



# Drinking Water Audit Report

<b>County:</b>	Cork	<b>Date of Audit:</b>	26/07/2018
<b>Plant(s) visited:</b>	Ballymakerra Water Supply Scheme (0500PUB2303)	<b>Date of issue of Audit Report:</b>	31/07/2018
		<b>File Reference:</b>	DW2018/138
		<b>Auditors:</b>	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), as amended.</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. **The UV disinfection system at Ballymakerra Water Treatment Plant was switched off on the 27/02/18 due to ongoing problems with cracking of the lamps.**
- ii. **Due to the configuration of the network the chlorine disinfection system has insufficient contact time to adequately disinfect the water in the Ballymakerra water supply.**
- iii. **A lack of communication of the relevant information internally in Irish Water resulted in a delay in the identification of the full extent of the deficiency in the disinfection system until the 18/07/18. This put the consumers of the supply at risk from inadequately disinfected water.**
- iv. **Irish Water should conduct a full review of their procedure in response to the identification of an inefficiency in the disinfection process. The review should include both internal communications within Irish Water and external communication with the HSE and EPA.**
- v. **Once the extent of the issue was identified Irish Water fast tracked the installation of a new UV disinfection unit. The unit is due to be installed and commissioned in early August 2018.**

## 1. INTRODUCTION

Under the *European Union (Drinking Water) Regulations 2014, as amended*, the Environmental Protection Agency is the supervisory authority in relation to Irish Water and its role in the provision of public water supplies. The audit of Ballymakerra water treatment plant (WTP) was carried in response to the notification by Irish Water dated 20/07/18 that the drinking water supply was not being adequately disinfected.

The Ballymakerra water treatment plant serves a population of approximately 674 people. Treatment consists of chlorination, followed by caustic dosing and pressure filtration for manganese removal and finally UV disinfection. The supply serves the area from Ballyvourney to Coolea.

The opening meeting commenced at 2pm at the Ballymakerra WTP. 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:**

Pat Duggan, Drinking Water Compliance Specialist.  
 Salvador Mc Namara, Water Engineer.  
 Kian Guihen, Drinking Water Compliance Analyst.

**Representing Cork County Council (CCC):**

Jerry Creedon, Executive Engineer.  
 Mary Hickey, Executive Scientist.  
 Donal Kelleher, Caretaker.

**Representing the Environmental Protection Agency:**

Regina Campbell, Inspector.  
 Criona Doyle, Inspector.

**Representing the HSE:**

John Maher, Senior Environmental Health Officer.

**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. Inadequate Disinfection**

- a. The EPA audit was carried out in response to the notification of inadequate disinfection due to insufficient contact time in the Ballymakerra water supply.
- b. Treated water is pumped to the reservoir located 2km from the WTP. When the pumps at the WTP are off consumers are receiving water from the reservoir. This water has had sufficient contact time and is adequately disinfected. The issue of inadequate disinfection arises when the treatment plant pumps are running and consumers are receiving water directly from the network. In this case the chlorine will not have had sufficient contact time to fully disinfect the water. The pumps operate for 15 hours a day.
- c. A UV disinfection system was installed in 2014 to address the issue of the inadequate contact time. There have been operational issues with the UV units since they were installed resulting in frequent shut downs. Problems included regular cracking of the lamps.
- d. On the 27/02/18 the UV disinfection system was shut down. Irish Water Compliance personnel indicated they were not aware of the issue of the inadequate contact time and only took the potential *Cryptosporidium* risk into account in their response. They instigated a programme of monthly monitoring for *Cryptosporidium*. There have been no detections in the samples to date. A copy of the results for May, June and July were presented at the audit.
- e. A continuous UVT monitor was installed in March 2018 to gather data to allow a replacement UV unit to be sized.
- f. As a result of the drought situation and issues with the UV unit Irish Water Process Optimisation and Asset Operations visited the site on Wednesday 18/07/18 to carry out a review of the supply. It was noted that the UV unit had been switched off and that there was an issue with inadequate contact time. Irish Water Compliance personnel then became aware of the issue regarding the inadequate contact time.
- g. Irish Water contacted the HSE on Thursday 19/07/18 regarding the inadequate contact time.
- h. Irish Water notified the EPA on Friday 20/07/18 that the pumping set up on the network results in insufficient contact time to achieve the required level of disinfection.

	<ul style="list-style-type: none"> <li>i. In a follow up phone call between the EPA and Irish Water on the 20/07/18 the EPA were informed that there were also issues with the operation of the UV unit and that the supply was at risk from <i>Cryptosporidium</i> due to a surface water influence on the source.</li> <li>j. On Monday 23/07/18 Irish Water outlined to the EPA that the UV units had been switched off for the previous 12 weeks. They confirmed that a new UV disinfection system was being fast tracked for delivery and would be installed within 10 working days. It was subsequently confirmed at the audit on 26/07/18 that the UV unit had been switched off on the 27/02/18.</li> <li>k. On Wednesday 25/07/18 Irish Water provided monitoring results including network residual chlorine levels, microbiological sampling and <i>Cryptosporidium</i> monitoring for the period April to July 2018. SCADA monitoring results from the treatment plant for the period 16/07/18 to 23/07/18 were also provided. No exceedances were detected.</li> <li>l. The results from the three samples taken on the 25/07/18 were provided at the audit. The samples were clear for both Coliform Bacteria and E. Coli and indicated satisfactory total and residual chlorine levels.</li> <li>m. A single UV unit is to be installed initially. The installation of the first UV unit is due to commence the week of 30/07/18. A second UV unit has been ordered and has a 4 week lead time for delivery.</li> <li>n. The new UV unit will automatically shut down the supply if the water quality drops outside of its validation range.</li> </ul>
<p><b>2.</b></p>	<p><b>Disinfection</b></p> <ul style="list-style-type: none"> <li>a. Disinfection is by means of chlorination and UV treatment.</li> <li>b. Chlorination with sodium hypochlorite is via duty and standby dosing pumps. There is automatic switch over between the duty and standby pumps.</li> <li>c. The dosing rate is fixed based on the flow rate and is not linked to the residual chlorine monitor. The target level leaving the WTP is 1.2 mg/l.</li> <li>d. The low level chlorine alarm is set at 0.4 mg/l and the high level alarm at 2.5mg/l with a 20 minute delay. There is automatic shutdown of the plant linked to the chlorine alarm. The chlorine levels are monitored at the outlet from the WTP.</li> <li>e. A text alert message is sent to both the caretaker and relief caretaker in the event of an alarm being generated.</li> <li>f. On the day of the audit 10% sodium hypochlorite was being used due to the recent hot weather. The sodium hypochlorite expiry date on the drums was 08/01/19. Normally 15% sodium hypochlorite from the bulk storage tank is used for chlorination.</li> <li>g. The network extends for approximately 5km to its farthest point at Coolea. There is a booster chlorination station at Coolea with chlorine alarms. The station was not visited as part of the audit.</li> <li>h. The current UV system includes both duty and standby units. The system design was based on the assumption that the raw water would remain within the specified UVT range. A UVT monitor was not installed as part of the monitoring equipment. UVI readings were used to monitor the operation of the unit. It was assumed that the unit was operating within its validation range once the UVI remained above 40 mj/cm<sup>2</sup>.</li> </ul>
<p><b>3.</b></p>	<p><b>Source Protection</b></p> <ul style="list-style-type: none"> <li>a. Raw water is obtained from an infiltration gallery located adjacent to the River Sullane. No construction details were available for the infiltration gallery and the its age could not be confirmed. The collection chambers are 4m deep.</li> <li>b. A map with the 250m and 200m set back distances was available. Landowners with lands in the buffer zones were last written to in 2007 to inform them of their obligations under the Good Agricultural Practice for Protection of Waters Regulations (2017).</li> <li>c. The area of the infiltration gallery floods.</li> <li>d. The most recent <i>Cryptosporidium</i> risk score, from 2016, indicates moderate risk (score 61). The score on EDEN is reported as high risk (score 77).</li> <li>e. No historic raw water monitoring data was available at the audit.</li> <li>f. The UVT monitor installed in March 2018 indicates 85% UVT on average.</li> </ul>
<p><b>4.</b></p>	<p><b>Filtration</b></p> <ul style="list-style-type: none"> <li>a. Two manganese dioxide pressure filters are used for manganese removal. The filters run in parallel and are backwashed on a timed basis (every 250m<sup>3</sup>).</li> <li>b. The backwash water is discharged to the River Sullane adjacent to the WTP.</li> <li>c. The water is treated with sodium hydroxide to achieve the optimum pH for manganese removal.</li> <li>d. Results from 03/07/18 show a manganese level of 286 ug/l before treatment and 11 ug/l after</li> </ul>

	treatment (drinking water limit 50 ug/l).
<b>5.</b>	<p><b>Treated Water Storage and Distribution Network</b></p> <ul style="list-style-type: none"> <li>a. The water is pumped to a storage reservoir located 2km from WTP. The reservoir was not accessible on the day of the audit due to health and safety restrictions.</li> <li>b. The reservoir was last cleaned 3 to 4 years ago.</li> <li>c. A new reservoir is to be installed by the end of 2018.</li> </ul>

### 3. AUDITORS COMMENTS

The disinfection system at Ballymakerra includes chlorination and UV treatment however the public have been at risk of receiving inadequately disinfected water since the UV unit was switched off on the 27/02/18. The configuration of the network means that there is insufficient contact time for the chlorine to adequately disinfect the water.

The audit identified an issue with the communication of information between different sections within Irish Water. A review of Irish Water's procedure for dealing with the detection of an inefficiency in the disinfection process is required to prevent the reoccurrence of a similar incident. The review should look at the internal communication procedures within Irish Water to ensure that personnel are provided with all relevant details to adequately assess the risk. The review should also ensure that all relevant information is provided on the incident/exceedance notification documentation to both the EPA and HSE.

Since Irish Water Compliance personnel became aware of the issue with the inadequate contact time on the 18/07/18, they have fast tracked the installation of a new UV disinfection unit. The installation of the unit is to commence during the week of 30/07/18.

### 4. RECOMMENDATIONS

#### General

1. Irish Water should review their response procedure for dealing with the detection of an inefficiency in the disinfection process. The review should look the internal communication procedures within Irish Water to ensure personnel are provided with all the relevant details to adequately assess the risk. The review should also look at the procedure for external communications between Irish Water and the HSE and EPA to ensure all relevant information is provided on the incident/exceedance notification documentation to both parties. The review should ensure procedures are being adhered to and responded to within appropriate timeframes.

#### Disinfection

2. Irish Water should keep the EPA updated on progress with the installation of the UV disinfection unit. The installation of the disinfection system should be in accordance with Section 3 of *EPA Advice Note 3: E. Coli in Drinking Water* which specifies the requirements for UV disinfection. Irish Water should submit two months verification data to the EPA as soon as it is available.

#### Monitoring and Sampling Programmes for Treated Water

3. Irish Water should continue to undertake daily monitoring of the microbiological quality of the water and weekly monitoring for *Cryptosporidium* until the UV unit has been commissioned. Irish Water should continue to forward the monitoring results to the EPA and notify of any exceedances.

## **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 Michelle Minihan, Senior Inspector, Drinking Water Team.

Irish Water should submit a report to the Agency within two weeks 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:**

*Cristina Doyle*

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**Date:**

31/07/2018

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Inspector