



# Drinking Water Audit Report

<b>County:</b>	Cork County Council	<b>Date of Audit:</b>	23/06/17
<b>Plant(s) visited:</b>	Inniscarra Water Treatment Plant	<b>Date of issue of Audit Report:</b>	27/06/17
	Cork Harbour and City Public Water Supply	<b>File Reference:</b>	DW2017/56
	Scheme Code 0500PUB3401	<b>Auditors:</b>	Mr. Darragh Page Ms. Regina Campbell Ms. Criona Doyle
<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> <li>• The recommendations specified in the <i>EPA Drinking Water Report</i>.</li> <li>• EPA Drinking Water Advice Notes No.s 1 to 15.</li> <li>• The recommendations in any previous audit reports.</li> </ul>		

## MAIN FINDINGS

- i. The water treatment plant is well operated. No significant issues at the treatment plant were identified.
- ii. The distribution network near the location of the *E. coli* failure was found to have low chlorine levels which need to be fully investigated and resolved.
- iii. A discrepancy was identified between the readings on the 2 no. continuous residual chlorine monitors on the inlet to the treated water reservoir. Irish Water should investigate the cause of this discrepancy.

## 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 providing clean and wholesome drinking water.

The audit of the Inniscarra WTP was undertaken following the detection of *E. coli* in a sample at Park Depot Mahon, Cork City on the 24/05/17. Repeat sampling has indicated that this detection was related to the contamination of the tap at the Mahon Parks Depot and is not linked to the operation of the Inniscarra Water Treatment Plant.

The Inniscarra Water Treatment Plant serves the Cork Harbour and City Water Supply Scheme and has been in operation since 1981. The raw water for the supply is abstracted from the River Lee at the Inniscarra lake and impurities are removed at the water treatment plant. The design capacity of the water treatment plant is 120,000m<sup>3</sup>/d and 68,000m<sup>3</sup>/d of water was being produced on the day of the audit. The water undergoes several treatment stages including coagulation, flocculation, clarification, filtration, disinfection and fluoridation.

The opening meeting commenced at 9:30am at the Inniscarra Water Treatment Plant. The scope and purpose of the audit were outlined at the opening meeting. The audit process consisted of interviews with staff, review of records and observations made during an inspection of the treatment plant. The audits observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

**Representing Irish Water:**

Deirdre O'Loughlin, Compliance Specialist, Irish Water.  
 Jim Fitzgerald, SLA Lead, Irish Water.  
 Patrick Duggan, Compliance Analyst, Irish Water.  
 Sean Lynch, Action Senior Engineer, Cork City Council.  
 John Slattery, Acting Senior Executive Engineer, Cork County Council.  
 Aoife Sugrue, Executive Engineer, Cork County Council.  
 Mary Hickey, Executive Scientist, Cork County Council.  
 James Thompson, Caretaker, Cork County Council.

**Representing the Environmental Protection Agency:**

Darragh Page, Senior Inspector.  
 Regina Campbell, Inspector.  
 Criona Doyle, Inspector.

## 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>Coagulation, Flocculation and Clarification</b></p> <ol style="list-style-type: none"> <li>The first step in the treatment process at the Inniscarra Water Treatment Plant is coagulation.</li> <li>Aluminium sulphate is used as the coagulant. Duty and standby aluminium sulphate dosing points are provided. Adequate mixing and retention time (3 minutes) is provided.</li> <li>There is little variation in the raw water quality. Flocculation tests are undertaken at a 2 week to 1 month frequency. The aluminium sulphate dosing rate typically ranges between 40 and 60 mg/l. On the day of audit the dose rate was 47 mg/l.</li> <li>Duty and standby polyelectrolyte dosing points are provided. Polyelectrolyte is used as a coagulant aid at a dose rate of 0.09mg/l. On the date of the audit a temporary polyelectrolyte dosing line was in use.</li> <li>Soda ash dosing is required occasionally after periods of heavy rainfall. This is required to adjust the pH to the optimum level for coagulation. Soda ash dosing was not taking place on the day of the audit.</li> <li>Granular activated carbon is used for manganese removal and was being used on the day of the audit. Manganese can give rise to taste and odour issues in the supply at certain times during the year. Manganese removal is required when blue green algae are present in the lake. Planned works at the plant include the installation of caustic dosing upstream of the filters to assist in manganese removal.</li> <li>No issues were identified with the coagulation process during the audit.</li> <li>The second step in the treatment process is clarification which is undertaken in 4 no. flat</li> </ol>
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	<p>bottomed clarifiers. Lamellae plates have been installed to assist clarification. The decanting channels were level and clean. The tanks are deep cleaned every six months. No issues were identified with the clarification process.</p>
<b>2.</b>	<p><b>Filtration</b></p> <ol style="list-style-type: none"> <li>The next step in the treatment process is the removal of any remaining impurities via filtration. 8 no. rapid gravity filters are provided on site. Manganese dioxide is added to the silica sand filter to further aid manganese removal.</li> <li>There is continuous monitoring of the turbidity of the filtered water from each individual filter and on the combined water. All turbidity monitors were within the calibration date. An alarm is triggered when the turbidity on the filtered water goes above 0.10 NTU for greater than 10 minutes.</li> <li>Backwashing of each filter is automated and takes place on a timed basis every 72 hours. All filter backwashes are observed by the caretaker. The backwashing sequence includes 7 minutes air scour, 10 minutes air and low flow water followed by high flow water until the wash water runs clear. Treated water is used for backwashing. Settled solids from the backwash water are combined with the sludge for disposal and the supernatant is discharged to the lake.</li> <li>A filter backwash was observed (Filter No. 7) and no problem areas were observed.</li> <li>Following backwashing there is a delayed start to allow the filter to remain offline for 30 minutes. This allows the filter material to resettle before it is brought into service again.</li> <li>The turbidity data on SCADA for previous 7 days was reviewed. No issues were identified with the filtration process.</li> </ol>
<b>3.</b>	<p><b>Disinfection</b></p> <ol style="list-style-type: none"> <li>The water is disinfected using chlorine gas.</li> <li>The chlorine cylinders are changed over manually every 3 to 4 days.</li> <li>The target chlorine level is 0.7mg/l. The low level chlorine alarm on the inlet to the reservoir is set at 0.3mg/l.</li> <li>There are 2 no. online chlorine monitors on the inlet to the reservoir. Different readings were observed on the trend data from the monitors on the date of the audit. It was not possible to confirm at the audit if the readings are taken at the same location.</li> <li>The caretaker undertakes daily monitoring of the chlorine levels at the water treatment plant using a portable chlorine monitor.</li> <li>Continuous monitoring of the residual chlorine levels occurs at the following locations on the distribution mains: Chetwynd Reservoir; Carr's Hill Reservoir; Strawhall Reservoir and Inchera Pumphouse. The levels are continuously monitored and displayed on the panel in the control room at the Inniscarra Water Treatment Plant.</li> </ol>
<b>4.</b>	<p><b>Treated Water Storage and Distribution Network</b></p> <ol style="list-style-type: none"> <li>An issue in relation to low chlorine residual levels has been identified in very localised areas of Mahon in Cork City which is supplied with water from the Inniscarra Water Treatment Plant. Irish Water are undertaking further investigations into the causes of the low chlorine levels. Chlorine levels at the Chetwynd reservoir, which supplies the affected area, are satisfactory.</li> </ol>
<b>5</b>	<p><b>Monitoring and Sampling Programme for treated water</b></p> <ol style="list-style-type: none"> <li>Monthly monitoring of <i>Cryptosporidium</i> is undertaken on the raw and treated water. The results for 2016 and 2017 were reviewed and indicated no <i>Cryptosporidium</i> or <i>Giardia</i> in the treated water.</li> </ol>
<b>6.</b>	<p><b>Chemical storage and bunds</b></p> <ol style="list-style-type: none"> <li>Bulk storage of liquid aluminium sulphate takes place in the chemical storage building from where it is pumped to the day tanks in the chemical dosing building.</li> <li>Hydrofluorosilicic acid is stored in a double skinned bulk storage tank for the addition of fluoride. The level is alarmed and monitored via SCADA.</li> </ol>

	<ul style="list-style-type: none"> <li>c. A bulk storage tank for heating oil is provided on site.</li> <li>d. Lime is used for pH correction and stored indoors in 2 no. silos.</li> <li>e. Granular activated carbon and soda ash are provided in powdered form with the bags stored on pallets in the chemical dosing building.</li> </ul>
<b>7.</b>	<b>Hygiene and Housekeeping</b> <ul style="list-style-type: none"> <li>a. The site was maintained in a clean and tidy state with good signage.</li> </ul>
<b>8.</b>	<b>Management and Control</b> <ul style="list-style-type: none"> <li>a. The site is operated under 2 daily shifts running from 8am to 12 midnight. Outside of these hours cover is provided by the engineering staff.</li> </ul>
<b>9</b>	<b>Sludge Management</b> <ul style="list-style-type: none"> <li>a. The contract for the improvement works on the sludge treatment process has recently commenced.</li> </ul>

### 3. AUDITORS COMMENTS

The audit indicated that the Inniscarra Water Treatment Plant is being well operated. Detailed records and well documented procedures were observed on site. Continuous monitoring of turbidity and residual chlorine is being undertaken and appropriate alarm levels have been set.

No significant issues were identified during the audit at the water treatment plant. A minor issue in relation to a discrepancy between the 2 no. chlorine monitors on the inlet to the reservoir was identified and requires investigation by Irish Water.

Low chlorine residual levels have been identified as an issue in localised areas of Mahon, Cork City which is supplied by water from Inniscarra WTP. Irish Water is required to investigate this issue and submit a report to the EPA.

### 4. RECOMMENDATIONS

#### Disinfection

- 1) Irish Water should investigate the discrepancy between the readings on the two residual chlorine monitors on the inlet to the reservoir.
- 2) Irish Water should record the chlorine levels from the hand held monitor together with the corresponding levels from the continuous monitors (same time) on the Lab Daily Records Sheet.
- 3) Irish Water should investigate the extent and reasons for the low chlorine residual levels being recorded in the Mahon area of Cork City. Microbiological sampling should be undertaken in conjunction with the monitoring of free and total chlorine levels. A map should be prepared outlining the affected areas and for comparison purposes information across the network should be examined from the same sampling date. Irish Water is requested to forward the details of the findings of the investigations to the Agency in association with a corrective action plan (including timeframes) to address the low chlorine levels. **The Agency request that Irish Water submit a report to the EPA on this issue by 14/07/17.**

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

During the audit Irish Water representatives were advised of the audit findings and that action must be taken as a priority by Irish Water to address the issues raised. This report has been reviewed and approved by Mr Darragh Page, Senior Inspector.

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.

Please quote the File Reference Number in any future correspondence in relation to this Report.

**Report prepared by:** Gráda Doyle      **Date:** 27/06/17

Inspector