Drinking Water Audit Report

County:	Dublin	**Date of Audit:**	9th October 2015
Plant(s) visited:	Stillorgan Reservoir	**Date of issue of Audit Report:**	13th October 2015
		File Reference:	DW2010/23
		Auditors:	Mr. Darragh Page Mr. Tom O'Reilly
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. There was a significant risk of contamination of drinking water to over 220,000 consumers by *Cryptosporidium* due to the open storage of treated drinking water in the Stillorgan public water supply. This risk has been mitigated to the satisfaction of the EPA with the installation of a validated UV treatment system on the outflow of the reservoir. The supply will therefore be removed from the Remedial Action List.

ii. In the long term Irish Water should ensure that the supply of water from uncovered reservoirs ceases.

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. The Stillorgan Reservoir was on the EPA Remedial Action List due to the open storage of treated drinking water. This audit was carried out to assess the action programme carried out by Irish Water and to determine whether the actions were satisfactory to enable the supply to be removed from the Remedial Action List.

The Stillorgan Reservoir is an open storage reservoir comprising of three separate ponds, the Lower, Upper and John Gray. Water enters the reservoirs from the Ballymore Eustace and Vartry Reservoir water treatment plants via a 24" and 33" main from Vartry and a 24" and 1000 mm main from Ballymore Eustace. No treatment of the stored water is undertaken other than chlorination.

The opening meeting commenced at 15:00 at Stillorgan Reservoir. 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 disinfection 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: (* indicates that person was also present for the closing meeting)

Mr. John Leamy – Compliance Specialist, Irish Water
Mr. Andrew Boylan – Compliance Specialist, Irish Water
Mr. Frances Glancy – Analyst, Irish Water
Mr. Tom Cuddihy - OM Water Lead, Irish Water
Mr. Gerard Brady – Water Engineer, Irish Water
Mr. Dave Murray – Irish Water
Mr. Stephen Burke – Senior Executive Engineer, Dublin City Council
Ms. Laura Walsh – Executive Engineer, Dublin City Council
Ms. Sandra McAleer – Water , Dublin City Council
Mr. Niall Armstrong – CAPO, Dublin City Council
Mr. Paul Quinn – Dublin City Council
Mr. Michael Joyce – Ryan Hanley
Mr. Paul O'Neill – VWI
Mr. Declan White – Veolia
Mr. Graham Egan - Veolia

Representing the Environmental Protection Agency:

Mr. Darragh Page – Senior Inspector
Mr. Tom O'Reilly – Programme 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.	**UV Disinfection** a. Micheal Joyce gave a presentation outlining the background to the improvement works carried out at Stillorgan Reservoir including details of the design issues, an overview of the disinfection goals, details of the validated UV system put in place, the Computational Fluid Dynamics analysis, the design control philosophy and the performance of tested and commissioned disinfection system upgrade. b. The UV system installed was an ATG SX1873-30 reactor which was retrofitted into the valve house where the chlorination system was previously housed. c. Three UV units were installed to operate as duty/duty and standby. These are alternated every two weeks in a changeover process that takes up to 5 minutes. d. The Validation Report and Design Control Philosophy reports were submitted to the EPA in advance of the audit. e. The UV is validated to operate at a UVT of greater than 70.2% at a flow input of between 2,811 and 27,051 gpm with a dose delivery of 40 mJ/cm^2. f. Switchover of the units occurs every two weeks. Water flows through the UV unit as soon as it is switched on. This results in a short period when water flows through the UV unit before the dose rate of 40 mJ/cm^2 is achieved. The bulbs heat up to full power and then the dose reduces depending on the UVT of the treated water, though the dose is never less than 50%. A manual changeover was observed during the audit and it was noted that it took approximately 1 ½ minutes for the dose rate to rise above 22 mJ/cm^2 (i.e. the required dose to inactivate *Cryptosporidium*).

	g. The UVT recording on the ballast was reading 89.9% at the time of the audit but the UVT on the HMI was reading 91.2%. A satisfactory explanation for the discrepancy between the two readings was not provided for the on the day of the audit and Irish Water agreed to investigate this immediately. Subsequent to the audit Irish Water confirmed that it was due to a scaling issue in the UV unit PLC. h. Monitoring data was provided for the month of September which showed the dose was maintained in excess of 40 mJ/cm^2. i. There was some discussion over the control philosophy of the plant. Due to the fact that there is no storage immediately downstream of the UV units the system has been designed to keep water automatically flowing through the pipework even in the event of the failure of the UV units. To mitigate this risk the following measures have been put in place: i. The electricity supply is on a loop line meaning a break or problem in the power in one area means it can be supplied from another source. This significantly reduces the risk of power failure resulting in bypassing of the UV. ii. Dublin City Council has a dial out alarm that requires a response within 20 mins. iii. Veolia have a response time of 3 hours to be on site in the event of major failure of one or more of the UV units. iv. Dublin City Council also stated that there is a possibility of bypassing the open storage for a period of time with water directly from Ballymore Eustace. As this water is fully treated before entering the reservoir it would not require UV treatment. Irish Water agreed to investigate the feasibility of adopting this as standard practice in the event of the failure of all the UV units.
2.	**Chlorination** a. The chlorination system was upgraded as part of the disinfection improvement works. The improvements included the replacement of existing flow meters and residual monitors to facilitate flow proportional dosing with feedback control.
3.	**Hygiene and Housekeeping** a. Further finishing of the plant to provide access and to meet Health and Safety requirements are ongoing. However, all works relating to the operation of the UV and chlorination systems were complete.

3. AUDITORS COMMENTS

There was a significant risk to the quality of drinking water to over 220,000 consumers due to the open storage of treated drinking water in the Stillorgan. The most significant risk was the risk of contamination of the supply with *Cryptosporidium* which could have been transferred to the reservoir from birds or other animals that live on or near the reservoir. Historical results have found low levels of *Cryptosporidium* in the treated water (though no illness linked to these detections). Treatment of the outflow of the reservoir with UV at a validated dose rate of 40 mJ/cm^2 ensures that this risk is minimised by inactivating the oocysts.

Thus the remedial works completed at the Stillorgan Reservoir are sufficient to address the primary concerns of the EPA and the risk of contamination with *Cryptosporidium* and the supply will be removed from the EPAs Remedial Action List.

However, the open storage of treated drinking water does present other risks such as the risk of deliberate contamination of the supply. In the long term Irish Water should ensure that the supply of water from uncovered reservoirs ceases. In the interim Irish Water must ensure that security at the reservoir is in place to deter and prevent unauthorised access to the reservoir.

4. RECOMMENDATIONS

Disinfection

1. Irish Water should investigate the feasibility of bypassing the open storage of treated water in the Stillorgan Reservoir in the event of the failure of two or more of the UV units to prevent inadequately disinfected water from entering supply. If feasible Irish Water should prepare and implement documented procedures outlining the circumstances under which bypassing would occur.

2. Irish Water should ensure that plans are in place to eliminate the open storage of treated drinking water in the Dublin water supply.

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 Yvonne Doris, Drinking Water Team Leader.

Irish Water is recommended to put such measures in place as are necessary to implement the recommendations listed in this report. The actions by Irish Water to address the recommendations taken will be verified by the Agency during any future audits.

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:** 13th October 2015

Darragh Page

Senior Inspector