Drinking Water Audit Report

County:	Kerry	**Date of Audit:**	16/02/2015
Plant(s) visited:	Waterville PWSS 075H 1300PUB1057	**Date of issue of Audit Report:**	09/03/2015
		File Reference:	DW2009/110
		Auditors:	Mr Niall Dunne
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014).* • *The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)* • The recommendations specified in the EPA *Drinking Water Report.* • The recommendations in any previous audit reports.		

MAIN FINDINGS

i. **The UV system at this treatment plant is not in compliance with the *EPA Drinking Water Advice Note No. 3: E. coli in Drinking Water; as* there is no automatic switchover between the two UV units and the UV units are not connected to a recording device. As a priority, the Irish Water must ensure that auto switch over between the UV units is installed and that the UV units are connected to a recording device.**

ii. **This supply is on the RAL for failure to comply with the THM parametric value. This is a new treatment plant, commissioned in December 2013; however, since its commission there have been two notified THM exceedances. The Water Services must ensure that a full review of the treatment process and the distribution network is carried out to ensure compliance with the THM parametric value in the 2014 Drinking Water Regulations and must as a priority endeavour to remove the supply from the RAL.**

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 in response to ongoing THM exceedances at this site; the most recent 105 ug/l on the 09/10/2014 and to a *Cryptosporidium* exceedance on the 27/01/2015 - 0.016 oocysts per 10 L. Where the text refers to the Water Service Authority this refers to Irish Water in accordance with Section 7 of the Water Services (No. 2) Act 2013.

This is a new water treatment plant, commissioned in December 2013. Treatment consists of a DAFF plant, operational only when the colour of the raw water is above 15 Hazen; duty and standby UV units with chlorine disinfection and pH correction. The plant serves approximately 890 persons and supplies an average of 550 m^3/day.

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 10.30 am at the Waterville 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: Donal Brennan - DBO Lead (Irish Water); Deirdre O Loughlin - Compliance Analyst (Irish Water); John Ahern - Acting Senior Executive Engineer (KCC); John Sugrue - Area Engineer (KCC); PJ McAuliffe - Executive Technician (KCC); Maguerite Lynch - Plant Supervisor (EPS); Glenn Bain - Supervisor (EPS); Representing the Environmental Protection Agency: Niall Dunne - 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.	**Source Protection** a. The sources were not visited as part of this audit. b. There are two sources; the River Fingal and Lough Currane. Lough Currane according to EPS is used as a secondary backup source and is not regularly used. EPS confirmed that the area around the River Fingal abstraction point is fenced off. c. Raw water from the two sources is mixed in a blending tank prior to treatment. d. According to EPS water quality is good, from observation of 2013 results, between May and July; it was observed that the average colour was 19.5 Hazen with an average turbidity 0.96 NTU. e. There are colour, pH and turbidity monitors on the raw water, these are linked to SCADA and readings are also recorded manually. f. During the audit a turbidity reading of 0.47 NTU was observed on the raw water monitor, and the colour was observed as 27.2 Hazen. g. EPS stated that the raw water is tested independently every few months.
2.	**Coagulation, Flocculation and Clarification** a. Treatment at this plant consists of DAFF, the design capacity is 2,000 m^3 /day. According to EPS, the plant produces on average 500-550 m^3/day (approximately 50 m^3/hr for 10 hours per day). b. The sand filter in the DAFF consists of 700 mm sand silica. EPS stated that the filter is visually inspected during each backwash cycle. c. Coagulation is achieved through the use of 8% Alum Sulphate; which conforms to IS EN878:2004. d. Soda ash is dosed flow proportionally prior to and post the DAFF plant. e. Coagulation is initiated manually once the colour of the raw water exceeds 12 Hazen. Below 12 Hazen there is no chemical dosing and no coagulation. The level of coagulant dosed is based on three colour bands; (0-12; 12-30 and 30+ Hazen). f. Poly is not dosed at this plant. g. EPS stated that the DAFF plant does not switch on automatically; and that once the DAFF plant is manually switched on it takes approximately 105 minutes to become fully operational. h. There is a turbidity monitor directly after the DAFF unit. The alarm level is set at 0.15 NTU. i. During the audit the turbidity reading after the DAFF unit was observed to be 0.87 NTU; the DAFF plant had just been switched on. (The treated water turbidity was 0.27 NTU). EPS stated that the turbidity reading after the DAFF plant is not accurate until the plant is fully operational.

	j. On review of historic SCADA data it was noted that there were spikes in the turbidity readings after the DAFF plant, in some cases up to 10 NTU. EPS were unable to identify the reason for these spikes, but it was assumed that the plant was not operational at the time. Turbidity spikes were noted after the backwash cycle. (Turbidity spikes were also noted in the treated water.) k. EPS stated that when the plant is in use it is backwashed daily and every 3 days when not in use. Backwash water is discharged to an onsite lagoon and then to a wastewater treatment plant. Following backwash, water is not run to waste and there is no slow start on the DAFF plant. l. EPS confirmed that jar tests are not regularly undertaken; dosing is based on historic jar test results carried out at the initial design/commissioning stage.
3.	**Chlorination and Disinfection** a. Disinfection at this plant consists of duty and standby UV units. There is no automatic switch over between the UV units. The UV units are validated to 76% UVT at a max flow rate 100 m^3/hr. The units are not connected to a recording device i.e. SCADA and UVT and UVI are not trended. The caretaker takes daily readings at the plant. b. EPS confirmed that there are proposals to connect the UV units to SCADA and to install auto shut off by the week ending 20/02/2015. The low level alarm is set at 86% UVT. c. Chlorine is dosed via duty and standby dosing pumps; there is auto switch over between the duty and standby pumps. d. Chlorine is dosed flow proportionally and is not connected to residual levels. e. During the audit the chlorine residual reading from the outlet of the reservoir was observed as 0.57 mg/l. f. A residual chlorine reading of 0.21 mg/l in the extremities of the network was noted from the caretaker's diary. g. Within the network there is booster chlorination, where there is only a single duty dosing pump, which doses flow proportionally (see photograph 1). There is a chlorine monitor on site and it is connect to SCADA. It was observed that the expiration date on the drum of sodium hypochlorite at the booster station had passed. EPS at the time of the audit could not confirm the low level alarm at this location.
4.	**Treated Water Storage** a. The treated water tank is a two cell reservoir, with only one cell currently in use. The capacity of the each cell is 860 m^3; estimated to be a day and a half to two days storage. b. The capacity of the reservoir in the network is 350 m^3.
5.	**Monitoring and Sampling Programme for treated water** a. On examination of the SCADA results turbidity spikes in the final turbidity readings were noted.
6.	**Exceedances of the Parametric Values** a. There have been ongoing THM exceedances at this plant with the most recent 105 ug/l on the 09/10/2014 and a *Cryptosporidium* exceedance on the 27/01/2015 0.016 oocysts per 10 L. b. EPS stated that KCC have been carrying out TOC and SUVA monitoring. TOC results of 1.1 - 1.6 mg/l within the network were observed.
7.	**Chemical storage and bunds** a. No drip tray or locked covers were observed on the inlets of the bulk storage tanks. b. The chlorine drum at the booster station was not bunded.
8.	**Management** a. EPS stated that all dosing equipment automatically switches over at midnight.

3. AUDITORS COMMENTS

The Waterville treatment plant is on the RAL for elevated THM levels. A new treatment plant was commissioned in December 2013; however there have been two THM exceedances on this supply since its commissioning. The EPA does not deem it acceptable that there are still THM exceedances following the construction of a new treatment plant. Irish Water must endeavour to resolve the THM issue on this supply to ensure compliance with the 2014 Drinking Water Regulations and endeavour to remove this supply from the RAL, and submit the information requested in the recommendations below.

Coagulation dosing is based on colour, and manually initiated above 12 Hazen. Irish Water must ensure that the dosing regimen and the operation of the plant are adequate to guarantee compliance with the THM parametric value. Irish Water should carry out a full review of the treatment process and of THM formation potential within the supply, as set out in *EPA Advice Note No 4. Version 2: Disinfection By-Products in Drinking Water.* This investigation should ultimately identify the cause and the remedial measures necessary to resolve THM non compliances.

At the time of the audit, the UV units were not connected to a recording device; UVT / UVI data was not being trended and there was no auto-switch over between the units. This is not in accordance with EPA guidance document "*EPA Drinking Water Advice Note No. 3: E. coli in Drinking Water";* and is of concern to the EPA. Through the lack of these control measures the operation of the UV units cannot be verified and the security of supply cannot be guaranteed. Irish Water must as a priority ensure that the UV units are set up in accordance with EPA Advice Note Number 3.

4. RECOMMENDATION

1. The Water Services Authority should as priority ensure that the UV system meet the criteria set out in "*EPA Drinking Water Advice Note No. 3: E. coli in Drinking Water* and submit the following information, in order for this supply to be considered for removal from the RAL;

    a. A copy of the validation certificate for the UV lamps including details of the validated range of the lamp, showing validated flow and % UVT/UVI.
    b. Confirmation that there is a UVI or UVT monitor on the UV lamp; that this is connected to a recording device and results are being trended to verify the UV units are operating within their validated range.
    c. Verification that the UV unit has operated within its validated range at all times (i.e. a print out for the past two months in graph form of the UVI or UVT readings; include flow though the plant on the graph).
    d. Two months turbidity results for the filtered and the final water in graph form.
    e. The following monitoring results to demonstrate that the actions undertaken have been adequate; from the raw and treated water at least three TOC (mg/L) and SUVA (L/mg-m) monitoring results taken on different dates; and from the treated water at least three consecutive compliant THM monitoring results taken on different dates.

2. The Water Services Authority should review, evaluate and prepare an action programme for the operational practices of the treatment process and the distribution system to deal with THM exceedances. As part of this review and in the development of the action programme the Water Services Authority should;

    a. Operate in accordance with the *EPA Advice Note No 4. Version 2: Disinfection By-Products in Drinking Water.*

    b. Initiate a monitoring program, for each stage of the process to evaluate critical parameters in THM formation.

    c. Undertake a review of the DAFF unit and coagulation / flocculation processes to ensure the efficiency of the treatment process in the removal of THM precursors and compliance with the THM parametric limit.

    d. Evaluate the potential for THM formation in the storage facilities following disinfection.

e. Take account of the recently published EPA Advice Note 15: Optimisation of Chemical Coagulation Dosing at Water Treatment Works available online at http://www.epa.ie/pubs/advice/drinkingwater/dwadvicenote15.html.

f. Consider the installation of an automatic initiation of the DAFF plant.

3. The Water Services Authority should investigate the cause of the turbidity spikes in filtered and final water, and implement remedial measures to rectify the cause of the spikes.

4. The Water Services Authority should review the operation of the filter to ensure that there is no filter breakthrough following backwash and that there is a slow start or run to waste policy following backwash.

5. The Water Services Authority should install duty and standby chlorine dosing pumps with automatic switch over at the chlorine booster station.

6. The Water Services Authority should put a system in place so that stocks of reagents and chemicals kept on-site are regularly checked to see if they are in date.

7. The Water Services Authority should review use of disinfectants at the Waterville PWS and all other public water supplies to ensure that all disinfectants are authorised in accordance with the EU Biocides Products Regulation (528/2012) and associated Irish regulations (*European Union (Biocidal Products) Regulations, 2013*.

FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

During the audit the Water Services Authority representatives were advised of the audit findings and that action must be taken as a priority by the Water Services Authority to address the issues raised. This report has been reviewed and approved by Ms Yvonne Doris, Drinking Water Team Leader.

The Water Services Authority 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:  **Date:** 09/03/2015

Niall Dunne

Inspector

Photograph 1: Duty chlorine dosing pump only at the booster station, no standby dosing pump. The expiration date on the chlorine drum was observed to have passed.