



# Drinking Water Audit Report

<b>County:</b>	Tipperary	<b>Date of Audit:</b>	13/10/17
<b>Plant(s) visited:</b>	Cloughjordan Public Water Supply (Scheme Code 2800PUB1005)	<b>Date of issue of Audit Report:</b>	27/10/17
		<b>File Reference:</b>	DW2017/145
		<b>Auditors:</b>	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>• <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> <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. Deficiencies were identified at the Cloughjordan Water Treatment plant in relation to the response to the low level chlorine alarm during an incident in September 2017.
- ii. Continuous on-line monitoring of the chlorine level (linked to the alarm system) was in place at the water treatment plant but the on-line data was not being reviewed on a regular basis. This resulted in the discharge of inadequately disinfected water to the public remaining undetected for 7 days.
- iii. Corrective actions have been implemented by Irish Water. The auto shut down of the plant is now linked to the on-line chlorine monitor, increased monitoring of residual chlorine levels in the network is being undertaken and updated protocols for responding to chlorine alarms have been put in place.

## 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 in response to the notification by Irish Water on the 15/09/17 of the failure to meet the E. Coli parametric value (as specified in Table A of Part 1 of the Schedule of the Regulations) in the Cloughjordan Water Supply in a sample taken on 12/09/17.

The Cloughjordan Water Supply is fed from a spring, known as Matty's Well, located adjacent to the treatment plant building. The supply provides 494m<sup>3</sup>/d of water to serve a population of 1,152 people. The water is chlorinated.

Photographs taken by Criona Doyle during the audit are attached to this report and are referred to in the text where relevant.

The opening meeting commenced at 10:30am at the Cloughjordan 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 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:**

Deirdre O’Loughlin, Compliance Monitoring Liaison Specialist, Irish Water.

Duane O’Brien, Water Lead, Irish Water.

Siobhan Clifford, Compliance Analyst, Irish Water.

Edward Treacy, Engineer, Tipperary County Council.

Aidan Delaney, Executive Scientist, Tipperary County Council.

Collum Grace, Senior General Services Supervisor, Tipperary County Council.

Martin McMahon, Water Treatment Plant Caretaker, Tipperary County Council.

**Representing the Environmental Protection Agency:**

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.*

<b>1.</b>	<p><b>Chlorine Pump Failure/Pipe Burst – Investigations and Actions</b></p> <ul style="list-style-type: none"><li>a. On Sunday 10/09/17 Tipperary County Council identified that there was no chlorine in the water at the reservoir outlet. The duty and stand-by chlorine dosing pumps were found to have failed. The injection line on the duty pump blocked and the standby pump had not switched on. An issue with the standby pump had previously been noted on the Sunday 03/09/17.</li><li>b. The caretaker removed a section of blocked injection line, installed a spare injector, added sodium hypochlorite to the reservoir via the rising main and flushed the network to get chlorinated water in the distribution system. The residual chlorine level at the water treatment plant returned to 0.91mg/l No monitoring of residual chlorine levels in the network or microbiological monitoring was undertaken in response to the breakdown of the chlorine dosing equipment on 10/09/17.</li><li>c. On Monday 11/09/17 the residual chlorine level was tested in the network and a level of 0.1 mg/l recorded.</li><li>d. A burst took place on Monday 11/09/17 and continued into Tuesday 12/09/17. Flushing of the network was carried out on 12/09/17.</li><li>e. A sample was taken for check monitoring on Tuesday 12/09/17 and the results of the microbiological monitoring were received by Tipperary County Council on Thursday 14/09/17. The results indicated E. Coli 6 / 100ml, Total Coliforms 24 / 100ml, Free Chlorine 0.01mg/l and 0.03mg/l Total Chlorine. An investigation into the cause of the exceedance commenced.</li><li>f. 2 no. repeat samples were taken on Thursday 14/09/17. The microbiological results received on Friday 15/09/17 indicated the repeat samples were clear.</li><li>g. Tipperary County Council consulted with the HSE on Friday 15/09/17 with respect to the failing microbiological results and the clear repeat samples. Tipperary County Council informed Irish Water of the plant issues and monitoring results on the same date.</li><li>h. The EPA were also informed of the microbiological exceedance on Friday 15/09/17.</li><li>i. As a result of low residual chlorine levels in the network monitoring continued on 15/09/17, 16/09/17 and 18/09/17. On 18/09/17 the levels were confirmed as &gt; 0.1 mg/l at three locations in the network.</li><li>j. The investigations identified that a single text alarm notification had been generated to the caretaker on Monday 04/09/17 when the chlorine level dropped below 0.3 mg/l. An alarm</li></ul>
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	<p>notification went undetected by the caretaker. The pump house is only visited once per week. The breakdown of the chlorine dosing pumps went undetected until Sunday 10/09/17 when the water treatment plant was next visited.</p> <p>k. Following the incident Tipperary County Council and Irish Water introduced the following corrective actions: (i) the installation of an automatic shut down of the treatment plant in the event of a low chlorine concentration being detected by the on-line chlorine monitor; (ii) the alarm notification system has been updated to include the Caretaker, Supervisor and Engineer on the text alert system (iii) daily chlorine checks are being undertaken in the rising main before the reservoir (iv) the frequency of chlorine monitoring on the distribution network has been increased from weekly to daily.</p>
<b>2.</b>	<p><b>Disinfection</b></p> <p>a. Sodium hypochlorite (14-15% with calgon) is used for disinfection.</p> <p>b. Duty and standby chlorine dosing pumps are installed on site and dosing is flow proportional. There is automatic switch over between the duty and standby pumps on a daily basis.</p> <p>c. All pumps were within the service due dates as indicated on the equipment labels.</p> <p>d. Adequate contact time is being provided with the contact time calculation confirming 54 mg.min/L is being achieved.</p> <p>e. The target chlorine residual leaving the treatment plant is 0.80mg/l at the treatment plant, 0.4 mg/l after the reservoir and 0.1mg/l at the end of the line. At the time of the audit the chlorine monitor at the treatment plant was reading 0.79mg/l.</p> <p>f. Continuous online recording of the residual chlorine level is being undertaken at the water treatment plant but at the time of the audit there was no procedure in place for the data to be reviewed.</p>
<b>3.</b>	<p><b>Chemical Storage and Bunds</b></p> <p>a. There was no expiry date or manufacture date indicated on the sodium hypochlorite drums. A batch number is provided on the drum and the date of manufacture is reported to be the batch number in reverse. A two week supply of sodium hypochlorite is stored on site.</p>
<b>4.</b>	<p><b>Hygiene and Housekeeping</b></p> <p>a. A build up of liquid was observed in the bund surrounding the chlorine day tank (Photograph No. 1).</p>
<b>5.</b>	<p><b>Management and Control</b></p> <p>a. The low level chlorine alarm is set at 0.30mg/l and the high level chlorine alarm is set at 1mg/l. The alarm is triggered when the chlorine residual falls outside of the specified range for greater than 15 minutes duration.</p> <p>b. At the time of the incident there was no written procedure in place at the water treatment plant outlining the Chlorine Alarm Response Procedure. The procedure is now displayed on site.</p>
<b>6.</b>	<p><b>Source Protection</b></p> <p>a. The source is a covered spring located adjacent to the treatment plant building. The spring collection chamber was adequately sealed.</p> <p>b. Landuse in the immediate vicinity of the borehole includes low intensity grassland and was being grazed by cattle on the day of the audit.</p> <p>c. 200m buffer zones have been set in accordance with the GAP regulations. Tipperary County Council have written to landowners to inform them of their obligations under the GAP regulations.</p>
<b>7.</b>	<p><b>Treated Water Storage and Distribution Network</b></p> <p>a. There was no record of the reservoir having been cleaned. It was outlined that a reservoir cleaning programme is being prepared by Irish Water.</p>

### **3. AUDITORS COMMENTS**

The audit identified significant deficiencies in relation to the response to the low level chlorine alarm which resulted in inadequately disinfected water being sent into the supply for up to 7 days.

The issues identified with the disinfection system included (i) failure of the standby unit to switch on due to pump breakdown (ii) alarm system being limited to a single text alert to one individual which resulted in the alarm notification not being responded to for up to 7 days (iii) absence of auto shut down of the supply linked to a low residual chlorine level (iv) site check limited to one visit per week with no remote checking of the continuous online residual chlorine monitor (v) monitoring of residual chlorine in the network being limited to a weekly check.

Irish Water had undertaken several corrective actions in advance of the audit including (i) the completion of the installation of the automatic shutoff on the supply linked to the chlorine alarm with works completed on 15/09/17, (ii) updating of the Chlorine Alarm Response Procedure to include the contact numbers for 3 no. staff and the display of the procedure on site (iii) commencement of daily checking by the caretaker of the residual chlorine level on the rising main before the reservoir and (iv) daily checking of the chlorine level in the network.

### **4. RECOMMENDATIONS**

#### **Management of Chlorine Alarms**

1. Irish Water should ensure that all staff are familiar with the protocol for dealing with the receipt of chlorine alarms and that the documented procedures are being followed. Irish Water should ensure that training is provided to staff on the procedure. Irish Water should ensure that records of all incidents, alarm events, alarm responses and results of monitoring of residual chlorine levels at the plant and in the network are documented and that alarms are escalated to senior staff quickly.

#### **Disinfection**

2. Irish Water should confirm that there is a procedure in place for the regular review of the continuous online residual chlorine data being gathered in County Tipperary, in particular at plants where there is currently no auto shut down in place.

#### **Chemical Storage and Bunds**

3. Irish Water should seek clarification from the supplier in relation to the expiry date indicated on the sodium hypochlorite drums at the time of the audit and provide an update to the Agency. Irish Water should ensure that a procedure is in place at the Cloughjordan WTP for stock control of the sodium hypochlorite.

#### **Hygiene and Housekeeping**

4. Irish Water should ensure that the bund on the chlorine day tank is cleaned out and any build up of liquid in the bund is removed.

#### **Treated Water Storage**

5. Irish Water should ensure that the reservoir is inspected and cleaned out on a regular basis in accordance with EPA Drinking Water Advice Note 10: Service Reservoir Inspection, Cleaning

and Maintenance and any maintenance and repairs completed as soon as possible after the need had been identified. Irish Water should provide an update on the Irish Water Treated Water Reservoir Programme including a timeframe for the cleaning of the reservoir for the Cloughjordan Water Supply.

### **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 Ms Regina Campbell, Drinking Water Team Leader.

Irish Water should submit a report to the Agency within one month of the date of this audit report detailing how it has dealt with the issues of concern identified during this audit. The report should include details on the action taken and planned to address the various recommendations, including timeframe for commencement and completion of any planned work.

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:**

*Ciona Doyle*

**Date:**

27/10/17

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Inspector

**Photograph No.1** : Build Up of Liquid in Chlorine Day Tank Bund.

