



# Public Drinking Water Monitoring Programme Audit Report

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| <b>County:</b>           | Leitrim   | <b>Date of Audit:</b>                 | 26 <sup>th</sup> September 2017                        |
| <b>Location visited:</b> | South Leitrim Regional Water Treatment Plant, Priests Lane, Carrick-on-Shannon  | <b>Date of issue of Audit Report:</b> | 15 <sup>th</sup> December 2017                         |
|                          |   | <b>Auditors:</b>                      | Ms. Derval Devaney (EPA)<br>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)</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

1. 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.
2. Irish Water has a draft protocol for use of external laboratories and is reviewing the training needs for relevant staff and samplers.
3. Irish Water did not notify the EPA of failures of an indicator parameter and should review and modify, as necessary, its procedures for notification of failures to the EPA. The circumstances that constitute trivial and the more serious exceedances should be clearly defined.
4. Irish Water does not have a formalised procedure or guidelines detailing the investigations required to identify reasons for sample results that exceed the parametric values outlined in the Drinking Water Regulations (S.I. No 122 of 2014, as amended).

## 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 2016 monitoring programme implemented in County Leitrim was carried out at South Leitrim Regional Water Treatment Plant, Priests Lane, Carrick-on-Shannon on 26<sup>th</sup> 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 EPA. Using a questionnaire as a guide, Irish Water and Leitrim 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 three public water supplies in Co. Leitrim. All are surface water sources.

The Public Water Supplies are divided into two large, South Leitrim and North Leitrim Public Water Supply Zone, and one smaller Kinlough/Tullaghan Public Water Supply zone. The Kiltyclogher Public Water Supply zone was decommissioned in 2016 as it was amalgamated with North Leitrim Regional Water Supply.

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

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| Representing Irish Water:   |
| Mr. David Barry, Executive Scientist Council<br>Ms. Mary O’Hara, Irish Water Compliance Analyst<br>Mr. Brian Boylan, Irish Water Compliance Analyst |
| Representing the Environmental Protection Agency:   |
| Ms. Derval Devaney, Inspector, EPA<br>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.*

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| <p><b>1.</b></p> | <p><b>Compliance Monitoring Programme</b></p> <p>a) The 2016 compliance monitoring programme was prepared by Irish Water and Leitrim County Council and was based on population (derived from 2011 census data) or volume with specific numbers of check and audit samples identified down to individual district metered areas (DMAs). A safety factor of 10% was applied to the number of samples required. If the number of samples based on population was greater than the number derived from volumes, sample numbers were based on volume requirements. If the number of samples based on population was less than the number derived from volumes, sample numbers were based on population requirements. Output volumes will be used in 2017 to specify numbers of samples required and the total population in each DMA (derived from 2016 census data) will be summed. It is possible that more samples than are legally required may on occasion be taken.</p> <p>b) 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 (<a href="https://www.water.ie/water-supply/water-quality/results/summary/">https://www.water.ie/water-supply/water-quality/results/summary/</a>) as well as in the sampling programme document.</p> <p>c) Details of the source water type, treatment provided, daily output and population served were</p> |
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reported to the EPA as part of the 2016 Annual Drinking Water Returns for supplies in County Leitrim.

- d) Irish Water, Leitrim County Council and the HSE meet formally on a quarterly basis to assess the management of sampling to ensure the sampling programme is on track and that samples are taken regularly throughout the year. Checks are also made on the cumulative trihalomethane data.
- e) Draft copies of colour coded maps were presented showing locations of treatment plants, reservoirs, mains owned by Irish Water, approximate residential populations, water supply zones and delineation of DMAs, regulatory monitoring locations and the sample type required (check or audit).
- f) Samples are generally taken from consumers' taps or at taps in public or commercial buildings. There is an unwritten protocol for selecting alternative addresses should the pre-designated sample point be inaccessible. Samples are not taken from outside taps. Samples tend to be taken at the same locations (e.g. public and commercial premises such as hotels, county buildings and staff's domestic dwellings) year on year. Leitrim County Council would like the 2017 distribution of samples to be different to the current 2016 and historic sampling locations, however it stated it had safety concerns for its staff with regard to what property samplers visited for compliance monitoring purposes.
- g) Each sample location is numerically identified and individual properties are identified using GPS/GIS mapping. Irish Water and Leitrim County Council have used an approach based on past sampling histories to determine the sampling points and intend to ensure that in future sample locations are chosen to ensure that they represent the quality of the water supplied throughout the supply areas.
- h) Installation of Labworks data management system in 2017 was in progress and will allow inclusion of GPS coordinates of samples, process control and remote access of information by Irish Water. Aerial photographs may also be overlaid on to the maps. It is the intention of Irish Water to overlay the layout of the mains network which will enhance the capabilities of the system.
- i) Maps showing the caretakers areas of responsibility were clearly displayed in the office together with a schematic of the reservoirs in the South Leitrim area which identified the priority order for cleaning the twelve reservoirs supplied from Carrick-on-Shannon water treatment plant. Chlorine residuals are currently logged in the caretakers' daily logbook rather than linked to a centralised system such as LabWorks.
- j) The Executive Scientist holds the only copy of the Sampling Manual which is not otherwise a controlled document. It is formally reviewed annually by Irish Water and the Executive Scientist and on an ad hoc basis when required to address issues arising in which case any amendments are communicated to the samplers. Samplers sign the manual to acknowledge they are familiar with procedures and any amendments although they and Irish Water have yet to receive formally a copy of the manual as a controlled document.
- k) A new framework for accreditation ("Laboratory consumables and equipment framework") is being introduced by Irish Water and is planned to go live in January 2018. The framework will include a roll out of training to relevant staff in Leitrim County Council
- l) There are a limited number of increased sampling frequencies in response to exceedances of the parametric values including iron and ammonium. Increased sampling frequencies are authorised by Irish Water and Leitrim County Council
- m) There were no monitoring shortfalls in 2016 for the public water supplies in County Leitrim.
- n) Compliance samples are not taken from treatment plants or reservoirs. Data from continuous water quality monitors are not used for compliance reporting.
- o) Samples are analysed at the Roscommon laboratory which is accredited for certain analyses. Other analyses, for which Roscommon laboratory is not accredited for, are subcontracted to ELS in Cork which is also an accredited laboratory. A comprehensive Service Level

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|                  | <p>Agreement (SLA) is in place.</p> <p>p) Upon review of the 2016 compliance data returns submitted to EPA, it is evident that most samples from the public water supplies for bacteriological analysis were taken on Monday (118) or Tuesday (113) with a very few (8) taken on Wednesday. None were taken on any other day of the week or at weekends. In addition, sampling takes place at the beginning of each month to afford time for Leitrim County Council to report results to Irish Water by the 10<sup>th</sup> working day of the following month which is part of the Local Authorities key performance indicators set out in their SLA.</p> <p>q) The data for total coliforms shows that the first sample date for Leitrim County Council was 11 January 2016 and the last 6 December 2016. If these circumstances are repeated year on year then it is apparent that no compliance samples are taken for a period approaching six weeks.</p>   |
| <p><b>2.</b></p> | <p><b>Operational Monitoring Programme</b></p> <p>a) An operational monitoring programme was not prepared for 2016 for public supplies. Operational samples were taken as and when required to monitor plant performance or to optimise treatment.</p> <p>b) The operational monitoring programme for 2018 prepared by Irish Water will include routine sampling of reservoirs by the caretakers for residual chlorine.</p> <p>c) Maps of the Roscommon area were inspected which had similar colour codings and detail to those relating to Co. Leitrim, together with the size of the mains and their location. Attention was made to ensure adequate recording of the extremities of the system so that residual chlorine concentrations at these points may be monitored. Leitrim County Council proposes to use a similar mapping technology to record (via GIS) the location of every sample taken in 2017.</p> <p>d) A programme of monitoring consumers' taps in 2016 included lead, copper, nickel, zinc, iron and manganese. The lead programme was contracted out by Irish Water. The HSE has agreed the format of a letter to be issued to consumers regarding health risk posed from exposure to lead in drinking water. Although health advice is available for lead, there is no similar template advice for other metals.</p> |
| <p><b>3.</b></p> | <p><b>Monitoring Programmes for Specific Parameters</b></p> <p>a) A standard suite of 21 pesticides was included in the 2016 audit monitoring programme to be sampled monthly.</p> <p>b) Acrylamide, epichlorhydrin and vinyl chloride are monitored depending on whether polymers are used as part of the water treatment process and on which polymer is used.</p> <p>c) The monitoring programme includes sampling for turbidity and nitrite at the treatment works.</p> <p>d) Monitoring for trihalomethanes forms part of the routine audit checks.</p> <p>e) Routine monitoring for radioactivity commenced in 2017 with all three public water supplies listed for such monitoring.</p> <p>f) 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><b>4.</b></p> | <p><b>Sampling Procedures</b></p> <p>a) There are documented procedures for taking check and audit samples, including a record of amendments, which are held electronically on Leitrim County Council's shared drive. Individual samplers do not hold their own copy. Leitrim County Council staff carry out sampling of the public water supplies.</p> <p>b) Leitrim County Council base the sampling procedures on guidance issued by EPA in 2010</p>   |

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|                  | <p>and found it difficult to sourcing additional guidance such as ISO standards.</p> <ul style="list-style-type: none"> <li>c) Daily worksheets are provided to the samplers by the Executive Scientist and include date of sampling, location and type of sample (check or audit). If it is not possible to collect the designated sample the fact is recorded on the Labworks system and the sample re-scheduled for the next group of samples from the area or for the next month. Alternative sample locations would be the properties adjacent to the specified location. If these were unavailable, the sampler would contact the Executive Scientist for an alternative address. However, the time constraint of returning samples to the collection point by 14:30 may preclude prolonged searching for alternative sample points although neither this constraint, not temperature limitations, are identified in the sampling procedures.</li> <li>d) A field sheet for audit samples was examined which contained details of date, sampler, reference, sample identity, weather and any other comments. Sample details are written on the relevant bottles in permanent marker pen. Containers for audit samples are provided by Roscommon Laboratory together with labels with appropriate codes. Leitrim County Council samplers add their own numbers to the labels. Sample numbers are taken from a consecutive listing and any duplication of numbering would be immediately obvious.</li> <li>e) Compliance samples are pre-designated as such and as the containers are pre-labelled before filling, it is not possible to alter the designation. The auditors were not able to inspect sample handling at the laboratory.</li> <li>f) A chain of custody is maintained throughout and a copy of such a form was inspected on the Executive Scientist's computer. The sampler is authorised to make changes to details of samples received.</li> </ul> |
| <p><b>5.</b></p> | <p><b>Data Handling</b></p> <ul style="list-style-type: none"> <li>a) Analytical and associated data is recorded both in the laboratory (Roscommon Co. Co.) and by Leitrim County Council When analytical data is transferred to Leitrim County Council it is entered on to the Labworks system by the sampler, who confirms that analysis is complete, and then authorised by the Executive Scientist.</li> <li>b) If a result on the database is subsequently shown to be incorrect it may be changed before the data is archived. After archiving, only the Executive Scientist has editing rights. The system can produce an audit trail of access to the system and of data entries.</li> <li>c) If the data from the laboratory is shown subsequently to be incorrect, a new laboratory report would be issued with corrected data to be entered on the Labworks system.</li> </ul>  |
| <p><b>6.</b></p> | <p><b>Exceedances of Parametric Values</b></p> <ul style="list-style-type: none"> <li>a) Non-compliant data associated with compliance and investigative samples is reported to the EPA. Leitrim County Council have a documented procedure for dealing with exceedances of microbiological, chemical and indicator parametric values and reporting failures to the EPA via the online drinking water notification system (ODWNS). A list of HSE contacts are also included in the documented procedure.</li> <li>b) There are no procedures in place to guide the identification of reasons for non-compliant results and remedial actions required. Irish Water and Leitrim County Council stated they are aware of what actions are required and the HSE would also be consulted for health advice.</li> <li>c) Circumstances surrounding the failure to notify EPA of a repeated exceedance for iron and associated low chlorine residuals on the North Leitrim Regional Water Supply was discussed. An iron failure of 330 µg/l on 25 April 2016 was reported to the EPA but a repeated iron failure of 335µg/l on 3<sup>rd</sup> October 2016 with associated low chlorine residuals at a National School was not notified to the EPA. Leitrim County Council has a tracker which lists what action was taken upon the occurrence of a failure. The tracker documented that the HSE was consulted by Leitrim County Council regarding the iron failures and an additional</li> </ul>   |

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|  | sample, taken on 22 November 2016, was complaint. However, a sample taken in April 2017 failed (the EPA was not notified of this failure) and another sample was taken in September 2017 when the school re-opened for which the result was awaited. A letter was issued to the National School by Leitrim County Council and Irish Water was also informed of the situation. Leitrim County Council stated that the failure is due to the private distribution network within the school and it is considering issuing a Regulation 6 letter requesting the owner rectify the matter and ensure iron is complaint and chlorine residuals are at least 0.1 mg/l at the tap. |
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### 3. Auditors comments

Arrangements by Leitrim County Council in assessing the quality of public water supplies for 2016 were generally found to be satisfactory. It is recommended however that the sampling programme should be shared with Irish Water.

Weaknesses were highlighted in relation to the lack of pre-determined alternative sampling locations, where it was left to the discretion of the sampler and their manager to choose sampling locations that were representative of the supply zone and therefore the same historic sampling locations tended to be chosen each year.

It was also noted that although draft documented procedures are being developed, they should be formalised as controlled documents and training on such documents should be rolled out to the relevant staff. Detailed guidance on the notification of exceedances and investigation of the causes of failures should also be put in place.

Further work on the upload of additional information to LabWorks (e.g. chlorine residuals at reservoirs and in the network, mains locations) is welcomed.

Finally, should Leitrim County Council wish to consult ISO standards for further information on sampling, the following documents may be of assistance:

- National Standards Authority of Ireland I.S. ENISO 19458:2006 Water quality sampling for microbiological analysis.
- ISO 5667-5:2006 Water quality – Sampling- Part 5: Guidance on sampling of drinking water from treatment works and piped distribution systems.
- ISO 19458:2006 Water quality – sampling for microbiological analysis.
- ISO 5667-3:2012(en) Water quality – Sampling-Part 3:Preservation and handling of water samples.

### 4. Recommendations

#### Compliance Monitoring Programme

1. Irish Water should ensure that:
  - a) the selection of alternative random addresses, should the pre-designated sample point be inaccessible, is documented and formalised rather than continuing to use the informal protocol currently in place;
  - b) whereas sample locations are selected based on past sampling history, a formal and structured method of assessment should be developed and implemented to ensure that sampling is representing the entire water supply zone as accurately as possible;

- c) where draft maps of the supply area have been produced, these should be enhanced with the addition of further details such as mains layout and finalised;
  - d) the concentration of residual chlorine in reservoirs and the network should be included on a centralised system such as LabWorks rather than in the daily log book;
  - e) the sampling manual should be a controlled document with amendments and its issue to samplers recorded;
  - f) , ensure the provision of appropriate training is provided to relevant staff including those undertaking sampling and that records of such training are maintained (noting that training requirements of relevant staff including samplers will be identified and actioned later in 2017); and
  - g) the recipients of the compliance monitoring programme, including Irish Water, are recorded.
2. Irish Water should ensure that the compliance sampling programme:
- a) is a controlled document;
  - b) has a spread of sample days, times and locations that 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; and
  - c) has predetermined alternative sample locations if a sample location is unsuitable or inaccessible.

### **Operational Monitoring Programme**

3. Whereas operational samples are taken to monitor plant performance or to optimise treatment, Irish Water should establish a formal operational monitoring programme to include the sampling of service reservoirs and networks which is specific to each public water supply and outline how and where to record such results.

### **Sampling Procedures**

4. Irish Water should:
- a) ensure that samplers hold their own copy of the sampling manual and, as it is a controlled document, its distribution is recorded; and
  - b) revise the procedure for bacteriological sampling with regard to storage and transport of samples to ensure that the specifications outlined in Section 4, Appendix 1 of the EPA's Public Water Supply's Handbook is adhered to.

### **Exceedances of Parametric Values**

5. Whereas Irish Water is developing a written procedure for dealing with sample results that exceed the parametric values outlined in the Drinking Water Regulations (S.I. No 122 of 2014, as amended), this should be finalised and issued formally as soon as possible.
6. 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.

### **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:**



**Date:**

15 December 2017

Derval Devaney,

John Gray

Inspector

Consultant