



# Drinking Water Monitoring Programme Audit Report

<b>County:</b>	Mayo	<b>Date of Audit:</b>	9 <sup>th</sup> November 2015
<b>Location visited:</b>	Mayo County Council Offices	<b>Date of issue of Audit Report:</b>	9 <sup>th</sup> February 2016
		<b>Auditors:</b>	Ms. Michelle Roche (EPA) Dr. John Gray (Consultant)
<b>Audit Criteria:</b>	<ul style="list-style-type: none"> <li>• <i>The European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014).</i></li> <li>• <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></li> </ul>		

## MAIN FINDINGS

- i. **Irish Water should undertake a review of the temporal and spatial distribution of sampling for compliance monitoring. A formal and structured method of assessment should be developed and implemented to ensure that sampling represents the water supply zone as accurately as possible. The distribution of sample days, times and locations within a monitoring programme should be as wide as possible.**
- ii. **Irish Water should develop 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). The procedure should include actions to be taken to investigate the exceedance and report the exceedance to the HSE, EPA and any other relevant party.**

## 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 drinking water supplies to ensure the provision of clean and wholesome drinking water.

An audit of the Irish Water 2014 monitoring programmes implemented in County Mayo was carried out at the Mayo County Council Offices on 9<sup>th</sup> November 2015. 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<sup>1</sup>, Irish Water and Mayo 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.

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

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

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

Ms. Anne Bonner – Irish Water Compliance Specialist\*

Mr. Iarla Moran – Senior Executive Engineer, Mayo County Council\*

Ms. Ann Browne – Water Services, Mayo County Council\*

Mr. Conrad Harley – Executive Engineer, Rural Water Services, Mayo County Council\*

Representing the Environmental Protection Agency:

Ms. Michelle Roche – Inspector, EPA\*

Dr. John Gray – Consultant, John Gray Consultancy\*

## 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.*

<b>1.</b>	<b>Compliance Monitoring Programme</b> <ul style="list-style-type: none"><li>a. The 2014 compliance monitoring programme was prepared by Mayo County Council with oversight by Irish Water. From 2016 onwards all monitoring programmes will be prepared by Irish Water in consultation with the relevant Local Authorities.</li><li>b. The compliance monitoring programme for 2014 included: a list of all public water supplies in the county, population data for each supply, the required number and frequency of all check and audit samples and predetermined sample locations.</li><li>c. Sample collection dates and suitable alternative sample locations were not pre-determined in the 2014 monitoring programme.</li><li>d. Sample locations were selected randomly based on historical data sets which are displayed on GIS, however a number of non-domestic locations identified in 2009 have not yet been overlaid with the GIS. It is envisaged that GPS coordinates for sample locations will be recorded from 2016 onwards.</li><li>e. No water supply zone (WSZ) was sampled on a reduced number or frequency of samples and all WSZs are subject to a predetermined increased number of samples of ten per cent as a contingency.</li><li>f. The number of samples required in each WSZ was calculated based on the WSZ population, using an occupational value of 2.7 persons per property, a value that was derived by the CSO. A review of WSZ populations was being conducted at the time of the audit.</li><li>g. The sampling and analysis of compliance samples in Mayo is sub-contracted out to the Health Service Executive (HSE) for all check samples and to ELS Laboratories for all audit samples. The HSE and ELS receive a copy of the monitoring programme at the beginning of each year.</li><li>h. A critical review of the temporal and spatial distribution of sampling, to ensure sampling represents the supply as accurately as possible, has not been carried out for County Mayo. Reliance is placed on the predetermined sampling plan.</li></ul>
<b>2.</b>	<b>Operational Monitoring Programme</b> <ul style="list-style-type: none"><li>a. The 2014 operational monitoring programme was prepared by Mayo County Council with oversight by Irish Water. The number and frequency of operational samples taken were reviewed quarterly by Irish Water, Mayo County Council and the HSE.</li><li>b. Operational samples at the water treatment plant and chlorine residuals at the end of the</li></ul>

	<p>network were taken by the plant caretaker and operational samples at the consumer tap were taken by the HSE. Investigative operational samples were taken as required, in liaison with the HSE.</p> <ul style="list-style-type: none"> <li>c. Sampling locations for operational monitoring at the consumer tap were agreed in advance with the HSE and provide for two samples per month in each major town. The locations agreed were chosen to be representative of the general quality of the water in supply.</li> <li>d. There was no routine operational monitoring of service reservoirs or towers.</li> </ul>
<p><b>3.</b></p>	<p><b>Monitoring Programmes for Specific Parameters</b></p> <ul style="list-style-type: none"> <li>a. The 2014 compliance monitoring programme did not include any specific monitoring of nitrite or turbidity at water treatment plants.</li> <li>b. A specific pesticide monitoring programme has been established for the purpose of investigative sampling and is linked to the pesticide monitoring programme for public water supplies; however the programme does not include a specified list of individual pesticides. Irish Water has since consulted with the Department of Agriculture, Food and the Marine and collated a monitoring suite of 21 baseline pesticides which will be included in the 2016 compliance monitoring programme.</li> <li>c. All supplies were monitored quarterly for trihalomethanes as part of audit monitoring.</li> <li>d. Lead sampling for compliance monitoring in 2014 was for flushed samples.</li> <li>e. The 2014 compliance monitoring programme did not include any radiological sampling; however in agreement with the EPA Office of Radiological Protection recommendation that supplies serving populations above 10,000 persons should carry out radiological sampling every four years, Lough Mask was last sampled in 2012.</li> <li>f. Mayo County Council does not have a specific sampling programme for tankers. Tankers are deployed in response to incidents and all have “Boil Water Advice” notices permanently fixed as well as additional notices on the tanker taps.</li> </ul>
<p><b>4.</b></p>	<p><b>Sampling Procedures</b></p> <ul style="list-style-type: none"> <li>a. Check and operational samples collected by the HSE were sampled and analysed in accordance with HSE sampling procedures, which are based on the ISO standards. Audit samples collected by ELS were sampled in accordance with ELS sampling procedures. Both HSE and ELS sample procedures were reviewed by Mayo County Council in 2014.</li> <li>b. No compliance samples were taken from water treatment plants or service reservoirs and no data from continuous monitors was used for compliance purposes.</li> <li>c. Sampler’s daily worksheets are required to be maintained in both procedures; however neither Mayo County Council nor Irish Water has direct access to these worksheets.</li> <li>d. Free and total chlorine concentrations were required to be taken with each sample collected for bacteriological analysis.</li> <li>e. Sampling procedures state that where a predetermined sample location and all alternative sample locations are unsuitable or inaccessible the sampler will inform Mayo County Council immediately.</li> <li>f. The HSE were provided with sample reference numbers by Mayo CC and ELS generated sample reference numbers in the laboratory.</li> <li>g. Sample bottle labels with adhesive backing were fixed securely to the sample container and appropriate information recorded.</li> </ul>
<p><b>5.</b></p>	<p><b>Data Handling</b></p> <ul style="list-style-type: none"> <li>a. Monitoring data for 2014 was recorded on the Mayo County Council LIMS system, with the HSE and ELS maintaining their own records. Data from Mayo County Council LIMS was then transmitted to Irish Water.</li> <li>b. The HSE data system cannot link to Mayo County Council’s LIMS; therefore sample results were emailed to Mayo County Council and the data was manually entered on LIMS. This data transfer was then validated by a second person in Mayo County Council.</li> <li>c. Sample results from ELS were electronically transferred directly to Mayo County Council’s LIMS.</li> <li>d. Any changes made to data on LIMS were automatically recorded and an audit trail of</li> </ul>

	<p>entries can be produced at any time. Once data has been validated on LIMS, no changes can be made.</p> <ul style="list-style-type: none"> <li>e. No information was available regarding data handling procedures within the HSE or ELS.</li> <li>f. Once sample results were received by Irish Water from Mayo County Council they were validated 3 times before being reported to the EPA via EDEN.</li> <li>g. Sample results from operational monitoring undertaken by the plant caretaker were recorded locally at the plant but cannot be accessed through a central system.</li> </ul>
<b>6.</b>	<p><b>Exceedances of Parametric Values</b></p> <ul style="list-style-type: none"> <li>a. A documented procedure is in place between the HSE and Mayo County Council, outlining the actions to be taken where a sample result shows an exceedance of the microbiological or chemical parametric values outlined in the drinking water regulations (S.I. no 122 of 2014).</li> <li>b. The procedure does not include sample results analysed by ELS and a procedure for reporting exceedances to Irish Water or the EPA is not documented.</li> <li>c. The procedure outlines a cascade system by which the HSE contact Mayo County Council in the event that a water restriction or boil water notice should be considered.</li> <li>d. At the time of the audit Irish Water had not yet produced a procedure for dealing with parametric exceedances reported in sample results.</li> <li>e. Although no written procedure is in place, ELS notify all parametric exceedances to Mayo County Council via email.</li> <li>f. All parametric exceedances are notified to the relevant water service area personnel within Mayo County Council and plant caretakers are notified by their operational engineer.</li> <li>g. All actions taken in 2014 were documented and provided to Irish Water in monthly Key Performance Indicator meetings.</li> </ul>
<b>7.</b>	<p><b>Review of Sampling Data</b></p> <ul style="list-style-type: none"> <li>a. Sample times recorded on the Mayo County Council LIMS showed that all samples were taken at 00:00 (midnight). This is a default time in LIMS and a review of actual sample records shows an expected spread of sample collection times.</li> <li>b. Samples were primarily collected on Mondays, Tuesdays and Wednesdays with less than 20 of the total 8,371 samples taken on Thursdays and Fridays.</li> <li>c. Sample collection was well distributed throughout the year.</li> </ul>

### 3. AUDITORS COMMENTS

The monitoring programmes drawn up and implemented by Irish Water and Mayo County Council in 2014 were generally found to be satisfactory in assessing the quality water in public water supplies. Weaknesses were highlighted in relation to the amount of randomness attributed to the selection of consumers' properties and the temporal distribution of sampling across the week. It was also noted that up to date documented procedures for implementing the monitoring programmes and reacting to exceedances of the parametric values outlined in the Drinking Water Regulations (S.I. no 122 of 2014) were lacking. A review of all 2014 data submitted to the EPA by Irish Water determined that all sample results were accurately reported to the EPA.

### 4. RECOMMENDATIONS

#### Compliance Monitoring Programme

1. Irish Water should provide a predetermined narrow window of sampling dates 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 overlay the non-domestic sampling location details, collected in 2009, on GIS.
4. Irish Water should ensure that all water supply scheme data, including population numbers, are updated on EDEN.
5. Irish Water should undertake a review of the temporal and spatial distribution of sampling for compliance monitoring. A formal and structured method of assessment should be developed and implemented to ensure that sampling is representing the water supply zone as accurately as possible. The spread of sample days, times and locations within a monitoring programme should be as wide as possible.

### **Operational Monitoring Programme**

6. Irish Water should ensure that routine operational monitoring of service reservoirs and towers is undertaken.

### **Monitoring Programmes for Specific Parameters**

7. Irish Water should ensure that turbidity at the water treatment plant is sampled where the supply source is surface water or influenced by surface water.
8. Irish Water should ensure that the 21 baseline pesticides and any other pesticides in use in the catchment of water supplies are included in future monitoring programmes.
9. Irish Water should ensure that compliance samples for lead are random daytime samples, in accordance with EPA Advice Note 1: Lead Compliance Monitoring and Surveys.
10. Irish Water should ensure that Section 4, Paragraph 5 of the EPA's Handbook is adhered to in relation to sampling required on water in tankers. A certain amount of sampling is required on the water used to fill a tanker, depending on the length of time water is stored in the tanker.

### **Data Handling**

11. Irish Water should consider developing a more robust system of transferring sample results to the Mayo County Council LIMS where automatic data transfer cannot be achieved. The current system of manually entering HSE sample results to LIMS is vulnerable to transcription errors and is resource intensive.
12. Irish Water should review the data handling procedures within the HSE and ELS to ensure they are robust.
13. Irish Water should ensure sampling times are accurately recorded in LIMS.
14. Irish Water should ensure access to sampler's worksheets, if required.

### **Exceedances of Parametric Values**

15. Irish Water should develop a written procedure for dealing with sample results that exceed the parametric values outlined in the Drinking Water Regulations (SI no 122 of 2014). The procedure should include actions to be taken to investigate the exceedance and report the exceedance to the HSE, the EPA and any other relevant party.

## **FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER**

This report has been reviewed and approved by Ms Yvonne Doris, 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 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 addressed at all other treatment plants operated and managed by Irish Water.

**Report prepared by:**  **Date:** 9<sup>th</sup> February 2016

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Inspector