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Section 6: Procedures for non-compliance with standards

Summary of Section 6

- ◆ Provides a summary of Regulations 9, 10 and 11, particularly the requirement to protect human health, investigate non-compliances and prepare remedial action programmes and applications for departures.
- ◆ Sets out the offences under Regulations 9 and 10.
- ◆ Describes how Water Services Authorities (WSAs) protect human health in consultation and agreement with the Health Service Executive (the HSE).
- ◆ Describes the requirement for WSAs to investigate failures to comply with the standards and indicator parameter values to determine the cause and advises on the nature of investigations, including whether caused by the domestic distribution system.
- ◆ Sets out the notification to the Environment Protection Agency (the EPA) of failures to comply and advises on the timing and content of notifications for different parameter failures.
- ◆ Sets out the requirement on WSAs to prepare remedial action programmes for approval by the EPA and provides comprehensive advice on the content and timing of the programmes and on the content for common types of failures.
- ◆ Describes the contents of a monitoring programme for non-compliant supplies.
- ◆ Describes the short term interim measures that must be taken by WSAs pending completion of a permanent action programme.
- ◆ Sets out the timescales within which action programmes must be completed by WSAs.
- ◆ Sets out how WSAs must inform consumers of the details of remedial action programmes.
- ◆ Describes the EPA's "Remedial Action List" and its purpose.

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- ◆ Sets out the availability of departures from the standards and describes how WSAs may apply for a departure and the conditions the EPA may apply to a departure.

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1. Introduction and overview of Regulations 9, 10 and 11

1.1 Introduction

1.1.1 | Regulations 9 and 10 of the Regulations deal with the **protection of human health**, the investigations required and the **remedial action** to be taken when the public water supply constitutes a potential danger to human health or fails to meet the

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standards and indicator parameters values specified in the Regulations. Regulation 11 makes provision for a departure from the parametric values specified in table B in part 1 of the schedule to the Regulations.

1.1.2 | In the context of regulations 9 and 10, the Environment Protection Agency (the EPA) has been assigned specific powers to supervise Water Services Authorities (WSAs) and enforce the standards and other requirements in relation to the quality of public water supplies. The Regulations also authorise the EPA to prepare legally binding guidance on specific areas of regulations 9 and 10 and they make it an offence for WSAs to fail to comply with specific aspects of these Regulations. The guidance in this section is issued pursuant to regulations 9(5) and 10(8) and WSAs should take this guidance fully into account when fulfilling their obligations under regulations 9 and 10.

1.1.3 | The EPA recommends that each WSA should have written procedures for dealing with non-compliances with the standards in tables A and B of part 1 of the schedule to the Regulations and non-compliances of the indicator parameter values in table C of part 1 of the schedule to the Regulations. These procedures should cover the protection of human health, investigations of non-compliances and remedial action. Each WSA should have arrangements with its laboratory or contract laboratory for immediate notification of any result that does not comply with a standard or exceeds an indicator parameter value.

1.2 Overview of protection of human health

1.2.1 | Regulation 9 deals with circumstances where there may be a potential danger to human health due to the failure to meet a standard or indicator parametric value as specified in part 1 of the schedule to the Regulations or due to the presence of some other substance or micro-organism. Regulation 9 requires the WSA to:

- ◆ firstly, consult and agree with the Health Service Executive (the HSE) whether there is a potential danger to human health;
- ◆ restrict or prohibit use of water or take other action to protect consumers, if such a potential danger to human health exists;
- ◆ ensure consumers are informed of the above actions; and
- ◆ ensure the EPA is promptly notified.

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1.2.2 | In considering the action to be taken the WSA must have regard, in consultation and agreement with the HSE, to the risk to human health that would be caused by the interruption of supply or restriction of use.

1.2.3 | The EPA's role, as outlined in regulation 9, is to ensure where there is a risk to human health, that where necessary it directs a WSA (in consultation and agreement with the HSE) to take the appropriate action to prevent, limit, abate or eliminate the risk to human health. This guidance is issued pursuant to regulation 9(5) to assist WSAs to fulfil their obligations under regulation 9.

1.3 Overview of investigations of failures

1.3.1 | Each WSA is required by regulation 10(1) to ensure that any failure to meet the parametric values specified in part 1 of the schedule to the Regulations in its water supply is immediately investigated to determine the cause of such failure. The WSA should develop and implement a system to investigate non-compliances and include it in its written procedures. Each WSA must notify the EPA of any failure to comply and of the results of its investigation.

1.4 Overview of remedial action

1.4.1 | Regulation 10 of the Regulations sets out the actions that the WSA must take in the event of a failure to meet a parametric value as specified in tables A, B or C of part 1 of the schedule to the Regulations. Regulation 10 places a number of specific legal obligations on the WSA and the EPA as the supervisory authority when a non-compliance with the parametric value has been detected as a result of routine compliance monitoring, operational monitoring or monitoring following a consumer complaint. These include the requirement for the WSA to:

- ◆ immediately investigate the cause of the failure;
- ◆ carry out remedial action as soon as possible;
- ◆ where necessary notify the EPA in accordance with guidelines issued by the EPA;
- ◆ prepare an action programme for the improvement of the quality of water so as to secure compliance with the Regulations within 60 days of being directed to do so by the EPA;

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- ◆ implement the action programme within at least one year of the approval of the action programme if the non-compliance presents a risk to human health or in at least two years if the non-compliance does not present a risk to human health; and
- ◆ ensure that consumers are informed of the corrective action where the non-compliance is non-trivial.

1.4.2 | The role of the EPA is also outlined in regulation 10. In summary, the EPA is required to:

- ◆ ensure that the WSA takes remedial action as soon as possible;
- ◆ give priority to enforcement action having regard to the extent of the non-compliance;
- ◆ where necessary, direct the WSA to prepare an action programme within 14 days of being notified of the non-compliance;
- ◆ review and amend as necessary the action programme prepared by the WSA; and
- ◆ issue guidelines in relation to the nature and timing of remedial, enforcement or other relevant action.

This section of the guidance is issued pursuant to regulation 10(8) and this section should be considered as the EPA guidance in relation to the nature and timing of remedial, enforcement or other relevant action.

1.5 Overview of departures

1.5.1 | Regulation 11 makes provision for a departure from the parametric values specified in table B in part 1 of the schedule to the Regulations. A departure may, on application by a WSA and subject to agreement with the HSE, be granted by the EPA in relation to a water supply up to a maximum value for the parameter, provided that it does not constitute a potential danger to human health and that the supply of water cannot be maintained by any other reasonable means. A departure is in effect permission to continue supplying water that does not comply with the standards whilst remedial action is taken provided there is not a potential danger to human health.

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1.5.2 | This section sets out what WSAs must include in any application for a departure and specifies what the EPA must include as conditions associated with any departure it grants.

1.6 Offences under Regulations 9 and 10

1.6.1 | In accordance with regulations 9 and 10 it is now an offence for a WSA to:

- ◆ fail to comply with a direction from the EPA to prevent, limit, eliminate or abate a non-compliance or take appropriate measures to deal with the presence of a substance or micro-organism for which no quality standard has been prescribed, where there is a risk to human health – regulation 9(6);
- ◆ fail to notify the EPA promptly that a water supply constitutes a potential danger to human health – regulation 9(7);
- ◆ fail to notify the EPA of a failure to meet the parametric values of Part 1 of the schedule to the Regulations in accordance with the EPA guidelines as outlined in this section of this handbook – regulation 10(3);
- ◆ fail to comply with a direction to submit an action programme within 60 days of being directed to do so by the EPA and implement such action programme, as amended by the EPA, for the improvement of the quality of water so as to secure compliance as soon as possible and no later than one year from the date of approval in the case of a non-compliance which presents a risk to human health and two years in the case of other non-compliances – regulation 10(12)(a);
- ◆ fail to inform consumers of the remedial action taken in accordance with the action programme – regulation 10(12)(b);
- ◆ fail to maintain records of an incident as outlined in regulation 10(12)(c); and
- ◆ fail to make a record available to the EPA on request – regulation 10(12)(d).

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2. Protection of human health and consultation with the HSE

2.1 | Whenever a drinking water sample (compliance, operational, investigation of consumer complaint or incident) has failed to meet the parametric value for any of the parameters in part 1 of the schedule to the Regulations, the WSA must determine whether the non-compliance presents a risk/potential danger to human health. This also applies to situations where there has not been an identified non-compliance with a parametric value but there could be a potential danger to human health such as

- ◆ the presence of a substance or micro-organism for which no standard is specified in the Regulations;
- ◆ detection of an inefficiency of the disinfection process (such as insufficient chlorine in the final water to ensure that disinfection is complete); and
- ◆ an unexpected increase in the concentration or value of a parameter but not exceeding the parametric value indicating contamination or a problem with a treatment process (such as turbidity indicating inefficient filtration).

Consequently, each WSA should have in place documented procedures for consultation with the HSE when non-compliance is detected or another potential health risk exists. These procedures should include, as a minimum:

- ◆ contact details of the relevant personnel in the HSE;
- ◆ details of what additional information should be sent to the HSE in the event of a non-compliance (such as the results of investigations of the cause of the failure); and
- ◆ details of agreed actions to be taken in the event of specific failures (e.g. E. coli, detection of Cryptosporidium or the issue of a boil notice).

2.2 | WSAs should be aware that the HSE has published a document “Drinking Water and Health – a Review and Guide for Population Health, Health Service Executive 2008” (www.hse.ie/eng/services/Publications/services/Environmentalhealth/HSE_Drinking_Water_and_Health_Review_and_Guide_2008.pdf). This recognises the key role that the HSE has in assessing and advising WSAs and the EPA on potential risks to human health. The primary purpose of the document is to assure increased consistency of approach from and between the HSE staff of different professional

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backgrounds who are involved with drinking water safety throughout Ireland. WSAs should also be aware that HSE has prepared a document “Guidelines proposed by the Health Service Executive as a template document between the Health Service Executive and Water Services Authorities for Dealing with Exceedances and Incidents in Water Supplies” which is intended to facilitate a standardised framework nationally for dealing with microbiological, chemical and indicator parameter failures and incidents.

2.3 | When the HSE advises a WSA that there is a potential danger to human health from a public water supply, the WSA must take action to protect the consumers. The WSA must agree the action with the HSE which will be either to prohibit the supply of water or to restrict the use of the water. But in reaching that agreement both the WSA and the HSE must have regard to the risks to human health that would be caused by an interruption to the supply or restriction of the use of the supply. The WSA and the HSE must also consider and where possible agree the criteria to be used to decide when to stop the interruption to the supply or the restriction of its use. Once agreement has been reached, the WSA must issue the advice promptly to consumers. In the majority of situations the action will consist of restriction of the use of the supply by advising consumers to:

- ◆ boil water before using for drinking and food preparation, for example when there is a failure of a microbiological parameter or a problem with disinfection; or
- ◆ not to use the water for drinking and food preparation (the supply can still be used for other purposes), for example when there has been a serious failure of a chemical parameter. In this case the WSA must make arrangements to provide an alternative supply of water for drinking and food preparation such as in tankers or other appropriate containers; or
- ◆ to remove the water that has stagnated in the pipe work and use it for some other purpose than drinking or cooking, for example when there is a failure of the lead standard.

2.4 | If the EPA is not satisfied with the action being taken by the WSA, it must, in consultation and agreement with the HSE, issue a direction to the WSA to ensure that appropriate measures are taken to prevent, limit, eliminate or abate the risk to human health.

2.5 | Each WSA should have documented written procedures for the issue of the advice to consumers. The WSA should also have:

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- ◆ model leaflets for:
 - interruption to a supply with details of the availability of an alternative supply in tankers or containers;
 - advice to boil water notices with guidance on how to boil the water and what to use the boiled water for;
 - advice not to use water for drinking and food preparation with details of the availability of an alternative supply in tankers or containers;
 - advice to remove the water that has stagnated in the pipe work and what other purposes than drinking and cooking it can be used for; and
 - withdrawal of any of the above advice;
- ◆ and these leaflets:
- ◆ should be capable of adaptation quickly to any situation where there is a potential danger to human health;
- ◆ should be very clear and use simple language; and
- ◆ may need to be provided in languages other than English in some cases (e.g. Irish and other languages).

Examples of the most common leaflets (notices) used by Scottish Water are contained in Appendix G of the Guidance Document for the Drinking Water Incident response Plan (DWIRP) published by the Water Services Training Group (WSTG) (see paragraph 3.1.1 of section 8 of this handbook).

3. Investigations of non-compliances

3.1 General

3.1.1 | Each WSA is required by regulation 10(1) to ensure that any failure to meet the parametric values specified in part 1 of the schedule to the Regulations in its water supply is immediately investigated to determine the cause of such failure. The WSA

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should develop and implement a system to investigate non-compliances and include it in its written procedures. This should include procedures and protocols to investigate the following:

- ◆ a review of previous results for that parameter at the same or similar sampling points in the affected water supply;
- ◆ a review of any results for that parameter at associated sampling points (for example at the treatment works for a failure within a supply zone);
- ◆ a review of the operation of the treatment works, service reservoir or distribution network associated with the failure;
- ◆ where the failure is with a microbiological parametric value then a review of the effectiveness and robustness of the disinfection and other treatment processes should be carried out to include a review of results and residual chlorine levels for the supply three days either side of the date the non-compliant sample was taken, review of the chlorine dosing systems and procedures, review of the maintenance of residual chlorine at the plant and in the distribution network and review of the integrity of the distribution network including service reservoirs. Where UV treatment forms part of the disinfection process the operation of this process should be thoroughly reviewed;
- ◆ a procedure to determine whether there has been any event in the catchment that might be responsible for the failure;
- ◆ a procedure for taking further samples from the same point and if necessary from associated points;
- ◆ when the failure is suspected to be due to the condition of the consumer's tap, further samples should be taken from such points as will help to assess whether the failure was caused by the condition of the pipe work and fittings in the consumer's premises. Inspection of the consumer's pipe work and fittings may be necessary. In addition samples should be taken of the treated water leaving the drinking water treatment plant;

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- ◆ when the failure is due to the presence of *E. coli* or coliform bacteria in a sample taken from a consumer's tap, a sample shall be taken before and after disinfection of the tap and a swab sample from the surfaces of the tap that come into contact with water; and
- ◆ when the failure is lead or copper or nickel in respect of a sample taken from a consumer's tap, the WSA should consider wider sampling from other premises in the supply zone to establish whether the failure is restricted to one premises or whether there is a risk of failures at many premises in the zone.

3.2 Failures associated with the domestic distribution system

3.2.1 | One of the matters that the investigation has to establish is whether the cause of the failure of the standard or an indicator parameter value is due to the condition of the pipe work and fittings in the premises (i.e. the domestic distribution system) or other factors. The EPA will only consider failures to be attributable to pipe work and fittings where the WSA demonstrates comprehensively that it has carried out a detailed investigation with supporting evidence to show that consumer's plumbing is most likely to be the cause of the failure.

Microbiological failures

3.2.2 | Microbiological parameters, such as *E. coli* or coliform bacteria, may be influenced by the condition of the pipe work and fittings and particularly the design and hygienic status of the consumer's tap. The outcome of the further analysis described above provides important information on the likelihood that the non-compliance is attributable to the condition of the pipe work and fittings. There is a strong indication that the non-compliance is attributable to the pipe work and fittings when:

- ◆ the non-compliance recurs in the further sample from the original consumer's tap but all other samples in the supply zone meet the relevant standards or indicator parameter values; or
- ◆ the non-compliance recurs in a sample taken from the original consumer's tap before disinfection, but does not occur in a sample following disinfection.

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Lead, copper and nickel failures

3.2.3 | Non-compliances with the standards for copper, lead and nickel at the consumer's tap may be associated with the consumer's pipe work and fittings or the WSA's pipe work as the water interacts with copper or lead pipes (or solders) and brass fittings and plated taps that contain nickel. The WSA's investigation should establish whether these metals are present in its pipe work (unlikely to be the case for nickel) and whether they are present in the consumer's pipe work and fittings. It should also establish whether non-compliances also occur in similar premises in the supply zone.

3.2.4 | If these metals are present **only in the WSA's pipe work**, then the WSA is required to take action by following the advice in the EPA Guidance Circulars No. 1 (Lead compliance monitoring and surveys) and No.2 (Action programmes to restore the quality of drinking water impacted by lead pipes and lead plumbing). If they are present **only in the consumer's pipe work and fittings**, then the WSA should provide advice to consumers on the action they can take to reduce their exposure to these metals. If these metals are present in **both the WSA's and the consumer's pipe work**, then the WSA should follow the advice in EPA Guidance Circulars No. 1 and No. 2.

3.2.5 | This advice particularly applies to **lead** which has been widely used in the past and most water supplies are plumbosolvent unless adequately treated. The long term solution for dealing with failures for lead in drinking water is to replace any lead pipes with a suitable alternative. The EPA recommends a phased approach to dealing with lead pipes giving priority to areas where lead concentrations are highest, whilst taking any opportunities, such as leak detection programmes, mains refurbishment or replacement programmes or pavement improvement works, to replace lead pipes. Further advice on investigation and action in respect of lead failures is given in paragraphs 5.3.14 – 5.3.26 of this section.

4. Notification of non-compliances to the EPA

4.1 Introduction

4.1.1 | Regulation 10(2) places an obligation on each WSA to notify the EPA as soon as it becomes aware of a failure to meet the parametric values in part 1 of the schedule of the Regulations. It must also notify the EPA as to whether the HSE considers the failure to be a potential danger to human health. **From August 1st 2011, WSAs are required to notify the EPA through one of the following methods:**

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- ◆ **Online Drinking Water Notification System – for supplies which have not had previous exceedance(s) notified to the EPA for the exceeded parameter.**
- ◆ **E-mail to drinkingwater@epa.ie – for supplies which have had any previous exceedance notified to the EPA for the exceeded parameter. This method should be used even if the file relating to the previous exceedance has been closed.**

Notification by email should be in the format as specified in Appendix 1 and must contain all of the information requested.

For a period following the launch of the Online Drinking Water Notification System notification is required using both methods, above, in parallel for verification purposes. The duration of this period is as communicated directly to WSAs by e-mail from the EPA. The system log-in page, a user manual and training videos can be accessed on www.epa.ie.

4.1.2 | It is essential that WSAs review their current arrangements with laboratories carrying out analysis of drinking water on their behalf to ensure that the laboratory immediately makes the WSA aware of all non-compliances with the parametric values in tables A, B or C of part 1 of the schedule to the Regulations.

4.2 Non-compliance with the standards for microbiological and chemical parameters

4.2.1 | A non-compliance with the parametric value for the microbiological or chemical parameters as specified in tables A and B of the schedule of the Regulations or a notification under regulation 9(1)(c) that a supply is to be prohibited or restricted, must be promptly notified to the EPA, in accordance with regulation 10(2) and 9(5) respectively **no later than 11.00 a.m. on the next working day**. As well as the written notification, if a supply is to be prohibited or restricted, the WSA should notify its designated EPA Inspector by telephone. In advance of notifying the EPA, the WSA must, in all such cases, have notified and, if possible have consulted with the HSE to establish the level of risk to human health and agreed with the HSE any actions that need to be taken pursuant to these consultations, as required by Regulation 9(1). The arrangements with HSE must make all reasonable attempts to make the determination

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on risk to human health prior to the deadline to notify the EPA. Where the EPA considers the information in the notification provided by the WSA as insufficient further specific information may be requested.

4.2.2 | The only exception to the requirement for prompt notification of a failure to meet the parametric values in tables A and B of the schedule of the Regulations relates to the fluoride parameter where the supply is artificially fluoridated. The Department of Health and Children has published a Code of Practice on Fluoridation of Water Supplies 2007 (http://www.dohc.ie/publications/fluoridation_2007.html) and this Code includes a protocol for dealing with failures of the 0.8 mg/l standard. The EPA advises WSAs to adhere to the protocol outlined in this Code. In the event of a one-off non-compliance with the fluoride parametric value of 0.8 mg/l, the WSA is not required to notify immediately the EPA except where the result exceeds the EU Directive 98/83/EC parametric value of 1.5 mg/l. However, in all such cases of failure to meet 0.8 mg/l, the WSA should take immediate action to return the supply to compliance and should immediately retest the supply. Where the follow up sample fails to meet 0.8 mg/l, the Agency should be notified in accordance with the procedures outlined in the previous paragraph. Furthermore, if there is a pattern of intermittent non-compliance with the fluoride standard of 0.8 mg/l the Agency should also be notified of the non-compliance.

4.2.3 | Also in accordance with regulation 10(10) each WSA shall maintain a record of any incidence of failure to meet the parametric values specified in Part 1 of the schedule to the Regulations. This record shall be kept for inspection by the EPA.

4.3 Non-compliance with the indicator parameter values

4.3.1 | Immediate notification of the failure of a single sample in a water supply to comply with the indicator parametric values as specified in table C of the schedule to the Regulations is **not** required **except** where the non-compliance could be a **potential danger to human health** or is **non-trivial**. Some examples of the circumstances requiring immediate notification by the WSA to the EPA using the procedure in paragraph 4.1 are listed below;

- ◆ when, after consultation with the and agreement with HSE, the failure is considered to be a potential danger to human health;

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- ◆ persistent non-compliances with an indicator parameter in the same supply that has not been rectified, for example repeated coliform bacteria or aluminium failures;
- ◆ elevated turbidity in the treated water especially in cases where the plant has a high *Cryptosporidium* risk assessment score; and
- ◆ non-compliance with an indicator parameter value caused by incidents or not adhering to operational practice or procedures at the treatment plant.

4.3.2 | Where the failure is not trivial the WSA must also notify the EPA. A trivial non-compliance can be defined as a marginal failure of the parametric values in table C of the schedule of the Regulations or where a failure is a one-off linked to a specific event that was quickly rectified. However, if there is a relatively frequent recurrence of marginal failures or intermittent one-off failures, the EPA must be notified as soon as practical using the form at Appendix 1.

4.3.3 | Whether the non-compliance of an indicator parameter value is a potential danger to human health or not, the WSA must take immediate action to ensure that the cause of the non-compliance is investigated and that the appropriate corrective action is taken to ensure compliance with the relevant parametric value. The WSA shall in accordance with regulation 10(10) maintain a record of any incidence of failure to meet the indicator parametric values. This record shall be kept for inspection by the Agency.

5. Preparation of remedial action programmes

5.1 Introduction

5.1.1 | When the EPA has been notified of a failure to meet a parametric value specified in part 1 of the schedule to the Regulations and the EPA has directed a WSA to prepare an action programme and to submit it for the approval of the EPA, the WSA must prepare this programme within the timeframe specified in the direction (and not exceeding 60 days). The following paragraphs provide guidance to WSAs on the nature and timing of remedial, enforcement or other relevant action in accordance with regulation 10(8).

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5.1.2 | The action programme must ensure compliance with the Regulations. It must be submitted to the EPA within the period specified in the EPA's direction and it should be e-mailed to drinkingwater@epa.ie with a signed copy also posted to Drinking Water, Office of Environmental Enforcement, Environment Protection Agency, Johnstown Castle Estate, Co. Wexford and the action programme should contain as a minimum:

- ◆ actions taken/to be taken to identify the cause of the non-compliance;
- ◆ actions taken/to be taken to address the cause of the non-compliance including details of any enforcement (under the Local Government (Water Pollution) Acts 1977-1990 including enforcement of discharge licences under Section 4) and source protection measures proposed/implemented;
- ◆ actions taken/to be taken to improve the treatment at the plant;
- ◆ a proposed increased monitoring programme for the parameter that failed to meet the standards for the duration of the action programme;
- ◆ interim measures taken/to be taken to prevent, limit, eliminate or abate the likelihood of a failure in the short term;
- ◆ proposed timescales and reporting frequencies for all of the actions to be taken above;
- ◆ details of the documented management and control system in place; and
- ◆ details of how consumers are to be informed of the actions taken/to be taken.

5.1.3 | WSAs should note that an action programme (amended if necessary by the EPA under regulation 10(6)) is a legally binding document and failure to submit and implement an action programme is an offence under regulation 10(12)(a). Therefore, WSAs should consider carefully the information that is to be included as part of the action programme and should include the actions it intends to carry out and should not contain unrealistic actions or timescales.

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5.2 Actions to identify the cause of non-compliances

Failures suspected to be caused by contamination of the source water

5.2.1 | If the cause of the failure is suspected to be contamination of the source of the water then the action programme could include any or all of the following actions:

- ◆ **Assessment of the geology and hydrogeology of the source** – this is to determine whether natural substances are likely to be present in significant concentrations. This may be relevant to naturally occurring metals and substances such as arsenic, fluoride, mercury, chloride, iron, manganese or sulphates. The investigations into the geology and hydrogeology should include, as a minimum, an examination of:
 - borehole logs for the well;
 - geological maps;
 - any geochemical data for geological formations;
 - hydrogeological flow regime; and
 - source water quality trends.
- ◆ **Identification of potentially polluting activities in the catchment or zone of contribution of the source** – where it is suspected that there are potentially polluting activities in the catchment or zone of contribution, a catchment inspection should be carried out. The investigations into the source of the pollution should include the identification and assessment of the following activities in the zone of contribution or catchment:
 - discharges from waste water treatment plants;
 - storm water over flows;
 - the location and effectiveness of septic tanks or other on-site treatment systems;
 - discharges licensed under Section 4 of the Local Government (Water Pollution) Act 1977;

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- discharges from facilities licensed by the EPA under the Environment Protection Act 1992 and the Waste Management Act 1996 (as amended);
 - agricultural activities (in particular farm yard management and land spreading activities);
 - forestry activities;
 - other industrial activities such as waste management, mining, quarrying or other similar activities; and
 - source water quality trends.
- ◆ **Liaison with the teams implementing the River Basin Management Plan** in carrying out the investigation and in developing measures to improve site specific source protection.
 - ◆ **Analysis of samples of the source water** to identify the cause and assist in formulating an action plan.

Failures suspected to be caused by problems with treatment or distribution

5.2.2 | If the cause of the **failure is suspected to be a problem with the treatment of the source water or the water distribution network** then the action programme could include any or all of the following actions:

- ◆ **Review of the operation of the water treatment plant** – an assessment of the operation of the water treatment plant should be carried out which should include any or all of the following reviews of:
 - recent daily operational monitoring results at the water treatment plant;
 - recent compliance check/audit monitoring results in the distribution network (and at the treatment works where permitted for specified parameters);
 - treatment processes at the plant including chemical dosing regimes, coagulation and clarification procedures, filter operation (backwashing arrangements and media adequacy), disinfection, operational monitoring frequency and process alarms;

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- recent operational changes made to the treatment plant including adjustment of chemical dosing, flows, pumps, pipe work and filter media;
 - recent operational problems including alarms (which should be recorded in the caretaker's diary and/or on the SCADA system); and
 - the ability of the existing treatment plant to treat the water adequately in order to meet the standards and indicator parameter values in the Regulations.
- ◆ **Review of the management and operation of the distribution network** – the management and operation of the distribution network should be examined including the identification of any or all of the following:
- changes to the operation of the distribution network such as introducing water from a different works or part of the network, flow reversals and pressure changes;
 - consumer complaints about drinking water quality (appearance, taste, odour)
 - flushing/scouring regime for the distribution network;
 - possible contamination following recent pipe replacement or repair of bursts;
 - leakage; and
 - dead ends, service reservoirs or vulnerable parts of the network.

The action programme should clearly state how the water supplier intends to identify the cause of the failure (if not already known) and should include details of how the investigation is to be carried out. Specific timeframes for the different aspects of the investigation must be included in the action programme.

5.3 Actions to address the cause of non-compliance

5.3.1 | Having identified the cause or suspected cause of the non-compliance the WSA must determine the specific actions that are to be taken to prevent, limit, eliminate or abate the cause of the non-compliance. The following paragraphs provide specific guidance on the actions to deal with common causes of failures.

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Action to improve source protection

5.3.2 | Where the cause of the non-compliance has been identified as originating from pollution of the source of the supply the WSA must take action to prevent, limit, eliminate or abate the source of the pollution, it is not sufficient simply to improve treatment at the plant to compensate for poor raw water quality. The root cause of the problem must be addressed. Actions taken to address the cause of the non-compliance could include:

- ◆ implementation of sustainable planning policies to protect source water;
- ◆ improvements in waste water treatment plants;
- ◆ elimination or relocation of storm water overflows;
- ◆ fencing off of the source of the supply;
- ◆ restriction of land spreading within the zone of contribution or within the exclusion zones as per the European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2009 (S.I. No. 101 of 2009);
- ◆ enforcement action under the Local Government (Water Pollution) Acts 1977-1990 including enforcement of Section 4 licences;
- ◆ liaison with the EPA regarding discharges from EPA licensed facilities; and
- ◆ working with the teams implementing the River Basin Management Plans to improve source protection measures.

Action to deal with failures caused by natural conditions

5.3.3 | In some cases, such as where the source of the non-compliance is natural or persistent, it may not be possible to take actions to address the cause of the non-compliance within the short to medium term or it may not be possible at all (if the cause of the non-compliance is natural e.g. arsenic). In such cases, replacement of the source may be necessary or alternatively the treatment processes may need to be upgraded or optimised to ensure compliance. However, in all cases every effort must be made to eliminate or reduce the cause of the non-compliance from the source. In many cases this will be done in tandem with the provision of improved treatment.

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Action to improve treatment and treatment plant operation

5.3.4 | Where every action has been taken to improve the quality of the source of the water so as to prevent, limit, eliminate or abate the likelihood of non-compliance and these actions are not sufficient, additional actions to improve the treatment process should be detailed in the action programme. Also in cases where the failure of the treatment plant has caused the non-compliance the WSA must outline in the action programme the actions to be taken to improve the treatment process. These actions could include:

- ◆ adjustment of chemical dosing regime;
- ◆ adjustment of treatment practices and procedures (e.g. coagulation/clarification conditions, filter operation and backwashing frequency, disinfection);
- ◆ replacement of filter media;
- ◆ addition of new treatment processes or modification of existing processes;
- ◆ installation of continuous monitoring and alarms for chlorine and turbidity;
- ◆ up-grade of the treatment plant;
- ◆ improved maintenance of treatment plant;
- ◆ additional training to be given to plant operatives; and
- ◆ increased monitoring at water treatment plant.

Action to deal with microbiological failures

5.3.5 | Where there is a failure to meet a standard for a microbiological parameter value or microbiological indicator parameter value, the WSA should examine the operation of the disinfection system as a priority. Where chlorination is used as the means of disinfection, as a minimum, the EPA expects that all treatment plants should be operated in accordance with the following guidance:

- ◆ only drinking water that is appropriately disinfected should be distributed;

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- ◆ treated water should contain residual chlorine at a concentration of 0.5 mg/l for at least 30 minutes contact time prior to supply to consumers to ensure that the disinfection is complete. The WSA should review the contact time on a site-specific basis. An optimum contact time must be implemented for each treatment plant. Thus direct supply of treated water (i.e. where water is not stored in a contact tank prior to distribution) will not be permitted in most circumstances;
- ◆ the final treated water (prior to entry into the distribution network) should have a continuous residual chlorine monitor and this monitor shall be linked to a recording device and alarmed to ensure that a deviation in the levels of residual chlorine from pre-defined upper and lower limits are immediately detected. The alarm should be linked by telemetry to a call out to ensure that the relevant personnel in the WSA are immediately notified of a failure of the system so as to allow immediate corrective action to be taken;
- ◆ where the source of the water is surface water (or groundwater influenced by surface water) the treatment of the water should not consist solely of chlorination; and
- ◆ the residual chlorine at the extremities of the distribution network must be at a concentration of at least 0.1 mg/l.

5.3.6 | Detailed advice from the EPA on dealing with *E. coli* (and enterococci) failures is given in Advice Note No. 3 “*E. coli* in Drinking Water” which includes:

- ◆ determination of whether the presence of *E. coli* constitutes a potential danger to human health and the implementation of immediate health protection measures;
- ◆ determination of the cause of the failure to meet the *E. coli* parametric value; and
- ◆ identification of the measures necessary to improve the security of the supply and implementation of an action programme.
- ◆ The advice also includes EPA recommendations on disinfection measures including:
 - **chlorination:** including continuous chlorine monitors, chlorine contact time, duty and standby dosing arrangements and flow proportional or chlorine monitor controlled dosage and re-chlorination within the distribution network; and

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- **ultraviolet (UV):** validation certificate for the lamp, monitoring of UV intensity or transmissivity and verification, duty and standby UV lamps or auto shut-down on lamp failure and secondary disinfection (e.g. chlorination) in the distribution network.

Action to deal with turbidity failures

5.3.7 | Turbidity is listed as an indicator parameter in the Regulations which states that the levels must be “Acceptable to consumers and no abnormal change”. There is a footnote in the Regulations that states in the case of surface water treatment a parametric value not exceeding 1.0 NTU in the water ex treatment works must be strived for. The turbidity levels (and colour) should be as low as possible prior to chlorination to ensure that disinfection is effective and the formation of disinfection by-products (such as trihalomethanes) is kept to a minimum. Colour should be kept below 20 mgPt.Co/l (Hazen). **Elevated turbidity in the treated water indicates that the treatment process is not operating adequately.**

5.3.8 | Although the indicator parametric value of 1.0 NTU is regarded as an aesthetic value, in practice it is a process control standard. Monitoring for *Cryptosporidium* cannot be used for process control, as it cannot be measured in real time so an alternative surrogate parameter is required. Turbidity is the best available and in order to maximise the removal of *Cryptosporidium* oocysts treatment plants need to be designed and operated to achieve minimum turbidity values in the treated water. Low filtered water turbidity also enhances the performance of *Cryptosporidium* removal or deactivation treatment technology when fitted such as membrane filtration or ultra violet (UV) disinfection. The 1.0 NTU level is an acceptable aesthetic standard so long as the source is not at risk from *Cryptosporidium*. If there is a risk of *Cryptosporidium* in the source water then WSAs should strive to minimise treated water turbidity as far below 1.0 NTU as is reasonably practical. **The EPA recommends that treatment processes should be optimised so that the turbidity in the water leaving treatment works is less than 0.2 NTU.**

5.3.9 | Detailed advice from the EPA on dealing with turbidity failures is given in Advice Note No. 5 “Turbidity in Drinking Water” which includes:

- ◆ turbidity levels to be achieved at the water treatment plant;
- ◆ action to be taken by the operator including:

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- ensure adequate treatment is in place to remove turbidity;
- improvements in monitoring at the water treatment plant to:
 - ❖ assess the adequacy of water treatment plant;
 - ❖ set appropriate alarm levels on the stages of the treatment plant; and
 - ❖ put in place procedures to deal with elevated levels of turbidity;
- optimisation and improved of the existing treatment processes;
 - ❖ assessing the adequacy of filters;
 - ❖ management of the backwash cycle; and
 - ❖ management of the filter backwash water.

Action to deal with disinfection by-product failures

5.3.10 | The Regulations set standards for the following disinfection by-products (DBPs):

- ◆ 100 µg/l for total trihalomethanes (THMs) (the sum of the concentrations of chloroform, bromoform, dibromochloromethane and bromodichloromethane). THMs are formed by the reaction of organic matter in the raw water (such as humic and fulvic acids) and chlorine used for oxidation and disinfection;
- ◆ 10 µg/l for bromate. Bromate is formed when ozone, used as an oxidant and disinfectant, reacts with bromide in the raw water. Bromate is also present in sodium hypochlorite used for chlorination; and
- ◆ 0.5 mg/l nitrite. Nitrite is formed when chloramination (monochloramine) is used as the disinfectant.

There are many other DBPs that are not regulated at present but may be regulated in the future. These include haloacetic acids formed by reaction of chlorine with organic matter, chlorite and chlorate formed when chlorine dioxide is used as an oxidant and disinfectant.

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5.3.11 | Some public water supplies currently fail to meet the THMs standard and WSAs need to investigate these failures and take action to ensure they comply with the standard. The causes of THM failures and the actions necessary vary with the nature of the raw water, the treatment processes and the way chlorination is used. WSAs must ensure that any action to reduce THM concentrations (and other DBPs) does not compromise the efficiency of disinfection.

5.3.12 | Detailed advice from the EPA on dealing with DBP failures is given in Advice Note No. 4 “Disinfection By-products in Drinking Water” which includes:

- ◆ formation of DBPs – conditions of formation, lists of disinfectants and DBPs and the World Health Organisation’s guideline values and the US Environment Protection Agency’s maximum contaminant levels ;
- ◆ investigations into the causes of DBP failures – lists main causes; and
- ◆ measures to reduce DBP concentrations – lists the possible actions and situations where they could be used.

Action to deal with failures caused by the distribution network

5.3.13 | When the cause of the failure may be due to contamination within the distribution network the guidance on water distribution and related matters provided in the section 12 of this handbook should be followed. Where the distribution network has been identified as the cause of the non-compliance the corrective action taken by the WSA may include:

- ◆ modification to the operation of the distribution network (such as to avoid high flows and flow reversals);
- ◆ flushing/scouring the mains;
- ◆ installation of chlorine booster stations in the network;
- ◆ installation of automatic continuous chlorine monitors at the outlet from a service reservoir or water tower and at appropriate points in the distribution network;
- ◆ replacement/refurbishment of corroded/leaking pipe work;
- ◆ maintenance of service reservoirs; and

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- ◆ replacement of old pipe work (e.g. lead service mains).

Action to deal with failures of the lead standard

5.3.14 | Sub-section 4.3 of section 4 of this handbook explains why the relatively few compliance audit monitoring samples for lead may not give a true picture of lead concentrations at consumers' taps within the zone because they can be highly variable. The results can depend on:

- ◆ the length of any lead distribution mains;
- ◆ the length of lead pipe, if any, in the WSA's part of the service connection pipe to the premises (in general the WSA owns the part of the service connection from the mains to the external stop tap located usually just outside the boundary to the premises and the owner of the property owns the part of the service connection from the external stop tap to the internal stop tap within the premises);
- ◆ the length of lead pipe, if any, in the property owner's part of the service connection pipe to the premises;
- ◆ the length of lead pipe, if any, within the internal plumbing to the kitchen tap in the property;
- ◆ the presence of copper pipe work joined by lead based solder;
- ◆ the type of sample taken (fully flushed, random daytime or stagnation);
- ◆ the time of sampling in relation to previous water use within the property (generally a sample taken following recent water use will have a lower lead concentration than a sample taken after a long period of no water use; and
- ◆ the volume of sample collected.

In that sub-section the EPA recommended that WSA's supplement the compliance audit monitoring with **lead surveys** as part as of investigations into non-compliance with the lead standard. The following paragraphs give advice on lead surveys and the subsequent remedial action. WSAs should also consult EPA Guidance Circulars No. 1 (Lead compliance monitoring and surveys) and No.2 (Action programmes to restore the quality of drinking water impacted by lead pipes and lead plumbing).

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5.3.15 | The purpose of a **lead survey** is to determine the extent of lead pipes in the distribution network, the supply pipe work (service connections) and the internal plumbing within premises. The survey should comprise the following actions:

- ◆ identification of any lead distribution mains in the ownership of the WSA;
- ◆ identification of any lead pipe work in the service connection in the ownership of the WSA;
- ◆ identification of any lead pipe work in the service connection in the ownership of the property owner;
- ◆ identification of the extent of any lead plumbing in public buildings;
- ◆ identification of the extent of any lead plumbing in domestic dwellings; and
- ◆ targeted monitoring for lead in water supply zones where the information is uncertain or further information is required – this monitoring is the final component of a lead survey.

WSAs should plan their lead surveys in consultation with the local Environmental Health Officers and Specialists in Public Health Medicine of the Health Service Executive (the HSE). Further advice on the actions is given in the paragraphs below.

5.3.16 | Generally it can be assumed that any mains, service connections and properties constructed after 1970 will not contain lead pipes, unless a WSA has specific information to indicate otherwise. WSAs should review available distribution maps and records for each supply zone to determine whether lead was used in the mains or service connections and whether replacement of any lead pipe work has taken place since the original installations. WSAs should consult caretakers, fitters, water conservation teams and other operatives who may have information about lead pipe work that is not documented or readily available. Results of compliance monitoring under these Regulations or the previous Regulations (SI 439 of 2000) and results of any previous investigative monitoring may assist in confirming the presence of lead pipes. Where gaps exist WSAs should commence a programme of investigation.

5.3.17 | Each WSA should review its records to determine whether there are any **lead distribution mains** in any of its supply zones. The EPA understands that the presence of lead distribution mains is rare, but it is aware of a few cases. If a WSA has a lead

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distribution main, it should make arrangements to replace it as quickly as possible as it will not comply with the 10 µg/l lead standard at consumers' taps in any premises supplied through the lead main.

5.3.18 | Each WSA should review its records etc and map each of its supply zones to show the **locations of lead service connections in the ownership of the WSA**. Connections laid before 1970 (properties built before 1970) should be assumed to contain lead pipes unless the WSA has specific information that confirms the absence of lead pipes (such as areas where the connections are known to be of another material or housing estates where all the lead service connections have been renewed). Where gaps exist a programme of inspection of external stop tap types may help WSAs determine the likely presence of lead pipe and if necessary excavation at typical stop taps in the area to confirm the presence or absence of lead pipe. A similar procedure should be followed **for lead service connections in the ownership of the property owner**.

5.3.19 | The WSA should identify all **public buildings** (for example but not limited to schools, hospitals, restaurants etc) that were constructed prior to 1970 where people may consume water. They should determine whether these **public buildings have lead plumbing**. The owner/manager of the building may have records or knowledge of the plumbing materials or may be aware that the internal plumbing has been replaced. Where there is doubt the owner or the WSA could inspect the plumbing or take an appropriate sample to confirm the presence or absence of lead plumbing. If there is a failure in a compliance sample or any other investigative sample, the WSA must notify the owner/manager of the building and require that person to submit to the WSA a programme of remedial action to rectify the failure and give that person advice on the action he/she can take to protect his/her health and the health of any consumers in the premises. WSAs should have written procedures for carrying out such notifications and for checking that the remedial action has been carried out. Where necessary the WSA should consider using the powers of Direction in regulation 6(3) of the Regulations in the event that action is not being taken by the owner/manager of the premises.

5.3.20 | It will not be feasible for WSAs to determine the full extent of **lead plumbing in domestic dwellings**. However, a WSA should attempt to identify the areas where such houses with lead plumbing may exist and the proportion of the supply zone these houses comprise. The WSA should assume, unless other information is available (e.g. where the local authority has refurbished local authority houses or local knowledge indicates that lead pipe work was used at a later date), that all houses constructed

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prior to 1970 are at risk of containing lead plumbing. The WSA should produce a map of the distribution network clearly showing areas of the distribution network where it is known that there is no lead internal plumbing within domestic dwellings (e.g. developments constructed since 1970 or areas which have been refurbished by the local authority or private developer). Public notices and engagement with local community groups may assist in delineating the extent of lead piping in the supply zone. WSAs should develop, in consultation with the HSE, a Frequently Asked Questions (FAQ) leaflet or put appropriate advice on their website outlining how the public can get their water tested and should include advice on what to do if lead is detected in their water supply. The HSE has a FAQ leaflet on lead in drinking water on its website ([www.hse.ie/eng/services/Publications/HealthProtection/Frequently Asked Questions on Lead in Drinking Water.pdf](http://www.hse.ie/eng/services/Publications/HealthProtection/FrequentlyAskedQuestionsonLeadinDrinkingWater.pdf)).

5.3.21 | When the steps in paragraphs 5.3.15 to 5.3.20 have been carried out, the WSA should produce a map of each supply zone showing areas of the supply zone that are supplied through lead pipes or are at risk of being supplied through lead pipes. The map should be dynamic and up-dated as further information becomes available. The WSA should develop an **investigative monitoring programme** targeting monitoring in areas of the water supply zone that are at risk of having lead pipe work in the WSA's or properties' owners system. The main purpose of this monitoring is to confirm the presence or absence of lead pipe work where information is currently unavailable. A subsidiary purpose is provide further information about the extent of failures to meet the 10 µg/l lead standard as this is an important factor to determine the necessary human health advice.

5.3.22 | A key factor in the development of this **monitoring programme** is the method of sampling used. It is important to note that the sampling method for lead as part of the investigative monitoring programme is not the same as that for compliance monitoring under the Regulations. Sampling for compliance monitoring requires WSAs to use *"an adequate sampling method at the tap so as to be representative of the weekly average ingested by consumers and that takes account of the occurrence of peak levels that may cause adverse effects on human health"*. For compliance monitoring, the EPA recommends that the random daytime samples are used. For the purposes of investigative monitoring WSAs should take stagnation samples. For such samples the pipes of the sample location should be flushed and run to waste and the sample should only be taken after a 30 minute stagnation time. Stagnation samples should inform the WSA whether there is lead pipe work present in the service connection or the internal plumbing.

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5.3.23 | In all cases where lead has been detected at levels above 10 µg/l (regardless of the sampling method used), or where the WSA has detected lead pipes in its own pipe work or pipe work belonging to the premises' owner (particularly serving public buildings – including but not limited to schools, hospitals and restaurants), the WSA should promptly consult with the HSE to determine whether there is, or could be, a potential danger to human health arising from the detection of lead. The WSA should inform the HSE of the type of sampling method used. Following such consultation and advice from the HSE, the WSA should inform consumers and give them the appropriate advice. Where relevant the WSA must notify the EPA in accordance with the guidelines in sub-section 4 of this section. Notification is required in all cases where the lead parametric value is exceeded, and where advice is given to consumers.

5.3.24 | The Regulations require that all appropriate measures are taken to reduce the concentrations of lead in drinking water. The long term solution for dealing with failures for lead in drinking water is to replace any lead pipes with a suitable alternative. However, treatment measures to reduce plumbosolvency may be needed in many zones as an interim measure. The EPA recommends a phased approach to dealing with lead pipes giving priority to areas where lead concentrations are highest, whilst taking any opportunities, such as leak detection programmes, mains refurbishment or replacement programmes or pavement improvement works, to replace lead pipes.

5.3.25 | Generally, if lead is present **only in the WSA's pipe work**, then the WSA is required to take action to comply either by providing additional water treatment or by replacing its pipe work. If lead is present **only in the consumer's pipe work and fittings**, then the WSA should provide advice to consumers on the action they can take to reduce their exposure to lead, [but the WSA should also consider additional treatment if other premises in the supply zone also show non-compliance]. If lead is present in **both the WSA's and the consumer's pipe work**, then the WSA should consider additional treatment (particularly if other premises in the supply zone also show non-compliance), replacement of its pipe work if treatment is not effective in securing compliance and provision of advice to consumers on the action they can take to reduce their exposure to lead.

5.3.26 | The following represents the recommended phasing for the replacement of lead pipes:

- ◆ lead distribution mains in the network as an urgent priority;

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- ◆ individual lead service connections in the ownership of the WSA, whose replacement is likely to bring excessive concentrations below an acceptable level (may still not meet the standard), should be replaced as soon as practical;
- ◆ a planned annual programme for replacement of lead service connections in the ownership of the WSA which cause failures of 10 µg/l with the long term aim of phasing out such service connections;
- ◆ this annual programme should be risk based and should deal progressively with replacements of service connections to premises with vulnerable populations (such as crèches, schools, hospitals etc), the longer service connections and those connections in supplies that are significantly plumbosolvent. In relation to local authority housing stock both the WSA's service connection and the local authority's connection as the premises owner should be replaced;
- ◆ the replacement of the lead service connection in the ownership of the WSA whenever the lead service connection belonging to the owner of the premises is replaced by the owner; and
- ◆ opportunistic replacement of lead service connections in the ownership of the WSA whenever appropriate work is carried out on the distribution network such as leakage detection programmes, refurbishment or replacement of distribution mains, road and pavement improvement works etc.

5.4 Monitoring programme for non-compliant supplies

5.4.1 | The monitoring frequencies for the audit parameters are relatively low and in some cases WSAs may only need to take only one sample per year to comply with the Regulations. Thus, where non-compliance has been detected for an audit parameter it may be necessary for the local authority to increase monitoring for that parameter in the affected water supply. The purpose of increasing the monitoring frequency is to assist the WSA to determine the cause of the problem (e.g. a THM or nitrate non-compliance may only occur in certain raw water or seasonal conditions). Furthermore, in order to be able to track and confirm the effectiveness of the corrective actions taken, the WSA will need to carry out additional monitoring.

5.4.2 | As part of the action programme to be submitted to the EPA, the WSA should propose an increased monitoring programme which will be assessed by the EPA and amended if necessary. In general, in the case of microbiological non-compliances, daily

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monitoring until the problem has been resolved would be appropriate while in most circumstances weekly monitoring of the chemical parameters would be considered appropriate. Consideration will also need to be given to the sampling locations which in many cases will need to include sampling of the raw water, the treated water leaving the treatment works and water from representative locations in the distribution network.

5.5 Short term interim measures

5.5.1 | In the case of a non-compliance with the parametric values in part 1 of the schedule to the Regulations, WSAs are required by regulation 10(7) to include interim measures in the action programme. In most cases it will not be acceptable to permit the non-compliance to continue for the duration of the implementation of the action programme, which could be up to one year where there is a risk to human health. Thus the WSA must include details of interim measures to ensure that in the short term the risk of non-compliance (and hence the risk to human health) is minimised. These measures may include:

- ◆ installation of temporary treatment;
- ◆ temporary use of an alternative water supply; and,
- ◆ placing of restrictions on the supply (both in terms of water conservation and restrictions/prohibitions on consumption) in consultation and agreement with the HSE.

5.5.2 | The WSA should state which of these measures are to be used as part of the action programme. If none are to be used, it will be necessary for the WSA to justify the reasons for non-inclusion of interim measures.

5.6 Action programme timescales

5.6.1 | The WSA should prepare a GANTT chart or equivalent timetable outlining when each of the actions proposed in the action programme are to commence and to be completed. The proposed completion dates should be clearly stated. The overall action programme must be completed as soon as possible. Where the non-compliance presents a risk to human health, the action programme must be completed no later than one year from the date of its approval by the EPA. Where there is not a risk to human

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health, it must be completed no later than two years from the date of its approval by the EPA. The EPA may require a shorter timeframe for the completion of actions proposed in the action programme and the decision to require a shorter timeframe will depend on the nature of the non-compliance, the speed with which it can realistically be resolved and the risk to human health caused by the non-compliance.

5.7 Informing consumers of the action programme

5.7.1 | Regulation 10(9) places an obligation on WSAs to ensure that consumers are informed of any remedial action to be taken to improve the water supply so as to ensure compliance with the standards and indicator parameter values in the Regulations. When informing consumers of the remedial action the WSA should provide the following information:

- ◆ a brief summary of the non-compliance and possible causes;
- ◆ details of actions consumers can take to reduce the likelihood of further non-compliances (e.g. flushing standing water to reduce lead concentrations);
- ◆ details of actions members of the public can take to reduce the likelihood of further non-compliances (e.g. prevention and reporting of pollution of the source);
- ◆ a brief summary of actions to be taken by the WSA;
- ◆ an indication as to when the supply is likely to be returned to compliance; and
- ◆ details of where consumers and members of the public can get access to the full action programme (including any amendments by the EPA).

5.7.2 | WSAs must make all reasonable efforts to make sure all consumers are informed. Consumers should be informed, as a minimum, via an advertisement in the local press and/or public notice on the website of the WSA. The WSA should also consider informing consumers via leaflet drop, radio announcements, teletext notices, notices in prominent locations or other means as may be appropriate for the situation. Regular updates on the situation should also be provided. WSAs should also inform and provide local elected representatives with information and updates on the programme.

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6. Remedial Action List (RAL)

6.1 Introduction

6.1.1 | The EPA, as part of its supervisory role under the Regulations, has prepared a list of public water supplies where remedial or management action is required to ensure compliance with the requirements of Regulations. This list is called the **“Remedial Action List (RAL) for Public Drinking Water Supplies”**. The EPA uses the RAL to focus attention on resolving any deficiencies in public water supplies in order to ensure a supply of clean and wholesome drinking water. The list focuses on those issues and parameters of concern as identified in the EPA’s Annual Reports on the Provision and Quality of Drinking Water in Ireland including, in particular, high risk supplies for *Cryptosporidium*, failures of the *E. coli* parameter standard and those supplies where treatment is inadequate.

6.1.2 | The RAL is updated on an ongoing quarterly basis to include any new supplies notified to the EPA under the requirements of regulation 9 and 10 in cases where an action programme or remedial work is required to prevent, limit, eliminate or abate the failure or the risk to human health from the supply (see sub-section 5 of this section). The RAL includes supplies that had reported failures of the priority parameters in paragraph 6.1.3 in the two years prior to the Regulations coming into force where action programmes are needed or are in the process of being completed. In many instances only the primary parameter of concern is listed on the RAL but there are instances where there are compliance issues in relation to several parameters that need to be addressed (despite the fact that only one primary parameter is listed). The up-to-date RAL for public water supplies is published on the EPA’s Enforcement Network website (www.enforcementnetwork.ie) and the EPA’s website (www.enforcementnetwork.ie).

6.1.3 | The priority RAL parameters are those for which the overall compliance rate needs to improve (e.g. *E. coli*) or where additional treatment is required to reduce risk to human health (e.g. *Cryptosporidium*) or where treatment is inadequate or inappropriate (e.g. bromate and THMs). A supply will not be included on the RAL where the EPA considers the non-compliance to be trivial. The priority parameters are:

- ◆ Table A – microbiological – *E. coli*;
- ◆ Table B – chemical parameters – nitrate, trihalomethanes (THMs);

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- ◆ Table C – indicator parameters – aluminium, turbidity;
- ◆ *Cryptosporidium* – high risk supplies based on the *Cryptosporidium* risk screening; and
- ◆ Other parameters on a case by case basis which in numbers or concentrations, constitute a potential danger to human health (e.g. arsenic, bromate).

6.2 Purpose of the RAL

6.2.1 | The purpose of the RAL is to ensure that WSAs prepare and implement an action programme for each public water supply on the list. The RAL includes supplies where the primary issue to be addressed is the water treatment plant. This list does not include supplies where there are issues of quality caused by the distribution network (for example lead). The action programme should provide details on actions already taken or planned with completion dates. The action programme chosen in a particular situation should be placed in one of the following categories:

- ◆ programme to abandon, supplement or replace the water source;
- ◆ programme to up-grade the treatment facilities; or
- ◆ programme to improve operational and maintenance arrangements at treatment works.

6.2.2 | Summary details on the action programme for each supply must be submitted to the EPA as part of the WSA's annual reporting of monitoring results and other information See section 9 of this handbook. This report must be submitted by 28 February each year in respect of the previous year.

6.3 Supplies on the RAL

6.3.1 | The RAL is compiled by the EPA in consultation with the Department of Environment, Heritage and Local Government (DoEHLG) and the HSE and includes supplies which (unless the EPA is satisfied with the action taken and removes the supply from the list):

- ◆ the EPA has received notification of a failure to meet a standard or indicator parameter value in previous years;

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- ◆ are at high risk from *Cryptosporidium* (e.g. surface water treatment works with chlorination only);
- ◆ any other failures for the priority parameters noted by EPA in the annual returns on drinking water quality; and
- ◆ were found to have deficiencies during the EPA audits.

6.3.2 | Each WSA should review its RAL carefully and ensure that measures are being taken to identify and resolve the reason why the supply is listed. In carrying out this review the WSA should have regard to the guidance in sub-section 5 of this section and it should identify the appropriate solution for each supply. This may involve, inter alia, abandoning, supplementing or replacing sources, upgrading treatment facilities or improving operational and maintenance arrangements. Also each WSA should consider water conservation and leakage reduction strategies when reviewing its solutions as these can lead to reduced stress on treatment works and therefore allow improved treatment. The WSA should develop an action programme for all supplies on the RAL which prioritises the actions to deal with the highest risks first.

6.3.3 | The WSA should keep records on the action programmes for each supply. Progress in upgrading supplies on the RAL should be published on the WSAs' websites in order to keep consumers informed of actions being taken to improve the quality of drinking water. The progress by WSAs in dealing with supplies listed on the RAL will be tracked by the EPA as part of its role under the Regulations. The EPA may review these records during its audits, or may request further information as part of its role in assessing notifications under Regulations 9 or 10. The RAL is used to target enforcement actions including audits. Summary details of the action programme should be submitted to the EPA on the form at Appendix 2 and should include the following details:

- ◆ if the supply is to be abandoned, supplemented or replaced, the supplementary or replacement supply;
- ◆ if the treatment of the supply is to be up-graded, brief details of the up-grade works (e.g. the type of treatment to be installed or details of specific improvement works); and
- ◆ If the treatment works operations are to be improved, brief details of the actions to improve operations.

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6.4 Removal of supplies from the RAL

6.4.1 | The EPA acknowledges that the RAL based on the results over the previous years is historical and that in certain cases actions will already been taken and completed by the WSA to deal with the cause of the failure or reduce the risk. Therefore, the RAL is continuously up-dated by the EPA. As soon as a WSA considers that the necessary remedial action programme to deal with the failure or the risk has been completed, it should submit details of the actions by e-mail to drinkingwater@epa.ie with “RAL” and name of supply in the title. The EPA will review this information and if the EPA is satisfied that the WSA has rectified the cause of the failure or installed the appropriate treatment or taken other appropriate action, the supply will be removed from the list. It will generally not be sufficient for the WSA to argue that monitoring results alone demonstrate compliance unless action has been taken to prevent a recurrence of the non-compliance with the standard or indicator parameter value.

6.4.2 | Appendix 3 contains guidance to WSAs on the criteria that should be met before the EPA will consider removing a supply from the RAL.

7. Departures from the standards

7.1 | A departure from the parametric values specified in table B in part 1 of the schedule to the Regulations may, on application by a WSA and subject to agreement with the HSE, be granted by the EPA in relation to a water supply³, provided:

- ◆ no such departure constitutes a potential danger to human health; and
- ◆ that the supply of water intended for human consumption in the area concerned cannot otherwise be maintained by any other reasonable means.

Departures are not available for the microbiological parameters in table A or for the indicator parameters in table C of part 1 of the schedule to the Regulations.

7.2 | A departure is in effect permission to continue supplying water that does not comply with the standards whilst remedial action is taken provided there is not a potential danger to human health. The standards for many of the chemical parameters

3 This does not apply if the failure is due to the condition of the domestic distribution system (pipe work or fittings) in the premises concerned.

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are based on life long consumption and have a wide margin of safety, so that relatively short term non-compliance up to a value that is not excessively higher than the standard is unlikely to be a potential danger to human health.

7.3 | Any departure granted by the EPA must be subject to a maximum value and for a period of not more than three years initially. The EPA must obtain agreement from the HSE that a water supply containing the maximum value for that parameter for that period does not constitute a potential danger to human health. The EPA also needs to be satisfied that the water supply to the supply zone affected cannot be maintained by any other reasonable means.

7.4 | An application by a WSA for a departure must include the information specified by the EPA. This information is set out in the form at Appendix 4.

7.5 | Any departure granted by the EPA must:

- ◆ be subject to any conditions specified by the EPA;
- ◆ be for as short a period as possible and not exceed three years
- ◆ provided the non-compliance is not trivial, specify:
 - the grounds for the departure;
 - the parameter concerned, previous relevant monitoring results, and the maximum permissible value under the departure.
 - the geographical area, the quantity of water supplied each day, the population concerned and whether or not any relevant food-production undertaking would be affected.
 - an appropriate monitoring scheme, with an increased monitoring frequency where necessary.
 - a summary of the plan for the necessary remedial action, including a timetable for the work and an estimate of the cost and provisions for reviewing.
 - the required duration of the departure.
- ◆ be reviewed by the EPA prior to the end of the period of the departure to determine whether sufficient progress has been made.

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7.6 | EPA need only specify the maximum value for the parameter and the time allowed for remedying the problem when the following circumstances apply:

- ◆ the EPA considers the non-compliance with the parametric value to be trivial;
- ◆ the EPA considers that the action taken in accordance with regulation 10(4)(a) is sufficient to remedy the problem within 30 days; and
- ◆ the failure to comply with the parametric value in the supply has not occurred on more than 30 days on aggregate during the previous three months.

7.7 | A WSA granted a departure, except for a departure covered by paragraph 7.6 above, must:

- ◆ inform the affected population of the departure and the associated conditions (see paragraph 5.7.2 above); and
- ◆ give advice, where necessary, to particular population groups if the departure could present a special risk (an example of where such advice may be necessary is when a departure is granted for nitrate. Anyone bottle-feeding infants should be advised to use low nitrate bottled water for preparing infant feeds and not to use the tap water until the remedial action programme is complete).

7.8 | If the WSA cannot complete the remedial action within the specified time, the WSA may make an application to the EPA for a further departure for a period not exceeding three years. Such an application should be in the same form as specified above and must include a full explanation and justification for not meeting the timetable and for requiring a further departure.

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Appendix 1: Model form for notification of failure to meet the parametric values in part 1 of the schedule to the Regulations in accordance with Regulations 9(1) or 10(2)

Water Services Authority	
Name of water treatment works	
Name of water supply zone (s)	
Water supply zone code(s)	
Estimated population affected	
Parameter (s) affected	
Monitoring results (note 1)	
Date and location of failure	
Notification under regulation (please tick one)	Regulation 9(1) Regulation 10(2)
Has the Health Service Executive been consulted	
What advice has been provided by the Health Service Executive?	
Likely cause and duration of the failure	
Has the parameter(s) failed in this supply in the past 12 months (if so give details)?	
Immediate action taken to protect and inform consumers	
Immediate remedial action taken	
Notified by and position	
Date of notification	
Contact telephone number	

Note 1: State whether the sample was a compliance, operational or investigational sample. For microbiological failures indicate the chlorine residual at the time and whether the remedial actions set out in this section of the handbook are being implemented. Also where relevant include the most recent information on raw water quality.

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Appendix 2: form for the submission of action programme for a supply on the Remedial Action List (RAL)

Name of water supply	Water supply zone code	Primary reason supply is on the RAL	Date of exceedence of parametric value1	Proposed action (please indicate a, b or c below) abandon up-grade improve operations	Details of actions proposed	Details of interim measures	Timeframe for completion of action programme2

- 1 Provide details on the date of the most recent exceedance (if any) of the parametric value for the parameter linked to the primary reason for inclusion of the supply on the RAL. In the case of supplies on the RAL for inadequate Cryptosporidium barriers include details of the date of any positive results for oocysts in the raw or treated water, and in the case of these supplies if Cryptosporidium monitoring is not carried out then this should be detailed.
- 2 The month and year of completion of works should be inserted here. The action programme in this case means that main programme of works that needs to be carried out in order to demonstrate to the EPA that the supply should be removed from the RAL.

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Appendix 3: Guidance for the removal of supplies from the RAL

This appendix includes the criteria that should be met before the EPA will consider removing a supply from the Remedial Action List (RAL).

1. Supplies on the RAL resulting from failure to meet a microbiological parametric value

1.1 | Where the supply is on the RAL resulting from failure to meet a microbiological parametric value (i.e. E. coli or Enterococci) the supply will only be removed where the cause of the failure has been investigated and the WSA has in place the following:

- ◆ For supplies that are chlorinated:
 - continuous chlorine monitor and alarm;
 - adequate disinfection contact time (30 minutes contact time at 0.5 mg/l Cl₂);
 - duty/standby dosing arrangements at all chlorine dosing points;
 - flow proportional dosing and/or dosing linked to chlorine residual monitor (this may be waived in exceptional circumstances – e.g., where a good quality borehole supply with a low chlorine demand is being pumped at a constant rate); and
 - results of monitoring to demonstrate that the actions undertaken have been adequate (at least 3 compliant microbiological samples on different dates).
- ◆ For supplies that are treated by ultraviolet (UV) irradiation:
 - a copy of the validation cert for the UV lamp including details of the validated range of the lamp;
 - confirmation that there is a UVI or UVT monitor on the UV lamp to verify that the UV is within its validated range at all times;
 - verification that the UV has operated within its validated range at all times (i.e. a print out of the UVI or UVT readings from the monitor for the past two months);

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- ◆ confirmation that there is duty/standby or, if it is a small supply, confirmation that there is an automatic shut off in the event of failure of the UV system (i.e. no undisinfected water enters the mains);
- ◆ details of how the WSA ensures there is no contamination in the distribution network (since UV does not provide residual disinfection in the network); and
- ◆ results of monitoring to demonstrate that the actions undertaken have been adequate (at least 3 consecutive compliant samples on different dates).

2. Supplies on the RAL resulting from failure to meet a chemical parametric value

2.1 | In the case of supplies on the RAL resulting from failure to meet a chemical standard the supply may only be removed where the cause of the failure has been investigated and the WSA:

- ◆ provides details of the actions taken to address the non-compliance with that parameter; and
- ◆ provides results of monitoring to demonstrate that the actions undertaken have been adequate (at least 3 consecutive compliant samples for that parameter on different dates).

3. Supplies on the RAL resulting from failure to meet an indicator parametric value

3.1 | In the case of supplies on the RAL resulting from failure to meet an indicator parameter (i.e. aluminum or turbidity) the supply may only be removed where the cause of the failure has been investigated and the WSA:

- ◆ provides details of the actions taken to address the non-compliance; and
- ◆ provides results of monitoring to demonstrate that the actions undertaken have been adequate. This should comprise two months results of compliant daily (unless agreed otherwise with the EPA) testing at the plant (i.e. either a print out from turbidity monitor or daily manual samples) and at least 3 consecutive compliant samples from the distribution network taken on different dates.

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4. Supplies on the RAL due to the absence of an adequate barrier for the removal of *Cryptosporidium*

4.1 | In the case of supplies on the RAL because of an inadequate barrier to *Cryptosporidium* the supply should only be removed where:

- ◆ the supply has been replaced by an alternative supply which does have an adequate barrier to *Cryptosporidium*; or
- ◆ an adequate barrier (e.g. filtration, UV) has been installed and fully commissioned; and
- ◆ there are operational controls to demonstrate the effectiveness of the barrier (e.g. turbidity monitors on filters); and
- ◆ it has been demonstrated that the barrier is being operated effectively (e.g. the results of continuous turbidity monitor indicate low levels in the filtered water).

5. Supplies on the RAL following the identification of issues arising from an EPA audit

5.1 | In the case of supplies on the RAL due to the identification of infrastructural, operational or management issues arising from an EPA audit, the supply will only be removed from the RAL where significant recommendations of the audit have been fully implemented and where implementation can be verified (e.g. further audit or photos of equipment to be installed).

6. Supplies on the RAL following identification by the Health Service Executive

6.1 | In the case of supplies on the RAL due to the identification of such supplies by the Health Service Executive (HSE) the supply will only be removed from the RAL where:

- ◆ the WSA has demonstrated that it has addressed the concerns of the HSE; and
- ◆ the HSE has stated that they are satisfied that the remedial measures implemented have addressed their concerns. In this regard, a letter from the HSE should be submitted to the EPA by the WSA verifying this fact.

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Appendix 4: Model form for application for a departure from the standards in table B of the schedule to the Regulations in accordance with regulation 11

General	
Water Services Authority	
Address	
Telephone no.	
Fax no.	
E-mail address	
Contact person	
Private water supplier	
Address	
Telephone no.	
Fax no.	
E-mail address	
Contact person	
Details of the departure	
Name of water supply	
Grid reference of abstraction point	
Name of treatment works	
Name and code of supply zone	
Volume supplied	
Population served	
Treatment processes (identify any relevant to this application)	

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Details of the Departure	
Parameter(s) applied for (from table B of part 1 of schedule to the Regulations)	
Grounds for departure (Include past monitoring results, geological maps or other information in support of the application including justification that the supply of water cannot be maintained by any other reasonable means.	
Duration of departure (must not exceed 3 years)	
Details of other possible alternative sources of water for supply	
Assessment of the Impact of the Departure	
Indicate if any of the opposite use, or will use, water from the supply during departure period and give details	Hospitals/medical centres: Nursing/residential homes: Schools/colleges etc: Food production facilities: Other sensitive users (specify):

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Assessment of the Impact of the Departure	
Details of how the WSA intends to identify particular population groups for which the departure could present a particular risk and how the WSA intends to ensure that appropriate advice is given to such groups.	
Provide the advice from the HSE on whether the departure constitutes a potential danger to human health	
Monitoring	
Details of current compliance monitoring programme (number of samples and results for last 3 years for the parameter(s) above)	
Details of any increased monitoring programme (frequency of sampling for parameter(s) above)	
Remedial action plan proposed to achieve compliance	
Details of remedial action	
Timetable for this action	
Estimated cost of this action	
How the WSA will review progress with the plan to ensure completion by departure date	
State how the WSA will ensure that the population affected is informed of the departure and its conditions	

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Declaration

I hereby make an application for a departure from the parametric value(s) specified in table B of part 1 of the schedule of the European Communities (Drinking Water) (No.2) Regulations 2007 for the parameter(s) above.

I certify that the information given in the application is truthful, accurate and complete.

Name	
Position	
Signature	
Date	