Drinking Water Audit Report

County:	Cork	**Date of Audit:**	26/09/2016
Plant(s) visited:	Whitegate Regional 0500PUB2407	**Date of issue of Audit Report:**	30/09/2016
		File Reference:	DW2016/37
		Auditors:	Mr Niall Dunne Ms Pauline Gillard
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. **Since the imposition of a boil water notice (BWN) on the 27/02/2016, Irish Water has installed additional treatment and controls at the Whitegate Regional treatment plant, and addressed the storage capacity and scheme management issues which were experienced during adverse weather conditions in winter 2015/2016. Two microfiltration units have been installed prior to the UV disinfection unit, a new raw water turbidity monitor has been installed and new plant shutdown controls have been put in place to prevent inadequately treated water entering the distribution network.**

ii. **The EPA is satisfied, once the microfiltration units are fully operational, that treatment at this plant is now sufficiently robust to deal with elevated turbidity levels within the raw water to ensure clean and wholesome drinking water.**

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 robustness of safeguards and treatment and to assist the HSE in the determination on whether the boil water notice, issued on the 27/02/2016 on the Whitegate Regional public water supply, could be lifted.

The Whitegate Regional Public Supply serves a population of approximately 10,300. The scheme demand is approximately 4,800 m^3/day. The source is the Dower spring, a large spring in karst limestone. The spring is highly vulnerable with a *Cryptosporidium* Risk Assessment Score of 133 (very high risk). The supply feeds a reservoir located at Kilva.

Treatment, located at Kilva reservoir, consists of microfiltration followed by UV, fluoridation and chlorination. Microfiltration has been installed subsequent to the imposition of the boil water notice. At the time of the audit, works on the microfiltration units were on going. Irish Water also proposes

to have polyaluminium chloride (PAC) dosing operational by Q4 2016 to assist with the treatment process.

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 10:35 am at the Dower spring. 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:
Jim Fitzgerald, SLA lead, Irish Water;
Patrick Duggan, Compliance Analyst, Irish Water;
Brendan Kidney, Irish Water;
Liam Lynch, Senior Executive Engineer, Cork County Council;
Paddy Crowley, Executive Engineer, Cork County Council;
Jim O'Neil, Caretaker, Cork County Council;
Eugene McCarthy, Water Technology.
Representing the HSE &EPA:
Kathleen Clifford, PEHO, HSE;
Niall Dunne, Inspector, EPA;
Pauline Gillard, Inspector, EPA.

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 Whitegate supply is served by the Dower Spring. The abstraction rate is 320 m^3/hr; the production rate of the plant is 300 m^3/hr. Pumping stops once the Kilva storage reservoir is full. b. In the EPA audit report, 02/02/2016, it was noted that there was a discrepancy in readings between the raw water turbidity monitor and the turbidity monitor located within the rising main. Subsequent to this the turbidity monitor in the rising main was taken out of service and a new turbidity monitor installed at the abstraction point. c. A dial out raw water turbidity alarm will trigger on 3 NTU. The alarm alerts Irish Water (IW) and Cork County Council (CCC) staff. d. The abstraction will shut off when 5 NTU is reached for a period in excess of 15 minutes in the raw water. During the audit the raw water turbidity was noted as 0.060 NTU. e. The turbidity monitor was last serviced 10/06/16; next service is due 10/12/16. f. A recommendation of the Geological Survey of Ireland (GSI) report 'Dower Spring, Ground Water protection Zone', May 2002, https://www.gsi.ie/NR/rdonlyres/0479C4F5-85BB-428A-9746-1FE8C36DED5A/0/Dower_Spring09.pdf , was that permanent monitoring stations, to measure flow and water quality be placed at three streams each of which input to the spring. These streams are Ballyyvorisheen, Carrignashinny and 'Dower Ford'. The estimated respective travel times from each of these to Dower Spring is 3 days, 3 days and 18 Hours. According to CCC no monitors were installed on these streams. g. CCC stated that catchment walkovers were completed July 2016.

2	**Coagulation** a. IW stated that polyaluminium chloride (PAC) dosing prior to microfiltration will be operational by Q4 2016. Installation works are currently ongoing.
3.	**Filtration** a. One of the recommendations of the 02/02/2016 EPA audit report was that additional treatment, organics removal prior to disinfection, should be considered. b. IW has installed two self-cleaning Amiad microfilters, which can filter to 2 microns, (see photograph 1). According to IW the filters were commissioned on the 16/09/16. At the time of the audit additional works on the filters were ongoing; these were scheduled to be completed by the 30/09/2016. c. Each filter is designed to treat up to 150 m^3/hr. d. It is proposed that automatic filter backwashes will be initiated on time, turbidity and on a 0.25 bar pressure differential (ΔP) across the filter. A second backwash will be initiated if the 0.25 ΔP does is not reduced. A dial out alarm will be initiated if 0.25 bar ΔP is recorded after the second backwash. Dial out alarms are also initiated on 0.7 NTU being exceeded for 15 minutes pre or post the filters. e. The plant is set to auto shutdown if post-filter turbidity > 1 NTU, for 15 minutes, and if ΔP > 0.45 bar across the filter. f. During the audit the observed turbidity readings were 0.066 NTU pre-filter, 0.05NTU post filter no. 1 and 0.061 NTU post filter no. 2.
4.	**UV Disinfection** a. A single Trojan UV Swift SC D12 disinfection system, validated to UVDGM (USEPA) is in place at the Kilva reservoir. b. The UV reactor is validated to between 11.1 and 689.8 m^3/hr, between 68.7 and 97.4% UVT and between 30 and 100% power. c. The UVT monitor samples the raw water, which is pre filtration. IW proposes to move the UVT sampling point to a location post the filter, pre the UV unit. d. Currently the plant is set to auto shutdown when the UVT of the raw water < 86%, at a production rate of 300 m^3/hr. The observed audit UVT reading was 97.1%. The plant is also set to automatic shut down when the pre UV unit turbidity is >1 NTU, the UV dose falls below 40 mJ/cm^2 or there is no flow to the UV units after two minutes following start up. e. IW has developed a UV operating envelope, which if required, will allow the plant to treat water to 69% UVT at a flow of 120 m^3/hr. This was developed in accordance with the validation certificate. f. Dial out alarms are activated when 0.7 NTU pre the UV unit is exceeded for 15 minutes. There is no low level UVT alarm in place, as CCC stated the turbidity limits will be exceeded before UVT limits. g. UV alarm set points are password controlled and limited to two people. h. There are 12 lamps within the UV unit. CCC stated that these lamps are replaced after 10,000 hrs of usage. CCC has a service contract with EPS for maintenance of the UV reactor. According to CCC the UV unit is serviced every three months and the UVT sensor is calibrated every six months. i. The maximum time the UV reactor would be out of service is 6 hours, noted from a previous audit. Since the previous audit the effective storage time has been increased from 20.8 hours to 32.2 hours. j. Also noted in the previous audit were concerns about the dehumidifier unit within the UVT monitor, CCC stated that this issue has now been rectified. **Chlorine Disinfection** a) The minimum standard for chlorine disinfection is being achieved in the Whitegate supply. Chlorine is being dosed typically at 1.2mg/l. Examined chlorine results at the end of the network were >0.1mg/l.

5.	**Network** a) IW has undertaken a review of the network and storage capacity of the scheme, since the pervious EPA audit. The review of the network allows for large customers to be switched to adjoining schemes and has resulted in a reduction in demand from 5,000 to 4,8000 m^3/day and reviewing reservoir capacities has resulted in an increase in the network storage from 20.8 hours to 32.2 hours. b) IW has also implemented contingency plans if water is cut off for extended periods, such as engaging with large consumers to reduce demand and to top up vulnerable reservoirs.
6.	**Management and Control** a. There is a standby generator on site in the event of a power outage.

3. AUDITORS COMMENTS

Since the EPA audit on 22/01/2016 and the imposition of the boil water notice on 27/02/2016, Irish Water has undertaken significant work to improve safeguards against elevated raw water turbidity levels and to address issues identified in the previous EPA audit report. Irish Water has installed two micro filters, replaced the turbidity monitor on the raw water intake and initiated the installation of PAC dosing. Irish Water has also introduced more stringent operating controls and auto shut off limits. They have also developed an operating curve for the UV unit so as to be able to treat water to 68% UVT, which can be achieved by adjusting flows in accordance with the validation certificate. They also have addressed network demand and storage capacity issues. The EPA is satisfied that these improvements significantly add to the robustness of the scheme to deal with elevated turbidity levels within the raw water to ensure clean and wholesome drinking water.

At the time of the audit some works were still outstanding on the micro filtration units. Irish Water should ensure that these works are complete without delay and that operational data is submitted to provide evidence of their effectiveness.

4. RECOMMENDATIONS

1. Irish Water should confirm when the microfiltration systems are fully commissioned and operational. Once operational Irish Water should submit at least one weeks plant performance data in graph form of the following parameters;
    a. Raw water turbidity;
    b. Plant flow;
    c. Turbidity data pre and post the filters;
    d. The UVT of the raw water; and
    e. The UV dose.

2. Irish Water should move the UVT monitoring location to post the filters and pre the UV unit.

3. Irish Water should examine the calibration schedule of the UV sensors to ensure that calibration is undertaken regularly to guarantee accuracy and dependability.

4. Irish Water should examine the option of installing low level alarms on the raw water UVT monitor so as to alert the caretaker to any potential issues.

5. Irish Water should review auto shut down settings to ensure that there is a minimum delay in the auto shut down of the plant if water quality deteriorates outside normal operational range for extended periods of time.

6. Irish Water should examine the feasibility of installing permanent monitors on the feeder streams to the Dower Spring, as recommended within the GSI report, so as to alert staff to potential issues within the catchment.

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, Drinking Water Team.

Irish Water should submit the information requested in recommendation No. 1 above once available. Subsequent to this 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 other 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 DW2016/37 in any future correspondence in relation to this Report.

Report prepared by: **Date:** 30/09/2016

Niall Dunne

Inspector

Photograph 1: One of the micro filtration unit, still under commission.