



Drinking Water Audit Report

County:	Tipperary	Date of Audit:	01/06/17
Plant(s) visited:	Kilcash Water Supply (Scheme Code 2900PUB0147)	Date of issue of Audit Report:	14/06/17
		File Reference:	DW2017/54
		Auditors:	Ms. Criona Doyle Mr. Niall Dunne
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>. • <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> • The recommendations specified in the <i>EPA Drinking Water Report</i>. • EPA Drinking Water Advice Notes No.s 1 to 15. • The recommendations in any previous audit reports. 		

MAIN FINDINGS

- i. **There are significant deficiencies at the Kilcash Water Treatment Plant in relation to the response to the low level chlorine alarm. Despite a documented protocol being in place and a memo having been issued to all water treatment plant caretakers / operators the protocol was not being implemented. Irish Water should undertake a review of the current protocol for dealing with responses to chlorine alarms on a countywide basis in Tipperary and ensure that the documented procedures are being followed.**
- ii. **Inadequate topping up of the sodium hypochlorite in the day tank had resulted in water which had not been disinfected being discharged to the reservoir. Improved procedures should be put in place to ensure regular topping up and checking of the level of sodium hypochlorite in the day tank.**

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 Kilcash Spring supplies the village of Kilcash. The spring is located in an area of forestry on the slopes of Slievenamon. The supply produces up to 55m³/d and serves a population of 184. Treatment at the plant includes disinfection with sodium hypochlorite. There is a 93m³ single celled reservoir located adjacent to the treatment plant.

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

The opening meeting commenced at 2:30pm at the Kilcash 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, Operations, Irish Water.

Pat Duggan, Compliance Analyst, Irish Water.

Flan Real, Assistant Scientist, Tipperary County Council.

Aine Butler, Process Technician, Tipperary County Council.

Joe Burke, Executive Engineer, Tipperary County Council.

Pat Fitzgerald, Acting Senior Executive Engineer, Tipperary County Council.

James Whelan, Acting Water Caretaker, Tipperary County Council.

Representing the Environmental Protection Agency:

Niall Dunne, 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.

<p>1.</p>	<p>Chlorine Pump Failure – Investigations and Actions</p> <ul style="list-style-type: none"> a. On Saturday 20/05/17 at 7pm the chlorine dosing pumps air locked due to a low level of sodium hypochlorite in the day tank. b. The PMAC alarm system was not operational on the 20/05/17 or 21/05/17 due to a modem fault and a problem with the back up power supply. The system failure was a countywide event affecting alarm call outs on all supplies. This resulted in no alarm message being sent to the Caretaker when the residual chlorine low level alarm was triggered on Saturday 20/05/17 as a result of the level dropping below 0.2 mg/l. A 24 hour back up power supply has since been sourced for the PMAC system. c. On the morning of Monday 22/05/17 Tipperary County Council identified that there was a fault with the PMAC system. All alarms triggered over the weekend of the 20/05/17 and 21/05/17 did not generate a text alert until the PMAC system came back online at 8:25am on 22/05/17. The PMAC alarm log was reviewed at the audit and there was no record of chlorine outages at any other plants during this time period. d. On Monday 22/05/17 remedial measures were undertaken by the caretaker including filling of the sodium hypochlorite day tank and scouring of the distribution mains. Monitoring of chlorine residuals and microbiological sampling was undertaken in the network to ensure no pockets of unchlorinated water remained. e. The HSE were consulted and a precautionary boil water notice was put in place on Monday 22/05/17. f. The precautionary boil water notice was lifted on the 26/05/17 on the advice of the HSE following the provision of 3 days (22nd, 23rd and 24th May) satisfactory monitoring results and adequate residual chlorine levels. g. The chlorine residual SCADA trend data from the 14/05/17 to 22/05/17 was reviewed at the audit. The data indicated that the chlorine level was < 0.1 mg/l between 8am on Sunday 21/05/17 until 9:45am on Monday the 22/05/17. h. The reason for the air lock in the chlorine dosing pump on Saturday 20/05/17, according to
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	<p>the local authority, is likely to have been caused by the level in the day tank dropping below the foot valve.</p> <p>i. During a review of other recent alarm events in the plant log book the following incident was also identified. On Sunday 07/05/17 a low chlorine alarm was triggered at 12 midnight (out of hours) and was responded to the next morning. The issue related to an air lock in the dosing pump as the sodium hypochlorite level in day tank had dropped below the foot valve. This resulted in water which had not been disinfected being discharged to the reservoir. Senior staff were not alerted to the incident at the time. On this occasion the issue arose as the day tank had not been topped up since Tuesday the 05/05/17.</p>
2.	<p>Source Protection</p> <p>a. The landuse in the immediate vicinity of the spring is composed of privately owned forestry.</p> <p>b. The Cryptosporidium Risk Screening Score is 57 (moderate risk).</p> <p>c. The high level turbidity alarm on the raw water is set at 1NTU. It generates a text alert but it is not linked to an automatic plant shutdown.</p> <p>d. The spring collection chamber is covered and is inspected every 2 days. Due to the wooded setting pine needles frequently build up in the chamber. The spring is surrounded by a dry stone wall and accessed via a timber gate.</p> <p>e. A copy of the Source Protection Map for Kilcash was provided by Irish Water on 13/06/17.</p> <p>f. No raw water monitoring programme is currently in place due to resource issues. Historic raw water monitoring data from 2010 to 2015 was provided by Irish Water at the audit.</p>
3.	<p>Disinfection</p> <p>a. Sodium hypochlorite (14% with softener) is used for chlorination.</p> <p>b. Duty and assist (boost) chlorine dosing pumps are installed on site and dosing is flow proportional. There is no standby chlorine dose pump. The assist pump provides boosting when the chlorine level drops below 0.2 mg/l. All pumps and monitoring equipment were within service dates.</p> <p>c. The low level chlorine alarm was set at 0.2mg/l and the high level alarm at 1.0mg/l. The alarm levels were displayed on site.</p> <p>d. Irish Water outlined that an auto shut off is to be installed on the outlet from the reservoir linked to the low level residual chlorine alarm.</p> <p>e. Due to the low volume of water being treated the day tank is made up to 100 litres twice a week (Monday & Friday) at a dilution ration of 1:40. The mixing instructions are displayed adjacent to the day tank including the instruction not to let the level in the day tank to drop below 30 litres. Records are not kept on site of when the day tank is filled.</p> <p>f. Details of the required chlorine monitoring locations on the distribution line and end of line are displayed on site.</p> <p>g. A copy of the contact time was provided which indicated a CT of 63 mg. min/l which includes the reservoir and some of the network.</p> <p>h. The target chlorine dose is 0.5 mg/l to achieve a chlorine residual of 0.10mg/l at the end of the network.</p> <p>i. The labels on the sodium hypochlorite drums indicated a production date of 17/05/17 and a “use by” date of 17/06/17.</p> <p>j. The Irish Water Disinfection Programme is scheduled to commence in Tipperary during Quarter 3 2017. Irish Water outlined that the Disinfection Programme would address issues in relation to alarms and auto shut offs. The Agency outlined that where there are significant issues identified in relation to disinfection that these would need to be addressed in advance of the disinfection programme.</p>
4.	<p>Treated Water Storage and Distribution Network</p> <p>a. A 93m³ reservoir is located adjacent to the treatment plant. Insect proof mesh was present on the vent pipe. The reservoir was last cleaned 2 – 3 years ago.</p>
5.	<p>Monitoring and Sampling Programme for Treated Water</p> <p>a. The 2017 compliance monitoring plan includes 3 no. check samples and 1 no. audit sample.</p>

	<p>b. The results of historic treated water monitoring from the Kilcash Supply were received from Irish Water on the 13/06/17. The data included audit monitoring from 2014-2017 and check monitoring data from 2012, 2013, 2014, 2015, 2016 and 2017.</p>
6.	<p>Exceedances of the Parametric Values</p> <p>a. There is a problem with persistent low pH in the final water due to naturally occurring geological conditions. The online pH monitor was measuring 5.0 pH units on the date of the audit.</p> <p>b. The analysis of metals indicated copper and nickel exceedances in the National School on the 24/02/17 and 07/04/17. The investigations identified that a copper pipe is servicing the school. The HSE advised a Do Not Consume Notice be placed on the school and they have been advised not to drink the water. Irish Water are replacing the copper pipe servicing the school and additional monitoring of metals is to take place once the works are completed.</p>
7.	<p>Chemical Storage and Bunds</p> <p>a. 2 no. 25 litre sodium hypochlorite drums are stored inside the treatment plant cabin within a bund.</p>
8.	<p>Management and Control</p> <p>a. A copy of the protocol for dealing with chlorine alarms is kept on site. Tipperary County Council issued a memo to all water treatment plant caretakers / operators on the 29/09/16 outlining a list of parameters, including low chlorine levels, for which all exceedances are required to be notified to the Process Technician, Assistant Scientist or Executive Chemist. The memo included a Corrective Action Log Sheet which is required to be filled out in the event of a chlorine dosing outage or very low levels of chlorine. The memo also outlined the personnel and contact numbers in relation to out of hours responses. The protocol indicates that alarms received between 8pm and 8am are to be responded to next working day unless there is an imminent risk to human health.</p>

3. AUDITORS COMMENTS

The audit identified significant deficiencies in relation to the response to the low level chlorine alarm despite documented protocols being in place that outlined the appropriate responses and relevant contact details. A review of the current protocol for dealing with the response to chlorine alarms on a countywide basis in Tipperary is required as a priority.

Issues were identified with the disinfection system including (i) the absence of a standby chlorine pump to facilitate automatic switchover between duty and standby chlorine dosing pumps and (ii) absence of auto shut down of the supply in response to low residual chlorine levels. The audit identified inadequate topping up of the sodium hypochlorite in the day tank had resulted in water which had not been disinfected being discharged to the reservoir as a result of air blockages in the chlorine dosing pumps. Improvement works are required to be implemented in advance of the Irish Water Disinfection Programme.

Irish Water confirmed that works are due to commence shortly in relation to the installation of an automatic shutdown of the supply linked to the chlorine residual low level alarm.

4. RECOMMENDATIONS

Management of Chlorine Alarms

1. Irish Water are requested to undertake a review of the current protocol for dealing with the receipt of chlorine alarms in County Tipperary and provide an updated protocol to the Agency by the 28/06/17 in relation to alarm responses. The protocol should make reference to alarm procedures countywide to ensure alarms are responded to quickly and appropriately by relevant staff to ensure safe and wholesome water is delivered to consumers at all times. The protocol should detail the required out of hours response. This review should also take into account the vulnerability of supplies in the absence of storage.

Disinfection

2. Irish Water should install a duty and standby chlorine dosing pump with automatic switchover in the event of the failure of one of the pumps. Irish Water are requested to confirm the timeframe for the installation of the auto shut off valve, linked to low level chlorine alarm, on the outlet of the reservoir.
3. Irish Water should ensure that improved procedures and checks are put in place to ensure the regular topping up and checking of the level of sodium hypochlorite in the day tank to prevent the occurrence of air blockages in the chlorine dosing pumps. Records should be maintained in the plant logbook in relation to the filling of the day tank.

Treated Water Storage and Distribution Network

4. 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.

Exceedances of the Parametric Values

5. Irish Water should provide the metals resampling results and an update on the proposed action plan in relation to the installation of pH correction.

Management and Control

6. 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.

