below its parametric indicator value of 0.1mSv/year. Where monitoring for artificial radionuclide levels is required, it shall be carried out at the audit frequency.
- 2 Where monitoring for natural radionuclide levels is required, DWI will define an appropriate frequency considering all relevant available information provided by Northern Ireland Water on temporal variations of natural radionuclide levels in different types of waters. Depending on the expected variations, monitoring frequency may vary from a single check-up measurement up to the frequency of audit monitoring. Where only a single check-up for natural radioactivity is required, a recheck shall be required at least where any change occurs in relation to the supply likely to influence the concentrations of radionuclides in the drinking water.
- 3 Where methods for removing radionuclides from drinking water have been introduced to ensure that a parametric indicator value is not exceeded, monitoring shall be carried out at the audit frequency.
- 4 Northern Ireland Water should use screening methods for gross alpha activity and gross beta activity to monitor for the parametric value for TID. If the gross alpha and the gross beta are less than 0.1Bq/l **and** 1.0Bq/l respectively, Northern Ireland Water may assume that the TID is less than the parametric indicator value of 0.1mSv/year and no further radiological investigation is needed. If the gross alpha activity exceeds 0.1Bq/l **or** the gross beta activity exceeds 1.0Bq/l, analysis for specific radionuclides shall be required. The radionuclides to be measured shall be defined by taking into account all relevant information about likely sources of radioactivity. Where necessary, tritium, gross alpha activity and gross beta activity should be measured in the same sample.

- 5 Instead of the gross alpha and gross beta activity screening discussed above, Northern Ireland Water may use screening methods for specific radionuclides to indicate reliably the presence of radioactivity in drinking water. If one of the activity concentrations exceeds 20% of its reference concentration (see Table 1 below) or the tritium concentration exceeds its parametric value of 100Bq/l, analysis of additional radionuclides shall be required. The radionuclides to be measured shall take into account all relevant information about likely sources of radioactivity.

### Calculation of the Total Indicative Dose (TID)

- 6 The TID is the committed effective dose for one year of intake resulting from all the radionuclides whose presence in a water supply has been detected, both of natural and artificial origin, but excluding tritium, potassium-40, radon and radon decay products. The TID is calculated from the radionuclide concentrations and the dose coefficients for adults laid down in Annex III, Table A of the European 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).

Where the following formula is satisfied, Northern Ireland Water may assume that the TID is less than the parametric indicator value of 0.1mSv/year and no further investigation is required:

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

where

$C_i (obs)$  = observed concentration of radionuclide  $i$   
 $C_i (ref)$  = reference activity concentration of radionuclide  $i$  (Table

- 1)  $n$  = number of radionuclides detected.

- 7 Where the formula is not satisfied, the parametric indicator value will only be exceeded if the radionuclides are persistently present at similar activity concentrations for a full year. DWI will define the degree of resampling necessary to ensure that the measured values are representative for an average activity concentration for a full year. Where representative sampling shows that the parametric indicator value is exceeded, DWI will advise what action is necessary to achieve compliance.

**TABLE 1: REFERENCE CONCENTRATIONS FOR RADIOACTIVITY IN DRINKING WATER<sup>1</sup>**

Origin	Nuclide	Reference Concentration
Natural	U-238 <sup>2</sup>	3.0Bq/l
	U-234 <sup>2</sup>	2.8Bq/l
	Ra-226	0.5Bq/l
	Ra-228	0.2Bq/l
Artificial	C-14	240Bq/l
	Sr-90	4.9Bq/l
	Pu-239/Pu-240	0.6Bq/l
	Am-241	0.7Bq/l
	Co-60	40Bq/l
	Cs-134	7.2Bq/l
	Cs-137	11Bq/l
	I-131	6.2Bq/l

<sup>1</sup> *This table includes the most common natural and artificial radionuclides. Reference concentrations for other radionuclides can be calculated using the dose coefficients for adults laid down in Annex III, Table A of Directive 96/29/Euratom, or more recent information recognized by the competent authorities in the Member State, and by assuming an intake of 730 litres per year.*

<sup>2</sup> *One milligram (mg) of natural uranium contains 12.3Bq of U-238 and 1 Bq of U-234. Table 1 allows only for the radiological properties of uranium, not for its chemical toxicity.*

REPORT TO DISTRICT COUNCILS (REGULATION 33)

DISTRICT COUNCIL REPORT

Regulation Information Required

Page 1 of 4

33					
33(4)(a)		<b>WATER TREATMENT WORKS</b>			
33(5)	For each WTTWs which supplies water to the DC area				
33(5)(a)	Names of water supply zones supplied from WTTWs				
33(5)(b)	General requirement for provision of results				
33(5)(c)	Schedule 1 Parameters	No. of Samples	No. of Samples >PCV	% >PCV	No. of Samples >AD
	Total coliforms				
	<i>E. coli</i>				
	Nitrite				
33(5)(d)	Schedule 2, Indicator Parameters	No. of Samples	No. of Samples >Specification	% >Specification	
	Colony counts				
	Turbidity				
	Residual chlorine (No. of samples - no specification or PCV)				
33(5)(e)	Schedule 1 Parameters		Min	Mean	Max
	Nitrite				
	<i>Cryptosporidium</i>				
	(not TC/EC)				
33(5)(f)	Schedule 2, Indicator Parameters		Min	Mean	Max
	Residual chlorine				
	(not <i>Clostridium perfringens</i> )				

**Regulation Information Required**

<b>33</b>							
<b>33(4)(b)</b>		<b>SERVICE RESEVOIRS</b>					
33(6)	For each SR which supplies water to the DC area						
33(6)(a)	Names of water supply zones supplied from SRs						
33(6)(b)	General requirement for provision of results						
33(6)(c)	Schedule 1 Parameters	No. of Samples	No. of Samples >PCV	% >PCV	No. of Samples >AD	% >AD	
	Total coliforms						
	<i>E. coli</i>						
33(6)(d)	Schedule 2, Indicator Parameters	No. of Samples	No. of Samples >Specification	% >Specification			
	Colony counts						
	Residual chlorine (No. of samples - no specification or PCV)						
33(6)(e)	Schedule 1 Parameters (not total coliforms/ <i>E. coli</i> )		Min	Mean	Max		
33(6)(e)	Schedule 2, Indicator Parameters		Min	Mean	Max		
	Residual chlorine (not <i>Clostridium perfringens</i> )						

**Regulation Information Required**

**33**

**SUPPLY POINTS**

33(4)(b)	For each supply point which supplies water to the DC area						
33(6)	Names of water supply zones supplied from supply points						
33(6)(a)	Schedule 1 Parameters	No. of Samples	No. of Samples >Specification	% >PCV	No. of Samples >AD	% >AD	
33(6)(b)	Benzene, etc.						
33(6)(c)	Schedule 2, Indicator Parameters	No. of Samples	No. of Samples >PCV	% >Specification			
33(6)(d)	Chloride, etc.						
33(6)(e)	Schedule 1 Parameters		Min	Mean	Max		
33(6)(f)	Schedule 2, Indicator Parameters		Min	Mean	Max		

33

**WATER SUPPLY ZONES**

33(7)	For each water supply zone which supplies water to the DC area					
33(7)(a)	The number of samples taken for each parameter					
33(7)(b)	General requirement for provision of results					
33(7)(c)	Schedule 1 Parameters	No. of Samples >PCV	% >PCV	No. of Samples >AD	% >AD	
	Enterococci					
	<i>E. coli</i>					
	Aluminium, etc.					
	Antimony, etc.					
33(7)(d)	Schedule 2, Indicator Parameters	No. of Samples >Specification	% >Specification			
	Colony counts					
	Residual chlorine (No. of samples - no specification or PCV)					
	Ammonium, etc.					
33(7)(e)	Schedule 1 Parameters	Min	Mean	Max		
	Aluminium, etc.					
	Antimony, etc.					
	(not enterococci/ <i>E. coli</i> )					
33(7)(f)	Schedule 2, Indicator Parameters	Min	Mean	Max		
	Residual chlorine					
	Ammonium, etc.					
	(not total coliforms/ <i>Clostridium perfringens</i> )					

**ANNUAL \* WATER QUALITY REPORT (REGULATION 34)  
NORTHERN IRELAND WATER ANNUAL \* WATER QUALITY REPORT**

**APPENDIX 6**

Regulation	Information Required					
<b>34</b>	<b>WATER TREATMENT WORKS</b>					
34(1)(a)	No. of WTWs, SFRs and supply points					
34(1)(b)	No. of water supply zones					
34(1)(c)	For all WTWs information in 35(4) (aggregated data)					
34(4)(a)	Total no. of samples (each parameter, chlorine residual, <i>Cryptosporidium</i> )					
34(4)(b)	<b>Schedule 1</b>	No. of Samples	No. of Samples > PCV	% >PCV	No. Samples >AD	% >AD
	Total coliforms					
	<i>E. coli</i>					
	Nitrite					
34(4)(c)	No. and % of WTWs in which samples >PCV					
	No. and % of WTWs in which samples >AD					
34(4)(d)	<b>Schedule 2, Indicator Parameters</b>	No. of Samples	No. of Samples >Specification	% >Specification		
	Colony counts					
	Turbidity					
	<i>Cryptosporidium</i>					
34(4)(e)	No. and % of WTWs in which samples >specification					

*\*This annual reporting format should be used to submit cumulative monthly compliance data submissions to DWI.*

Regulation	Information Required					
34						
<b>SERVICE RESERVOIRS</b>						
34(1)(d)	For all SFRs (and supply points) information in 35(5) (aggregated data)					
34(5)(a)	Total no. of samples (each parameter, chlorine residual)					
34(5)(b)	Schedule 1	No. of Samples	No. of Samples >PCV	% >PCV	No. of Samples >AD	% >AD
	Total coliforms					
	<i>E. coli</i>					
34(5)(c)	No. and % of SFRs in which samples >PCV					
34(5)(d)	No. and % of SFRs in which samples >AD					
	Schedule 2, Indicator Parameters	No. of Samples	No. of Samples >Specification	% >Specification		
	Colony counts					
34(5)(e)	No. and % of SFRs in which samples >specification					

\*This annual reporting format should be used to submit cumulative monthly compliance data submissions to DWI.



34

<b>SUPPLY POINTS</b>					
34(1)(a)	No. of supply points				
34(1)(d)	For all supply points information in 35(4) and 35(5) (aggregated data)				
34(5)(a)	Total no. of samples (each parameter, chlorine residual)				
34(5)(b)	Schedule 1	No. of Samples	No. of Samples >PCV	% >PCV	No. of Samples >AD
	Benzene, etc.				% >AD
34(5)(c)	No. and % of supply points in which samples >PCV				
	No. and % of supply points in which samples >AD				
34(5)(d)	Schedule 2, Indicator Parameters	No. of Samples	No. of Samples >Specification	% >Specification	
	Chloride, etc.				
34(5)(e)	No. and % of supply points in which samples >specification				

*\*This annual reporting format should be used to submit cumulative monthly compliance data submissions to DWI.*



Regulation	Information Required						
34	<b>WATER SUPPLY ZONES</b>						
34(1)(e)	For all water supply zones information in 35(6) (aggregated data)						
34(6)(a)	The number of samples taken for each parameter						
34(6)(b)	Schedule 1	No. of Samples	No. of Samples >PCV	% >PCV	No. of Samples >AD	% >AD	
	Enterococci						
	<i>E. coli</i>						
	Aluminium, etc.						
	Antimony, etc.						
34(6)(c)	No. and % of zones in which samples >PCV						
	No. and % of zones in which samples >AD						
34(6)(d)	Schedule 2, Indicator Parameters	No. of Samples	No. of Samples >Specification	% >Specification			
	Colony counts						
	Ammonium, etc.						
34(6)(e)	No. and % of zones in which samples >specification						

*\*This annual reporting format should be used to submit cumulative monthly compliance data submissions to DWI.*



*Our aim is to protect, conserve and promote the natural and built environment for present and future generations.*

**Environment & Heritage Service  
Klondyke Building  
Cromac Avenue  
Gasworks Business Park  
Lower Ormeau Road  
Belfast  
BT7 2JA  
Tel: 0845 302 0008**

**[www.ehsni.gov.uk](http://www.ehsni.gov.uk)**

