



Public Drinking Water Monitoring Programme Audit Report

County:	Cork	Date of Audit:	28 th September 2017
Location visited:	Inniscarra Water Treatment Works	Date of issue of Audit Report:	15 th December 2017
		Auditors:	Ms. Derval Devaney (EPA) Dr. John Gray (Consultant) Mr. Niall Dunne, (EPA)
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>. • <i>The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)</i>. 		

Main Findings

- Arrangements for the compliance monitoring programme for public water supplies in County Cork were found to be generally satisfactory.
- The distribution of sample days, times and specific locations within the compliance monitoring programme was limited to certain locations, days and weeks within each month.
- Irish Water did not notify the EPA of indicator parameter failures where required and should review and modify, as necessary, its procedures for notification of failures to the EPA.
- Irish Water has some draft documents that should be finalised and issued to relevant recipients as controlled documents (e.g. actions to take upon exceedances of parameters and response to incidents).

1. Introduction

Under the *European Union (Drinking Water) Regulations 2014* 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 public water supplies to ensure the provision of clean and wholesome drinking water.

An audit of the Irish Water's 2016 monitoring programme implemented in County Cork was carried out at the Inniscarra Water Treatment Works on 28th September 2017. Prior to the audit, the EPA assessed

monitoring returns, to identify any areas of discrepancy between samples taken and analysed and reported to the EPA. Using a questionnaire as a guide, Irish Water and Cork County Council 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.

There are 177 public water supplies in County Cork, as detailed in the 2016 Drinking Water Returns, which are operated by Irish Water and regulated by the EPA.

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:
Deidre O'Loughlin, Irish Water Compliance Specialist Eliz Hipwell, Cork County Council, Senior Executive Chemist Pat Kelly, Cork County Council, Water Liaison Engineer David Sheehan, Cork County Council, Laboratory Technical Manager Jacinta Reynolds, Cork County Council, Senior Scientist Denis Lyons, Cork County Council, Chief Technician Karen Condon, Cork County Council, Assistant Staff Officer
Representing the Environmental Protection Agency:
Ms. Derval Devaney, Inspector, EPA Niall Dunne, 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.

<p>1.</p>	<p>Compliance Monitoring Programme</p> <p>a) The compliance monitoring programme for 2016 was prepared by Irish Water and issued to Cork County Council. The summary programme for 2016 and programme for 2017 were viewed. Historically, the sampling frequency was determined by the size of the population. The programme for 2016 was generally based on volume being supplied or the population divided by five. If the ratio was <5 then the number of samples was increased. If the proportion was >5 the sampling frequency was determined by the population with a safety factor of 10%. The sampling programme is reviewed at the end of the year with the population being assessed by the Local Authority and Irish Water's Asset Intelligence staff. Irish Water and Cork County Council have in the past delineated the water supply zones using data from the 2011 census and a review using 2016 data is planned. It is recognised that information from Irish Water's Asset Management may differ from that known to exist on the ground and that coordination is required. Cork County Council will in future investigate inconsistencies. Irish Water will also progress the issue and improve on its communications.</p> <p>b) The required numbers of check and audit samples are recorded in the sampling protocol.</p>
------------------	--

It is possible that more samples than are legally required may on occasion be taken. A summary of the 2016 schedule for check and audit samples for public water supplies was examined. This sampling plan is also held electronically.

- c) The minimum number of check and audit samples required are identified and the approximate date on which a sample should be taken is recorded. The compliance monitoring results are published in summary form on Irish Water's website (<https://www.water.ie/water-supply/water-quality/results/summary/>).
- d) Details of the source water type, treatment provided, daily output and population served were reported to the EPA as part of the 2016 Annual Drinking Water Returns for supplies in County Cork.
- e) Data pertaining to Allow Regional Public Water Supply was examined together with colour coded maps of public water network for Zone 1 and Zones 2, 3 and 4. Maps showed the mains layout, group schemes and fixed sample points.
- f) Check samples are generally taken at the same location each year. Audit samples are taken at randomly selected locations with consumers being first notified by letter of an intended sampling visit. The locations of samples taken in previous years is reviewed by the Water Liaison Engineer to ensure that the current year's locations truly represent the quality of the water supplied throughout the supply areas. Samples are taken approximately monthly.
- g) Should it not be possible to take a sample from the pre-determined location, adjacent properties would be approached up to a maximum of three attempts. All sampling locations are at the consumers' tap or taps in public or commercial buildings.
- h) Sampling frequencies for each supply zone are specified in the 2016 programme. Applications for monitoring derogations were received by the EPA from Irish Water in respect of audit monitoring of public water supplies for several parameters. Monitoring derogations for the sampling of several parameters in 57 PWS during 2016 were approved. However, certain parameters were not approved by the EPA for City Import PWS and Cois Tobair PWS because insufficient evidence was provided (two years of data was provided instead of the required three years). Middleton PWS was not approved for a PAH derogation as one result was greater than 90% of the parametric value and not less than 50%. It should be noted that previous approvals for reductions in monitoring cannot be transferred under the new regulations; *European Union (Drinking Water) (Amendment) Regulations 2017* (S.I. No. 464 of 2017). Any future application to the EPA for a reduction in monitoring will require the Supervisory Authority to carry out a risk assessment in support of its application.
- i) No samples are taken for compliance purposes from treatment plants or service reservoirs. Monitoring of water quality at weekends is reliant on on-line instrumentation and the SCADA system. The data is not used for compliance purposes.
- j) Check samples and some audit samples are analysed at the Inniscarra laboratory which is accredited for these parameters. The remaining audit samples are analysed by ELS who are accredited. Sampling for *Cryptosporidium* is subcontracted to Ruskin laboratories.
- k) Apparent shortfalls in monitoring for six parameters occurred in the Whitefield/Ryefield zone during 2016, however this zone was amalgamated into the Whitechurch PWS zone, so monitoring during 2016 was not required. Irish Water had not put an end date (e.g. of 31/12/15) for this supply into EDEN. Shortfalls in sampling for metals occurred in the Charleville zone. This was attributed to an error in EPA not recording the approval of the derogation applied for. All other shortfalls, 192 in total, were for the determination of colour. The shortfall was thought to be either attributed to the fact that the determinand was recorded on Labworks as "True colour" and not exported to EPA as "Colour" or due to the guidance issued by Irish Water relating to uploading Colour data to LabWorks.

	<p>l) Upon review of the 2016 compliance data returns submitted to the EPA, it is evident that most samples from PWS for bacteriological analysis were taken on Monday (265), Tuesday (631) and Wednesday (212) with a very few taken on Thursday (6). None were taken on Friday or over the weekend. Cork County Council confirmed that the Thursday samples were repeat samples as a result of failures found earlier that week in the sampling round.</p> <p>m) Consideration of the data for total coliforms show that the first sample date for Cork County Council was 12th January 2016 and the last 20th December 2016. If these circumstances are repeated year on year then it is apparent that no compliance samples are taken for a period approaching three weeks.</p>
<p>2.</p>	<p>Specific Monitoring Programme</p> <p>a) An operational monitoring programme is in place for turbidity and aluminium at treatment plants together with on-line streaming current detectors where required to monitor plant performance or to optimise water treatment. There is no chloramination and nitrite is not monitored. Acrylamide, epichlorohydrin and vinyl chloride compliance may be determined by product specification and do not need to be monitored directly. However, there is no provision for determining acrylamide, epichlorohydrin or vinyl chloride in drinking water.</p> <p>b) Cork County Council use an in-pipe camera to assess the internal condition of the water mains.</p> <p>c) There is now no raw water monitoring programme, the earlier programme that was in place in Cork County Council has been subsumed into a programme run by Irish Water.</p> <p>d) Audit samples for pesticides are taken in spring and autumn at the times of maximum application. A draft procedure has been developed by Irish Water to increase the rate of sampling (investigative) to monthly intervals between April and November in the event of non-compliance. A standard suite of 21 pesticides was included in the 2016 audit monitoring programme.</p> <p>e) A specific programme is in place for audit monitoring of trihalomethanes with additional samples taken in response to non-compliances. However, samples for trihalomethanes were not taken at times to maximise the likelihood of detecting non-compliances, which is usually from September onwards on surface water when vegetation is decaying.</p> <p>f) Although there is no specific monitoring programme for lead, lead is included in the routine audit checks and Irish Water has a National Lead Strategy in place.</p> <p>g) Further information is to be sought by Cork County Council of EPA regarding monitoring for radioactivity.</p> <p>h) In the event that tankers are deployed in an emergency, the sampling protocol according to the EPA handbook would be followed. Tankers have not been deployed recently.</p> <p>i) There is a programme of sampling for <i>Cryptosporidium</i> and risk assessments have been carried out on water sources. It was observed that <i>Cryptosporidium</i> monitoring was carried out at plants that had UV treatment in place. It was stated during the audit that it is the EPA's view that where there is a validated UV unit and online monitors and alarms in place, monitoring for <i>Cryptosporidium</i> is not needed, since there could be a possibility of false positives with the associated costs and inconvenience of issuing unnecessary advice to boil water. Irish Water and Cork County Council concurred with this approach.</p>

<p>3.</p>	<p>Sampling procedures</p> <ul style="list-style-type: none"> a) There are documented procedures for taking chemical and bacteriological samples. Although each sampler does not hold a copy, flow sheets for each procedure are issued to each sampler. b) The samplers are issued by the Chief Technician with written worklists showing all samples to be taken which clearly identify compliance samples. Reasons for failing to collect a pre-designated sample are recorded and the sample rescheduled. In the event a sample cannot be taken at the designated location; three adjacent alternative locations may be tried or a nearby fixed point selected. c) Compliance samples are pre-designated as such on the daily worksheet and the database. It was not possible to change the designation to non-compliance at the time of sampling when the designation is also recorded on the field sheet and sample bottles. Samples intended for the contract laboratory have pre-designated labels although Cork County Council samplers record details of other samples on sample containers using a waterproof marker. Consideration is being given to reverting to adhesive labels for such samples. Receipt of samples by sub-contract laboratories was not audited. d) The Labworks system does not permit duplicate numbers to be issued. Because sample numbers are recorded in the laboratory workbook in sequence, numbers can only be issued once and duplication therefore prevented.
<p>4.</p>	<p>Data Handling</p> <ul style="list-style-type: none"> a) Analytical and other data is recorded both in the contract laboratories and Cork County Council. When analytical data is transferred to Cork County Council it is either entered onto the Labworks database by the analyst although some analytical instruments can transfer the data directly. The accuracy of the data recorded is verified by the Chief Technician or Data Manager. b) If a result on the database is subsequently shown to be incorrect it may be changed before the data is archived. After data has been archived, only the Chief Technician or Data Manager have editing rights. The system can produce an audit trail of access to the system and of data entries.
<p>5.</p>	<p>Exceedances of Parametric Values</p> <ul style="list-style-type: none"> a) There are documented procedures for dealing with exceedances of microbiological and chemical parametric values. There is also a procedure for dealing with exceedance of indicator parametric values. b) Cork County Council has in place a document entitled “Internal protocol on receipt of non-compliances for public supplies”, issue No 8, dated September 2017 which identifies, amongst other issues, situations requiring notification to EPA; protocol/actions for exceedances; detection of <i>Cryptosporidium</i> and <i>Clostridia</i>. It identifies broadly the need to investigate causes of exceedances but does not sufficiently detail specific actions to guide the identification of reasons for non-compliant results. c) Data is regularly reviewed and monthly reports submitted to Irish Water by the Chief Technician, after review and cross checking by the Data Manager. d) Quarterly meetings are held between senior officers including, as required and appropriate, the Assistant County Manager, the County engineer, the Director of Services and Environmental Water Service. e) The HSE and Cork County Council have in place a joint, draft, comprehensive documented procedure dated December 2011 for responding to incidents involving water supplies. Kerry Co. Co. also participates in the document. Progress meetings are held to update actions

	<p>taken in response.</p> <p>f) The HSE notifies Cork County Council of outbreaks of disease or clusters of illness. Irish Water is also kept informed, advised and involved in taking appropriate remedial action. Cork County Council undertake the investigations and take samples.</p> <p>g) The failure to notify the EPA of 44 failures to repeatedly meet the specified value of pH was discussed. Failures occurred between 3 and 6 times for each location. It was concluded that the data system used by Cork County Council and Irish Water did not flag up persistent failures or show emerging upward trends in parameter concentrations.</p> <p>h) Irish Water confirmed that draft decision trees have been produced detailing actions required for exceedances of a number of parameters and others are in preparation.</p>
--	---

3. Auditors Comments

Arrangements by Cork County Council and Irish Water for the compliance monitoring programme for collection and transport of samples were found to be generally satisfactory.

Weaknesses were highlighted in relation to the notification of persistent exceedances for indicator parameters and the limit in the distribution of sample days and specific locations within the compliance monitoring programme.

It was also noted that the documented procedures to be followed in the event of exceedances lacked detailed guidance on the investigations required to identify the causes of the exceedance.

4. Recommendations

Compliance Monitoring Programme

1. Irish Water should:
 - a) determine and agree zonal populations with Cork County Council as soon as possible;
 - b) ensure that applications for monitoring derogations (in respect of reduced frequencies) are not made in the event that results exceed 90% of the parametric value;
 - c) ensure that EDEN is updated for example, to reflect those PWSs not in use;
 - d) revise guidance on entering sampling data to LabWorks to ensure results are not documented as shortfalls in error (e.g. guidance states colour to be left as “blank” if there is a ‘less than’ result);
 - e) ensure that the nomenclature of determinands on its LIMS should match that of EPA; and
 - f) ensure that the spread of sample days and times within a sampling programme are as wide as possible to ensure that compliance samples are representative of water quality consumed throughout the year as required by the Drinking Water Regulations.

Monitoring Programmes for Specific Parameters

2. Irish Water should establish a method for its assessment of acrylamide, epichlorohydrin and vinyl chloride compliance. This may be carried out by documenting Irish Water’s assessment of product specification, where coagulation treatment is present or there is a risk of vinyl chloride presence. For more information on this see Section 4, Paragraphs 4.1.1 – 4.1.3 of *The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies* (ISBN: 978-1-84095-349-7).
3. Irish Water should finalise the draft procedure for when to increase the frequency for sampling for

pesticides and ensure it is in line with Irish Water's National Pesticide Action Programme.

4. Irish Water should sample for trihalomethanes at times which maximise the likelihood of detecting the parameter, which is usually from September onwards on surface water when vegetation is decaying.
5. Irish Water should consider not monitoring for *Cryptosporidium* where supplies have validated UV treatment with online monitors and alarms.

Sampling Procedures

6. Irish Water should:
 - a) ensure that samplers hold a copy of the sampling manual; and
 - b) consider using adhesive labels for all sample containers.

Exceedances of Parametric Values

7. Irish Water should;
 - a) develop further their procedure for responding with exceedances and include detailed guidance on the investigations required to guide the identification of the cause of such exceedance;
 - b) ensure that repeated exceedances are notified to EPA as they occur. A procedure or detailed guidance should be put in place which outlines the actions to be taken to investigate and identify and notify the EPA of an exceedance of any parameter and determine its cause and any remedial action required. The circumstances that constitute trivial and the more serious exceedances should be clearly defined;
 - c) finalise the draft decision tree, identifying actions required for exceedances of some parameters and complete the remainder as soon as possible; and
 - d) finalise the HSE and Cork County Council joint, draft, comprehensive documented procedure dated December 2011 for responding to incidents involving water supplies.

Follow-Up Actions Required by Irish Water

This report has been reviewed and approved by Aoife Loughnane, Drinking Water Team Leader.

Irish Water is recommended to put such measures in place as are necessary to implement the recommendations listed in this report. The actions taken by Irish Water to address the recommendations 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 other Public Water Supplies operated and managed by Irish Water.

Report prepared by:

John Gray

Derval Devaney



Consultant

EPA

Date:

15 December 2017