



# Public Drinking Water Monitoring Programme Audit Report

<b>County:</b>	Kerry	<b>Date of Audit:</b>	22 <sup>nd</sup> August 2019
<b>Location visited:</b>	Kerry County Council Offices	<b>Date of issue of Audit Report:</b>	17 <sup>th</sup> December 2019
		<b>Auditors:</b>	Ms. Derval Devaney (EPA) Dr. John Gray (Consultant)
<b>Audit Criteria:</b>	<ul style="list-style-type: none"> <li>• The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014), as amended.</i></li> <li>• The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7).</li> <li>• The EPA Information Note on Monitoring issued January 2019 to Irish Water and Local Authorities.</li> </ul>		

## MAIN FINDINGS

- Irish Water did not notify the EPA of iron and turbidity failures which occurred in Listowel PWS in April 2018 and in Central Regional PWS in October and December 2018. The EPA became aware of the failures upon a review of the 2018 monitoring data for Co. Kerry submitted by Irish Water to the EPA in Q1, 2019.
- Weaknesses in procedures were identified, particularly for the selection and taking of compliance samples and pre-determining sampling locations to ensure that compliance samples are evenly spread and representative of water in the supply zone.
- Irish water did not carry out compliance monitoring for nitrite at public water treatment plants and there was no protocol to determine the concentrations of acrylamide, epichlorhydrin and vinyl chloride in drinking water, where these chemicals are used in treatment and supply.
- Irish Water did not have a written procedure for notifying the EPA of an indicator parameter failure nor for identifying the cause of any sample result that exceeds the parametric values outlined in the *Drinking Water Regulations (S.I. no 122 of 2014), as amended*, and the remedial action required.

## 1. Introduction

Under the *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014) as amended*, the Environmental Protection Agency is the supervisory authority in relation to Irish Water and its role in the provision of public water supplies. This audit was carried out to assess the performance of Irish Water in carrying out effective monitoring of drinking water supplies to ensure the provision of clean and wholesome drinking water.

An audit of Irish Water's 2018 monitoring programme implemented in County Kerry was carried out at the Kerry County Council Offices, County Buildings, Tralee, Kerry V92 H7VT. Prior to the audit, the EPA assessed the 2018 monitoring returns submitted by Irish Water to identify any areas of discrepancy between samples taken and analysed and reported to EPA. Using a questionnaire as a guide, Irish Water staff, Kerry County Council water services staff and Kerry County Council laboratory staff were interviewed to ascertain the principles and methodology for establishing monitoring programmes, sample point selection, sample classification, integrity of data reporting and notification procedures.

The audit observations and recommendations are listed in Sections 2 and 4 of this report. The following were in attendance during the audit:

### **Representing Irish Water:**

Kian Guihen – Drinking Water Compliance Analyst  
Sarah Kearney – Drinking Water Compliance Analyst  
Tommy Roche – Drinking Water Compliance Analyst

### **Representing Kerry County Council:**

John Breen – Director of Services, Water and Environment  
Colm Mangan – Senior Executive Engineer, Water Services  
Brian Lennon – Senior Executive Engineer, Water Services  
Kathleen Casey – Senior Executive Technician, Water Services  
Derry Bowler – Senior Executive Technician, Kerry Co. Co. Laboratory  
Andrew Scanlon – Environmental Technician, Kerry Co. Co. Laboratory  
David Lenihan – Senior Executive Chemist, Kerry Co. Co. Laboratory

### **Representing the Environmental Protection Agency:**

Ms. Derval Devaney - Inspector, EPA  
Dr. John Gray - Consultant

## 2. Audit Observations

*The audit process is a random sample on a particular day of a facility's operation. Where an observation or recommendation against a particular issue has not been reported, this should not be construed to mean that this issue is fully addressed.*

### 1. Compliance Monitoring Programme

- a) Kerry County Council (Co. Co.) has documented 62 public water treatment works which abstract water from 70 water sources and provide water to 122,000 consumers. The list of public water supplies (PWSs) is amended when changes occur such as when a water treatment plant has closed or when the source or treatment plant supplying a particular population has changed. These PWSs are managed by Irish Water and fall under the remit of the *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014), as amended*. Kerry Co. Co. operates the public water supply system on behalf of Irish Water under a Service Level Agreement.
- b) The 2018 compliance monitoring programme was prepared by Irish Water and Kerry Co. Co. It included for each PWS in County Kerry: the scheme name; scheme type; source name; treatment type; population, daily volume supplied; and the ratio of population to volume (P/V). An increased sampling frequency was applied in tourist areas where a large influx of visitors occurs.
- c) Population was derived from GIS data and Irish Water's data book (containing census figures) multiplied by an occupancy rate of 2.6 per property or volume. Kerry Co. Co. also maintains records of population which may differ slightly from that of Irish Water, but differences are not considered to impact significantly on the sampling programme. The population and volume data are reviewed by Irish Water and Kerry Co. Co. annually.
- d) The minimum number of Group A and Group B samples were identified based on the population or volume figures. The approximate date on which a sample should be taken was also specified. Regulatory changes were identified by Irish Water early in 2018 (with the introduction of the *European Union (Drinking Water) (Amendment) Regulations 2017, S.I No. 464 of 2017*) and amendments were made to the 2018 compliance monitoring programme.
- e) Kerry Co. Co. carries out the sampling programme on public water supplies on behalf of Irish Water and abide by two internal customer contracts (between Kerry Co. Co.'s Laboratory, the Water Services Department and the Environmental Services Department).
- f) Kerry Co. Co.'s Laboratory is accredited to undertake testing of potable water for some 31 routine tests for seven bacteriological, 13 chemical and three physical parameters, in compliance with the International Standard ISO/IEC 17025:2005 2<sup>nd</sup> Edition standard. Testing for other parameters not accredited is outsourced to an accredited laboratory.

- g) Compliance samples for Group A and Group B parameters are taken throughout the year, as specified in Irish Water's monthly sampling plan. Sampling locations are selected by Kerry Co. Co. (specifically by the Senior Executive Chemist in Kerry Co. Co. Laboratory) using a geodirectory kept in the laboratory. There is slight bias towards taking a greater number of samples from areas of larger populations for example in Tralee and Killarney. Kerry Co. Co. ensure that the same sampling locations are not repeated within three years.
- h) Compliance samples are taken from consumers' taps in the network or at drinking water taps in public or commercial buildings and locations (using an EN Grid Reference Number) and are manually recorded on water supply zone (WSZ) maps for each PWS. The WSZ maps are not formally reviewed to ensure samples are evenly distributed within the water supply zone but are assessed by the Senior Executive Chemist in Kerry Co. Co. Laboratory when a new monthly sampling schedule is being prepared.
- i) Irish Water have recorded sampling locations for 2019 on maps which identify WSZs which are to be made available to Kerry Co. Co. for its use and reference. Upon the auditors review of the 2019 WSZ maps, the sampling locations appeared to be evenly spread throughout the entire WSZ (e.g. for Lough Guitane WSZ). Other WSZs which had smaller populations, and therefore less Group A and Group B samples were required to be taken. In these instances, compliance Group A and Group B sampling concentrated around the main village where the largest number of consumers reside. For these small WSZs, the auditors stated it was important that operational monitoring includes sampling at the ends of the distribution system to ensure optimum water quality is being maintained throughout the entire WSZ.
- j) No compliance samples are taken from water treatment works or service reservoirs.
- k) Turbidity (for surface water supplies) and nitrite are required to be monitored for compliance purposes at the water treatment plant in addition to the network. Nitrite is not being monitored in the final water at public water treatment plants. While each water treatment plant has an online and continuous final water turbidity meter, data from continuous monitors is not used for compliance purposes.
- l) No provision has been made to analytically determine acrylamide, epichlorohydrin and vinyl chloride levels in drinking water and reliance is placed instead on product specification and accurate control of dosing of polymer at the treatment plant. However, information regarding the latter was not available to inspect during the audit to determine adherence to guidance specified in the EPA's Handbook for Public Water Supplies (Section 4, Paragraph 4).
- m) The compliance monitoring results are published on Irish Water's website (<https://www.water.ie/water-supply/water-quality/>).
- n) Details of the source water type, treatment provided, daily output and population served were reported to the EPA as part of the 2018 Annual Drinking Water Returns for supplies in County Kerry.

	<ul style="list-style-type: none"> <li>o) Some Group B parameters are taken at an increased frequency for investigative purposes when known problems exist, e.g. pesticide or trihalomethane (THM) failures in a PWS.</li> <li>p) Sampling frequencies are formally reviewed by Irish Water and Kerry Co. Co. annually and on a monthly basis to ensure the sampling programme targets are being met and there are no shortfalls in compliance monitoring. Should any changes to compliance sampling frequency be required, they would be determined by Irish Water through a risk assessment and approved by the EPA in accordance with Part C of the <i>European Union (Drinking Water) (Amendment) Regulations 2017, S.I No. 464 of 2017.</i></li> </ul>
<p><b>2.</b></p>	<p><b>Operational Monitoring Programme</b></p> <ul style="list-style-type: none"> <li>a) An operational monitoring programme was prepared for 2018 for public water supplies. Operational samples were taken as and when required of raw waters (e.g. for <i>E. coli</i>, coliforms, <i>Enterococci</i>, ammonium, turbidity, pH, iron, manganese, conductivity, hardness, chlorite and colour). Samples are also taken to monitor plant performance at various stages of the water treatment (e.g. UVT, TOC, DOC, pH, turbidity, <i>Cryptosporidium</i>, chlorine, aluminium and iron) and to optimise treatment (e.g. in the event of high trihalomethane formation potential) or to investigate non-compliant results.</li> <li>b) Group A parameters are generally used for operational monitoring purposes. Up to five samples per year are taken from source waters but the frequency depends on the size of the water treatment plant. Samples are also taken to assess the quality of any waste water / supernatant discharging from a public water treatment plant.</li> <li>c) Samples for turbidity and free chlorine are taken from treatment works where there are continuous online monitors to cross check analytical data.</li> <li>d) Operational samples are taken from service reservoirs for disinfectant and turbidity and are verified monthly by the Senior Executive Technician. Samples from hydrants and other locations in the distribution system are taken monthly for specific problems such as pesticides (samples are taken at times of increased use between April and November) or THMs (on a seasonal basis) and weekly for residual chlorine and turbidity to assess the effectiveness of disinfection and flushing programmes. Samples are also taken from the distribution system for fluoride.</li> <li>e) Water sources that are considered for return to use after a period of non-use and new borehole sources would be subject to operational sampling to determine the suitability of the source water for water treatment and supply. There is no policy for the monitoring of new sources.</li> </ul>
<p><b>3.</b></p>	<p><b>Monitoring Programmes for Specific Parameters</b></p> <ul style="list-style-type: none"> <li>a) There is a specific monitoring programme for lead which falls under Irish Water's National Lead Strategy and for radioactivity in accordance with the EPA's Annual Radioactivity Programme.</li> </ul>

#### 4. Sampling Procedures

- a) In the event that tankers or bowsers are deployed in an emergency they would be hired in. The requirement to clean tankers is contained in the Drinking Water Incident Response Plan and specifies the use of food tankers and the cleaning protocol required which involves dilute caustic soda solution followed by chlorinated water. Proof of cleaning is required by Kerry Co. Co. However, the incident response plan did not outline the sampling protocol to be used in the event of use of a tanker, as required by the EPA handbook for Public Water Supplies. In addition, the requirement to record the use of tankers as required by the EPA Handbook for Public Water Supplies was not identified. Kerry Co. Co. stated that the recording of tankers may be something that the caretakers record at the plant.
- b) Kerry Co. Co. have in place a Standard Operating Procedure (SOP) for sampling (Sampling– P-001 – Rev 19/08/19). Although sampling details were limited there were adequate references to other documents where additional detail could be found on, for example, preparation of sample containers and methods for carrying out on-site tests. Although the procedure requires bacteriological samples to be placed in a cool box for transport, no guidance is given for the maximum time period within which bacteriological samples should be returned to the laboratory for analysis. Such a critical constraint should be identified in the main body of the SOP. Guidance of the selection of a sample tap is included.
- c) There is no procedure for the selection of sample locations or alternative sample locations.
- d) The manual is a controlled document subject to regular review by all users and annually by an internal quality audit team. A named person is responsible for issuing the manual and all laboratory staff hold a copy. Records are kept of its issue and the Information Technology (IT) system audits access to the electronic location where the manual resides. Amendments are notified by email to all users and the document identifies the latest issue. Changes are audited by laboratory staff.
- e) Daily worksheets are provided by the Senior Executive Chemist by email to the samplers who may download a hard copy if required. The worksheet identifies compliance samples and includes the date of sampling, location, type of sample (compliance, operational) and the reference number for the location.
- f) No adhesive sample labels are used, and samples are labelled by marker pen. The laboratory intends to institute a system of pre-printed bar-coded adhesive labels. Compliance samples are pre-designated as Group A or Group B. The Laboratory Information Management System (LIMS) system does not allow the generation of duplicate sample numbers. Individual and unique sample numbers are generated when samples are logged on to the system by laboratory staff.
- g) Field sheets are used by samplers to record sample details and the results of any on-site tests together with details of the cool box in use and data retrieved from the data logger. Any amendments to the fieldsheet are corrected using a single

	<p>line strike-through which must be initialed.</p> <p>h) While sampling, if it is not possible to collect a sample at the sampler’s intended sampling location, an alternative location would be selected by the sampler, usually a neighbouring property within 500m of the planned sampling location. The reason for selecting a particular alternative sampling point is not recorded in the samplers fieldsheet and there is no protocol for guiding the selection of alternative addresses should the initial sample point be inaccessible. A record of the selection of an alternative sample location and its grid reference number is entered into the samplers’ worksheet. It is stipulated in the SOP that repeat samples should not be taken from the same location.</p> <p>i) Sample details are recorded manually in the laboratories Databook and the LIMS system. A chain of custody is maintained throughout the sampling process which records personnel involved, sample details, refrigeration units used and analytical requirements.</p>
<p><b>5.</b></p>	<p><b>Data Handling</b></p> <p>a) Analytical and associated data is recorded on the sampler’s worksheet for on-site tests such as residual disinfectant, taste, odour and temperature. Results of laboratory tests are available on the printouts from the analytical instruments. Results are recorded manually by the relevant analyst in the laboratory in Databooks and on the LIMs system.</p> <p>b) After Analytical Quality Control (AQC) checks have been verified, data is entered on the LIMs system and is validated by the Senior Executive Chemist. Should the AQC data be out of limits or showing adverse trends, the method is revalidated before being used for compliance analysis. No changes may be made to data once it has been validated. The system is capable of producing an audit trail of access to the system and of data entries.</p> <p>c) If the data from the laboratory is shown subsequently to be incorrect, a new laboratory report would be issued, and corrected data entered on the system.</p>
<p><b>6.</b></p>	<p><b>Exceedances of Parametric Values</b></p> <p>a) In 2018 Kerry Co. Co. had a protocol for the management of drinking water results (V5, printed on 19 August 2019). The Health Service Executive (HSE) also issued a “Guideline for the Management of Initial Notification of a Drinking Water Issue of Potential Danger to Human Health”.</p> <p>b) Irish Water has developed a protocol (IW-PRT-EPA-001) for the notification of failures of chemical and microbiological parameters and recording the initial consultation (INR) with relevant stakeholders, which was rolled out for use nationally in 2019.</p> <p>c) An alert protocol has been developed by Kerry Co. Co. Laboratory for use from 2019, which relies on the notification by email of microbiological failures to relevant staff of the local authority. It was not possible to verify from the protocol the actions that would be taken by Kerry Co. Co. in the event of a non-compliant sample. The relationship between the protocol and other procedures was also</p>

	<p>not clear (e.g. roles and responsibilities of personnel involved and subsequent communications and actions to be taken to protect consumers were not included).</p> <p>d) Non-compliant data associated with compliance, operational and investigative samples is required to be reported to the EPA. Circumstances surrounding the failure to notify EPA as soon as practicable via ODWNS on a number of occasions when exceedances occurred for a number of parameters were discussed. Particularly three occasions when iron exceeded the 200 µg/l parametric value; 744 µg/l on 08/10/18 and 209 µg/l on 04/12/19 in Central Regional Lough Guitane PWS and 2,315 µg/l on 23/04/18 in Listowel PWS. The Lough Guitane sample of 08/10/19 also had a significant turbidity failure of 26.1 NTU and the Listowel PWS sample had a turbidity failure of 19.1 NTU. These parameters are indicator parameters and Irish Water had no procedure in place regarding the notification of these parameter types to relevant personnel, such as the HSE and EPA. The audit showed there was apparent inconsistency within Irish Water in the notifying of indicator parameters to the EPA.</p> <p>e) There are no procedures in place to guide the identification of reasons for non-compliant results and remedial actions required. However, completion of the Irish Water INR protocol would somewhat assist in identifying reasons for the non-compliance.</p>
<p><b>7.</b></p>	<p><b>Review of Sampling Data</b></p> <p>a) Samples were collected mainly on Mondays and Tuesdays.</p> <p>b) Sample collection was generally well distributed throughout the year.</p> <p>c) The first samples in 2018 were taken on 8 January and the last on 11 December.</p>

### 3. Auditors comments

Arrangements by Kerry County Council with the oversight of Irish Water in assessing the quality of public water supplies for 2018 was generally found to be satisfactory.

Weaknesses were highlighted however in relation to procedures around sampling, monitoring and the notification of failures. For example, there was no procedure in place for the notification of indicator parameters to the EPA which led to the non-notification of a number of significant parametric failures to the EPA during 2018. Compliance monitoring was also lacking for some specified parameters (for e.g. nitrate, acrylamide, etc.).

Weaknesses were also identified in the sampling procedures regarding the selection of monitoring locations and suitable alternative sample locations (to ensure samples are randomly pre-selected prior to a sampling event) and in the transportation of bacteriological samples. It is therefore recommended that a review of such procedures is undertaken by Irish Water and Kerry Co. Co. to ensure appropriate sampling procedures are in place, the HSE and the EPA is notified as necessary of failures in a water supply and appropriate investigations and any remedial action specified in the

procedures are undertaken.

#### **4. Recommendations**

##### **Compliance Monitoring Programme**

1. Irish Water should ensure that:
  - a) compliance monitoring for nitrite and turbidity (for PWSs that are sourced from surface waters) is undertaken, as required, at water treatment plants and is incorporated into the annual compliance monitoring programme;
  - b) a protocol is put in place to ensure acrylamide, epichlorohydrin and vinyl chloride levels in drinking water are determined at the required frequency where such chemical is used in the water treatment process or where uPVC pipes are used for distribution mains;
  - c) the compliance sampling programme includes specific predetermined sampling locations and predetermined narrow window of sampling dates;
  - d) the compliance programme has predetermined alternative sample locations in the event that a sample location is unsuitable.
  - e) in instances where the required number of compliance samples to be taken are limited (i.e. due to the WSZ having a small population or volume), operational monitoring locations should be planned to ensure it represents, as accurately as possible, the quality of water throughout the entire WSZ;
  - f) WSZ maps are continually updated with sampling locations and that these maps are issued to Kerry Co. Co. Samplers should be provided with the WSZ maps to ensure sample locations are selected in accordance with the compliance monitoring programme's pre-determined sampling locations and taken within the WSZ;
  - g) a formal review is undertaken of compliance samples taken across all WSZs to ensure that they represent as accurately as possible the quality of water throughout the entire WSZs.

##### **Operational Monitoring Programme**

2. Irish Water should develop a procedure and implement a programme for monitoring new sources that are to be introduced to a public water supply treatment plant.

##### **Sampling Procedures**

3. Irish Water should ensure that:
  - a) it reviews the sampling procedure for compliance sampling and ensure that the sampling manual, which is a controlled document, identifies sampling methods for all parameters, disinfection of taps, timing and temperature limitations to ensure samples are transported under appropriate conditions and in a timely manner, and any other appropriate information;
  - b) the sampling procedure used by contract laboratories is adequate and that samples are transported under appropriate conditions and in a timely manner;

- c) a formal protocol is established and implemented for the selection of random addresses for compliance monitoring at consumer's premises and for the selection of alternative addresses, if required in the event that a sample location is unsuitable or inaccessible;
- d) the sampling procedure includes the need to record, in the sampler's field sheet, the sampler's reason for selecting alternative sample locations;
- e) the use of permanent marker pens for the labelling of sample containers is replaced as soon as possible with self-adhesive, bar coded, pre-printed labels; and
- f) Section 4, Paragraph 5 of the EPA's Handbook is adhered to in relation to sampling required of water in tankers and that appropriate records are kept of their preparation and deployment.

### **Exceedances of Parametric Values**

- 5. Irish Water should:
  - a) ensure that the EPA is notified as soon as it becomes aware of a failure to meet the parametric values in Part 1 of the schedule of the Drinking Water Regulations 2014, as amended;
  - b) develop and implement a written procedure for dealing with sample results that exceed the parametric values outlined in the Drinking Water Regulations (SI no 122 of 2014), as amended. The procedure should include:
    - i. actions to be taken to investigate the exceedance and determine its cause,
    - ii. reporting the exceedance to the HSE, the EPA and any other relevant party, and
    - iii. remedial action required.

The circumstances that constitute trivial and the more serious exceedances should be clearly defined. Reference should be made to the EPA's Handbook Section 6, Paragraph 4.3 regarding the reporting of non-compliance with indicator parameters and Regulation 9 of the Drinking Water Regulations 2014 regarding consultation with the HSE on risk to public health when a failure occurs.

### **Follow-Up Actions required by Irish Water**

This report has been reviewed and approved by Emer Cooney, Inspector, EPA.

Irish Water is recommended to put such measures in place as are necessary to implement the recommendations listed in this report. The actions by Irish Water to address the recommendations taken may be verified by the Agency during any future audits.

The EPA also advises that the findings and recommendations from this audit report should, where relevant, be applied on a national basis to future public water supply monitoring programmes.

**Report prepared by:**

\_\_\_\_\_  
Derval Devaney  
Inspector

**Date:**

\_\_\_\_\_  
17/12/19