



# Public Drinking Water Monitoring Programme Audit Report

<b>County:</b>	South Dublin	<b>Date of Audit:</b>	22 <sup>nd</sup> August 2018
<b>Location visited:</b>	Dublin City Council Central Laboratory	<b>Date of issue of Audit Report:</b>	29 <sup>th</sup> November 2018
		<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. No. 122/2014), as amended.</i></li> <li>• The <i>EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7).</i></li> </ul>		

## MAIN FINDINGS

- The monitoring programme is generally satisfactory although some weaknesses were highlighted in relation to the pre-determined selection of consumers' properties for sampling and the distribution of those samples within a Public Water Supply zone to ensure that the compliance samples are representative of water in the entire water supply zone.
- The process used by Dublin City Council Central Laboratory for the labelling of samples on-site could be susceptible to loss of integrity.
- There was no documented procedure for reacting to exceedances of the parametric values outlined in the *European Union (Drinking Water) Regulations 2014 (S.I. No. 122/2014), as amended.*

## INTRODUCTION

Under the *European Union (Drinking Water) Regulations 2014 (S.I. No. 122/2014), 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 (PWS). 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 the Irish Water's 2017 monitoring programme implemented in County South Dublin was carried out at Dublin City Council Central Laboratory on 22<sup>nd</sup> August 2018. The South Dublin area has four PWSs, namely South Dublin (SD) Zone 1 Ballyboden, SD Zone 2 Ballymore Eustace, SD Zone 3 Brittas and SD Zone 4 Leixlip/Ballymore. Prior to the audit, the EPA assessed monitoring returns to identify any areas of discrepancy between samples taken and analysed and reported to EPA for these four PWSs and what was observed during the audit and required to be reported. Using a questionnaire as a guide<sup>1</sup>, Irish Water, South Dublin County Council and Dublin City Council Central Laboratory staff were

<sup>1</sup> The questionnaire was based on those used by the Drinking Water Inspectorate, London, and modified by Dr John Gray for the purpose of this audit.

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 Section 2 and 4 of this report. The following were in attendance during the audit.

Representing Irish Water: (\*indicates that person was also present for the closing meeting)

Mr. Andrew Boylan – Irish Water, Drinking Water Compliance Specialist\*

Mr. Brian Walsh – Irish Water, Drinking Water Compliance Analyst\*

Mr. Francis Glancy – Irish Water, Drinking Water Compliance Analyst\*

Mr. Brian Boylan – Irish Water, Reporting Specialist\*

Ms. Aileen O’Connell – Dublin City Council, Central Laboratory\*

Ms. Sheila Hourigan– Dublin City Council, Central Laboratory\*

Ms. Imelda Averill – Dublin City Council, Central Laboratory\*

Ms. Claire Cummins – Acting Senior Executive Engineer, Dublin City Council\*

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.	<p><b>Compliance Monitoring Programme</b></p> <ol style="list-style-type: none"> <li>a. The 2017 compliance monitoring programme was prepared by Irish Water and provided to South Dublin Co. Co. and the Central Laboratory. It included a list of all public water supplies serving South Dublin, the population data for each supply, the required number and frequency of all check and audit samples and approximate sample locations.</li> <li>b. The four public Water Supply Zones (WSZ), SD 1 – 4, have been delineated by the Environmental Regulation Team of Irish Water, in agreement with Irish Water’s Asset Intelligence Team according to volume of water supplied and population.</li> <li>c. A review of the temporal and spatial distribution of sampling, to ensure sampling represents the supply as accurately as possible, is carried out by Irish Water. The four WSZs and their 2017 regulatory and investigative monitoring have been mapped. Irish Water stated that the Water Supply Zones are in a constant state of flux in response to supply and demand requirements. The samples taken during 2017 and mapped for SD Zones 1 - 3 indicates that sampling locations are not representative of the entire WSZ. However, there appeared to be an even spread of regulatory samples taken during 2017 for SD Zone 4.</li> <li>d. The number of samples required in each WSZ was based on the volume of water supplied to the WSZ if the ratio of population to volume was &gt;2.2, otherwise sample numbers were based on population. The coefficient is based on an understanding by South Dublin Co. Co of occupation rates. Population data is reviewed annually and South Dublin Co. Co. advises of any changes it becomes aware of. Census data produced at four yearly intervals is also considered.</li> <li>e. Samples were collected within a monthly period although the precise dates on which to take the samples were not pre-determined. Samplers are directed by Dublin Co. Co. Central Laboratory (DCCCL) to sample from a specific area by listing road or street names to be sampled from within that month. Therefore, specific addresses are not listed in the compliance monitoring programme. Instead DCCCL identified a specific area based on consideration of the location of previous samples, which were recorded in field sheets to</li> </ol>
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	<p>include name, address and telephone number of residences sampled previously. A random number generator is used as an aid in the selection of locations for check samples. Audit samples are focussed on major areas of population. Suitable alternative sample locations were not pre-determined in the 2017 monitoring programme and only properties where there is an indication that someone is in on the day are approached.</p> <ul style="list-style-type: none"> <li>f. All samples are taken from taps in consumers' properties or taps in public or commercial buildings. Potential issues were identified by DCCCL regarding the concerns expressed by some consumers regarding the large number of sample bottles required on some occasions which entails collecting a large volume of water from their tap which can be a time-consuming process and may have cost implications regarding water usage.</li> <li>g. A number of WSZ were sampled at a reduced frequency for nitrite. No WSZ are sampled at an increased frequency for regulatory samples.</li> <li>h. Compliance samples are taken from consumers taps in the network as required and not from water treatment plants or service reservoirs. Samplers also carry out analysis using calibrated portable instrumentation to cross-check against data from grab samples taken in the network and on-line monitoring data taken at the water treatment plants or reservoirs for significant parameters including turbidity, aluminium, iron and residual chlorine.</li> <li>i. Examination of data recorded by EPA showed an apparent shortfall in regulatory monitoring. Seven samples for colour appeared not to be taken as part of some check and audit compliance sampling in all four WSZ. Data held by Irish Water confirmed there was no shortfall and the discrepancy was attributed to the nomenclature used for recording the term "colour" when submitting the data to the EPA via EDEN. The EPA and Irish Water are working to address this discrepancy.</li> </ul>
<p><b>2.</b></p>	<p><b>Operational Monitoring Programme</b></p> <ul style="list-style-type: none"> <li>a. The 2017 operational monitoring programme was prepared by Irish Water and includes sampling from raw water sources (feeder streams and rivers), water treatment plants, service reservoirs, the distribution system and consumers' taps. The parameters examined are dependent on a number of factors including the site, time of year and historical data.</li> <li>b. Data on samples taken from the distribution system are recorded in the caretaker's handbook. Residual chlorine concentrations are also mapped to visually indicate potential areas of concern.</li> <li>c. DCCCL produce and circulate to interested parties a monthly summary of operational monitoring carried out at the raw water intake, water in process of being treated, the final water outlet and reservoir inlet and outlets. Monitoring included <i>Cryptosporidium</i> and <i>Giardia</i> at the raw and final water, aluminium residuals ex waterworks and a suite of other parameters including microbiological and chlorine residuals taken at the plant and reservoirs.</li> <li>d. No provision has been made to determine acrylamide, epichlorhydrin and vinyl chloride levels in drinking water and reliance is placed on well-defined product specification and accurate control of delivery of polymer at the treatment plant.</li> </ul>
<p><b>3.</b></p>	<p><b>Monitoring Programmes for Specific Parameters</b></p> <ul style="list-style-type: none"> <li>a. Specific monitoring programmes were in place in 2017 for lead, trihalomethanes and pesticides and were in accordance with Irish Water's national programmes. Radiological parameters were sampled in accordance with the EPA's annual monitoring programme.</li> <li>b. There is a procedure for the cleaning, testing and storage of tankers which are held in readiness for deployment when required in response to incidents. Appropriate taps are fitted and "Advice to boil water" notices are fixed to the tankers which are uniquely identified and certified when ready for use.</li> </ul>
<p><b>4.</b></p>	<p><b>Sampling Procedures</b></p> <ul style="list-style-type: none"> <li>a. The sampling procedure is a controlled document which was issued in December 2015 by DCCCL. Daily worksheets are issued to samplers by DCCCL and identify regulatory (check and audit samples) and non-regulatory (investigative or operational) samples to be taken. Samples are transported in clean and numbered cool boxes, the temperature of which is recorded before, during and after the sampling round.</li> </ul>

	<ul style="list-style-type: none"> <li>b. DCCCL staff undertake the sampling. Results from field tests are recorded by the sampler on daily worksheets.</li> <li>c. Bottles for compliance samples are labelled at the time of sampling using a marker pen which could lead to a loss of sample integrity. Adhesive labels for all sample bottles are printed at the laboratory when the samples are logged in to the Laboratory Information Management Systems (LIMS). These labels identify the analytical requirements. A list is prepared of all samples requiring the same analyses.</li> <li>d. Sample numbers are generated sequentially and duplication of numbers is not possible.</li> </ul>
<p><b>5.</b></p>	<p><b>Data Handling</b></p> <ul style="list-style-type: none"> <li>a. Field data is entered onto the laboratory system by the sampler when logging in the samples. Printed labels with adhesive backing are produced which are attached to the individual sample containers. The information on these labels allows for batching of analyses.</li> <li>b. Analytical data from the laboratory is entered onto the LIMS by the analysts and subsequently authorised by the Senior Scientific Officer. The Technical Manager ensures that appropriate analytical quality control (AQC) is associated with each analysis.</li> <li>c. Any changes made to data on LIMS are automatically recorded and an audit trail of entries can be produced. Once data has been validated on LIMS, no changes can be made.</li> <li>d. If the data recorded is subsequently shown to be incorrect, the Technical Manager would investigate and, if appropriate, issue a revised laboratory report which would again require authorisation by the Senior Scientific Officer.</li> </ul>
<p><b>6.</b></p>	<p><b>Exceedances of Parametric Values</b></p> <ul style="list-style-type: none"> <li>a. Although there is no documented procedure, Irish Water hold a template protocol outlining the actions to be taken where a sample result shows an exceedance of the microbiological or chemical parametric values outlined in the <i>European Union (Drinking Water) Regulations 2014 (S.I. No. 122/2014), as amended</i>. The template is held by Irish Water, but not by South Dublin Co. Co.</li> <li>b. There is a documented procedure for DCCCL’s notification of exceedances to South Dublin Co. Co. who would in turn contact Irish Water and HSE to determine the most appropriate response.</li> <li>c. DCCCL produce and circulate to interested parties a monthly summary of drinking water quality in the distribution system which identifies the number of check and audit samples undertaken for that month and the parameters that were exceeded. Although no written procedure is in place, DCCCL notify all parametric exceedances to South Dublin Co. Co. via email.</li> <li>d. All parametric exceedances are notified to the relevant water service area personnel within South Dublin Co. Co. and plant caretakers are notified by their operational engineer.</li> <li>e. All actions taken in 2017 regarding the response to failures are documented and provided to Irish Water in monthly Key Performance Indicator meetings.</li> <li>f. The 2017 Drinking Water Monitoring Returns submitted by Irish Water to the EPA identified five exceedances in the four public water supplies for South Dublin. These were all investigated as follows: <ul style="list-style-type: none"> <li>i. An iron failure of 207 ug/l in SD Zone 2 on 07/11/18 was reported in the 2017 Drinking Water Returns. A re-sample was taken on 16/11/17 and was compliant. Irish Water explained that this parameter was not reported to the EPA at the time of occurrence via Online Drinking Water Notification System (ODWNS) as it was an indicator parameter and there were no previous failures in that district within the previous 12 months.</li> <li>ii. The iron failure of 222 ug/l in SD Zone 2 on 18/05/17 reported in the 2017 Drinking Water Returns was rectified by cast iron mains replacement on Limekiln Road and follow up sampling was compliant. This failure was notified via ODWNS to the EPA at the time of the failure but the date of the failure reported was 15/05/17. Irish Water explained that there must have been an error when reporting the failure date via ODWNS.</li> <li>iii. The 2017 Drinking Water returns showed one sample taken on 05/04/17 from SD Zone 2 contained 22 no. total coliforms/100ml. Irish Water explained that the chlorine residual sample in the failed result was satisfactory and samples taken from the same area that day</li> </ul> </li> </ul>

	<p>and the day before were compliant. A further sample from the failed premises was arranged when the householder returned the following week.</p> <p>iv. The 2017 Drinking Water returns showed one sample taken on 02/11/17 from SD Zone 2 contained one coliform/100ml and a repeat sample was satisfactory.</p> <p>v. The 2017 Drinking Water returns showed a sample taken on 12/06/17 in SD Zone 4 contained MCPA at a concentration of 0.242 µg/l. The failure was also notified to the EPA via ODWNS and further investigational sampling was initiated with liaison between South Dublin Co. Co and Irish Water.</p>
<b>7.</b>	<p><b>Review of Sampling Data</b></p> <p>a. Samples were primarily collected on Tuesdays and Thursdays and fewer on Mondays and Wednesdays.</p> <p>b. Sample collection was well distributed throughout the year.</p> <p>c. The first samples in 2017 were taken on 12 January and the last on 20 December.</p>

### 3. AUDITORS' COMMENTS

The 2017 monitoring programme drawn up by Irish Water and implemented by Dublin City Council Central Laboratory and South Dublin Co. Co. was generally found to be satisfactory in assessing the quality of water in public water supplies. The auditors note and welcome the production and circulation by DCCCL of monthly summaries of water quality.

Weaknesses were highlighted in relation to the predetermined selection of consumers' properties and the distribution of sampling across the entire WSZ. It was also noted that documented procedure outlining the action to be taken in responding to exceedances of the parametric values outlined in the *European Union (Drinking Water) Regulations 2014 (S.I. No. 122/2014), as amended* was lacking. A review of monitoring data submitted to the EPA by Irish Water determined that sample results were accurately reported to the EPA for the 2017 Annual Drinking Water Returns and failures in the distribution network appeared to be promptly investigated and by the Water Supplier.

### 4. RECOMMENDATIONS

#### Compliance Monitoring Programme

1. Irish Water should ensure its compliance monitoring programme, prepared before the start of each sampling year, includes a list of predetermined sampling dates and sampling locations and is provided to samplers.
2. Irish Water should provide predetermined alternative sample locations to samplers in the event that a sample location is unsuitable or inaccessible.
3. Irish Water should ensure that sampling is representing the water supply zone as accurately as possible and that the spread of sample days, times and locations within a monitoring programme should be as wide as possible.
4. Irish Water should ensure all public water supplies are monitored for compliance at their required frequencies. To obtain approval by the EPA for a reduction in the monitoring frequency of a parameter (e.g. nitrite), the *European Union (Drinking Water) (Amendment) Regulations 2017 (S.I. 464 of 2017)* and specifically Part C of these regulations require Irish Water to complete a risk assessment in its determination of a derogation from the required sampling frequencies and parameters set out in the Drinking Water Regulations.
5. Irish Water should continue to work with the EPA to ensure that the nomenclature used for reported data for colour is that required by EPA.

### Sampling procedures

6. Irish Water should review Dublin City Council Central Laboratory's labelling of samples on-site as the current labelling process may be susceptible to loss of sample integrity.

### Exceedances of Parametric Values.

7. Irish Water should complete a written procedure for dealing with sample results that exceed the parametric values outlined in the *European Union (Drinking Water) Regulations 2014 (S.I. No. 122/2014), as amended* and issue to relevant personnel. The procedure should include actions to be taken to investigate an exceedance and report the exceedance to the HSE, the EPA and any other relevant party.
8. Irish Water should ensure that failures are accurately reported to the EPA via ODWNS (e.g. that the date of failure reported is correct).

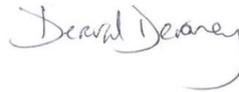
### FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

This report has been reviewed and approved by Emer Cooney, 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 will 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 to the monitoring programmes of all public water supplies operated and managed by Irish Water.

Report prepared by:



Date:

29<sup>th</sup> November 2018

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EPA Inspector

John Gray, Consultant