Drinking Water Audit Report

County:	Cork	**Date of Audit:**	16/11/18
Plant(s) visited:	Bantry Derryginagh (Scheme Code 0500PUB4101)	**Date of issue of Audit Report:**	04/12/2018
		File Reference:	DW2018/198
		Auditors:	Ms. Criona Doyle
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014) as amended*. • *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*. • EPA Drinking Water Advice Notes No.s 1 to 15. • The recommendations in any previous audit reports.		

MAIN FINDINGS

i. **The treatment plant was found to be well operated.**
ii. **Irish Water should undertake a review of the UV disinfection system to include the provision of a standby reactor, generation of alarms and auto shutdown of the supply in the event of the failure of the UV system.**
iii. **Irish Water should undertake a review of the current methods for handling and disposal of sludge and implement suitable measures for the disposal of the sludge.**

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. This audit was carried out to assess the performance of Irish Water in providing clean and wholesome drinking water.

The Bantry Derryginagh public water supply provides a daily volume of approximately 1,135m^3/d and serves a population of 2,013. The supply is sourced from Lough Boffina. Treatment at the plant includes coagulation, flocculation, clarification, filtration, disinfection (UV and chlorination) and fluoridation. The plant was constructed in the 1950's and refurbished in 2012 and 2015.

The opening meeting commenced at 10:40am at the Derryginagh 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 Specialist Salvador McNamara – Water Engineer **Representing Irish Water:** Michael Russell – Acting Senior Executive Engineer Pauline McAree – Executive Engineer Seamus Sutton – Executive Engineer Diarmuid O'Mahony - Curator **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.

1.	**Source Protection** a. Raw water is abstracted from Lough Boffina. The intake was not examined as part of the audit due to time constraints. b. Farm inspections were undertaken in the catchment in 2013 by Cork County Council. c. Landowners with lands in the buffer zones were last written to in 2007 under the European Union (Good Agricultural Practice For Protection of Waters) Regulations. d. The catchment comprises 40% grassland, 20% rough scrub and 40% forestry. e. The *Cryptosporidium* risk score is 8.5 (low risk). Sampling for *Cryptosporidium* was being undertaken twice a year by Cork County Council. Irish Water confirmed at the audit that as a validated UV disinfection system is in place monitoring for *Cryptosporidium* is not required in the supply as it can lead to false positives.
2.	**Coagulation, Flocculation and Clarification** a. pH correction of raw water takes place with the addition of sodium hydroxide to ensure the correct pH prior to the addition of the coagulant. b. There is further pH correction prior to manganese removal. There are two sets of sodium hydroxide dosing pumps for pH correction. Both sets of dosing pumps operate on a duty/standby basis. c. Polyaluminium chloride (PAC) is used as the coagulant. Duty and standby coagulant dosing pumps are provided. PAC dosing was taking place at a concentration of 35ppm. A streaming current analyser is provided on site but manual dosing is undertaken. A dose chart is provided in the plant manual. The dose typically ranges from 30 to 35 ppm. d. Jar testing is undertaken in response to changing raw water quality as required but typically twice per year as the water quality from the lake is generally stable. e. There are two hopper bottomed clarifiers with tube settlers. f. The design treatment capacity of the plant is $80m^3/hr$ but the throughput at the plant is limited to $70m^3/hr$ by the intake pumps. g. It is proposed to switch over to automatic dosing of the coagulant in the future but this requires the installation of a static mixer and an additional pH probe. h. The decanting channels were level and clean and no floc carryover was visible.
3.	**Filtration** a. There are 2 no. rapid gravity filters on site. They were completely refurbished in 2014 and manganese dioxide was added to the sand layer for manganese removal. The sand was topped up to a 700mm depth six weeks prior to the audit. The filtration rate is $3.5m^3/m^2/hr$.

	b. A depth marker is provided but could not be read due to build-up of material on the gauge. c. Automatic backwashing can be instigated on the basis of the turbidity reaching 0.2 NTU or headloss. Normally the filters are automatically backwashed every two days on a timed basis in advance of the measured turbidity or head loss triggering backwashing. d. An online continuous turbidity monitor is in place on each individual filter and on the combined filtered water. At the audit the following turbidity levels were observed Filter No. 1 0.068 NTU; Filter No. 2 0.057 NTU and combined filtered water 0.088 NTU. e. The high level turbidity alarm is set at 0.6 NTU with 30 minutes delay. f. There are three staff members on the alarm cascade for all alarms. g. The automatic backwash sequence is 2 minutes up wash, 5 minutes air, 1 min air and water followed by 12 minutes up wash. After backwashing there is 30 minutes settling time followed by 15 minutes run to waste period. h. A copy of the final combined filtered water turbidity was provided subsequent to the audit. The data for the individual filters or the corresponding flow data was not provided. i. There is an online continuous aluminium monitor which monitors the concentration in the settled water, filtered water and final water. A text alarm is generated if the level exceeds 0.15 mg/l.
4.	**Disinfection** a. UV was installed in 2007 / 2008 following the detection of *Cryptosporidium*. A single duty Trojan Swiftsc D06 UV unit is provided. It was reported that it is validated under DVGW UV intensity set point approach. The plate indicated the UV unit is validated for a maximum flow of 80m^3/hr at 74% UVT (1cm). The HMI indicated a UVI of 30.57W/m^2, flow of 80m^3/hr, UVT 80% and RED dose 55.67mJ/cm^2. No alarm is generated in response to the UV unit dropping outside of its validated range. There is no automatic shutdown of the plant linked to the failure of the UV unit. The HMI screen will display the message "unhealthy UV" or "system okay". b. It was outlined at the audit that it is proposed to upgrade the UV disinfection system to include duty / standby reactors and the facility for auto shutdown of the supply. Due to the proximity of some customers to the WTP in the event of the reservoir running dry there would be an issue with inadequate contact time. The proposed upgrade works also include the installation of a residual chlorine monitor after the reservoir. c. Sodium hypochlorite 14-15% (ultra-low bromate) is used for chlorination. d. Bulk delivery of sodium hypochlorite takes place four times per annum. e. Duty and assist chlorine dosing pumps are in place. Dosing is flow proportional and linked to the residual chlorine monitor at the inlet to the reservoir. Both pumps can provide the full dose if required. The pumps automatically changeover every 8 hours. f. The residual chlorine target level at the WTP is 1.5 mg/l. The level on the day of the audit was 1.51 mg/l. g. The low level chlorine alarm was set at 0.55mg/l and the high level alarm was set at 3.80 mg/l on the HMI. The high level alarm was reduced to 2.8 mg/l at the audit. Both chlorine alarms trigger automatic plant shutdown. h. A copy of the residual chlorine trends for August, September and October 2018 were provided subsequent to the audit. A copy of the corresponding flow data was not provided. i. The site has been prioritised for assessment under the Irish Water Disinfection Programme for County Cork. The site was surveyed on 16/05/18 and the Phase 2 report received on 20/07/18. The value engineering workshop took place at the start of October 2018 and a revised proposal was requested by Irish Water / Cork County Council and is currently awaited.
5.	**Treated Water Storage and Distribution Network** a. The single cell reservoir has a storage capacity of 1,000m^3. The reservoir was cleaned in April 2017 and the network was last flushed in April 2018. There were 4 no. vents in place at the reservoir with insect proof mesh. All reservoir access covers were locked and fitted with a watertight seal. b. The distance to the furthest extremity of the network is approximately 9km. It was outlined at the audit that monitoring of residual chlorine was being undertaken once a week at the end of the line. Subsequent to the audit Irish Water have confirmed that the monitoring frequency has been increased to three times per week.

6.	**Monitoring and Sampling Programme for treated water** a. Weekly monitoring of manganese levels in the final water is undertaken and results are satisfactory. b. The daily fluoride results were reviewed. On 26/08/18 a concentration of 0.57mg/l was calculated based on the weight of chemical used. The result was cross checked by undertaking a SPADNS analysis which confirmed a compliant level of 0.60mg/l. c. The audit and check monitoring results were reviewed and were satisfactory.
7.	**Chemical storage and bunds** a. All chemical storage tanks were bunded and provided with covered drip trays.
8.	**Management and Control** a. A detailed up to date plant manual was available. Good record keeping was observed. b. There was good signage and labelling of all equipment at the WTP.
9.	**Sludge Management** a. Sludge bleeds are collected in the sludge holding tank (volume 23m^3). There is no treatment of sludge on site. There is no procedure in place for emptying of the sludge holding tank. The overflow from the tank is discharged to a drain adjacent to the WTP.

3. AUDITORS COMMENTS

The audit indicated that the plant is well operated and good record keeping was observed.

Irish Water should provide a timeframe for the upgrade of the UV system at the site to ensure that there is standby unit in place and to ensure that the UV unit has appropriate alarms and continuous monitoring to demonstrate that it is operating within its validation range at all times.

Sludge treatment is not provided on site and there is no procedure in place for the removal of sludge from the holding tank. This results in a potential risk of pollution to water bodies in proximity to the site. Irish Water should implement suitable measures for the disposal of the sludge.

4. RECOMMENDATIONS

Filtration

1. Irish Water should undertake a review of the final water turbidity alarm level and time delay on the alarm to ensure that it is appropriate to prevent against filter breakthrough.

2. Irish Water should provide a print out of one months continuous filtered water turbidity trend data for each of the individual filters and the final filtered water together with the corresponding flow data superimposed on the same graph.

Disinfection

3. Irish Water should ensure that there are duty and standby UV disinfection arrangements with automatic changeover in the event of the failure of one of the UV disinfection units. Irish Water should ensure that the UV unit is alarmed and linked to a recording device to ensure that any deviation of the quality of water outside of the validated range for the UV treatment system or failure of the UV disinfection system is immediately detected. Irish Water should submit the complete validation certificate for the current UV unit.

4. Irish Water should provide a print out of one months (a) continuous UV dose data and (b) residual chlorine trend data together with the corresponding flow data superimposed on the same graph.

Sludge Management

5. Irish Water should undertake a review of the current methods for handling and disposal of water treatment sludge and implement suitable measures for the disposal of the sludge.

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: Fiona Doyle **Date:** 04/12/18

Inspector