Site Visit Report

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 water to the visited public supply.

The audit process is a sample on a given date of the facility's operation. Where a finding against a particular issue has been reported this should not be construed to mean that this issue is fully addressed.

Water Supply Zone

Name of Installation	DLR Zone 6
Organisation	Irish Water
Scheme Code	1000PUB1006
County	Dublin
Site Visit Reference No.	SV22427

Report Detail

Issue Date	25/06/2021
Prepared By	Aoife Loughnane

Site Visit Detail

Date Of Inspection	28/05/2021	**Announced**	Yes
Time In	10:30	**Time Out**	11:30
EPA Inspector(s) **Additional Visitors**	Aoife Loughnane Michelle Minihan		
Company Personnel	Irish Water: Andrew Boylan & Eamonn Connolly Dublin City Council: Ned Fleming		

Summary of Key Findings

1. Irish Water has installed a new ultraviolet (UV) disinfection system at Vartry water supply, to help safeguard drinking water quality until the new water treatment plant comes into production in Q3 2021.

2. The audit found that the new UV disinfection system was operating within its validated range, and there were appropriate alarms and controls in place to ensure adequate disinfection of the Vartry water supply.

3. Following the audit, Irish Water provided 4 weeks of operational data (flow, UV dose, UVT & turbidity) which demonstrates satisfactory UV performance. However, the operational data has identified the need to implement a chemical cleaning schedule to prevent fouling of the lamp sleeves and UVI sensors with chlorine residue.

Introduction

Vartry water treatment plant provides drinking water to over 200,000 people in Wicklow and Dublin. Treatment consists of slow sand filtration and disinfection by chlorination and a newly installed UV disinfection system. A new water treatment plant is currently under construction and is due to begin production in Q3 2021.

There are seven supplies on the EPA's Remedial Action List which are fed by Vartry water treatment plant. The RAL completion date for the upgrade of Vartry water treatment plant is July 2021. The commissioning, validation and verification of the performance of the new plant is expected to take up to six months before the seven supplies fed by Vartry water treatment plant can be removed from the RAL.

This audit was carried out to verify the performance of the new UV disinfection system.

Supply Zones Areas Inspected

The audit comprised of a site visit to the new UV disinfection system at Vartry water supply.

1. Disinfection

		Answer
1.1	Is the UV system suitably validated?	Yes

Comment

1. The UV disinfection system was commissioned and put into service on 24/05/21. It consists of 5 no. Wedeco LBX 400e reactors with 16 lamps each. All 5 reactors operate on a duty basis. It is possible to operate for certain periods using only 4 reactors, with one available as a standby.

2. The UV system is validated to meet the USEPA UV Disinfection Guidance Manual (UVDGM). Irish Water provided a copy of the validation certificate and test envelope following the audit.

		Answer
1.2	Is the UV disinfection system operating within its validated range?	Yes

Comment

1. The UV system is designed to provide a 3 log Cryptosporidium barrier at a dose of >12 MJ/cm3. The reactors actually deliver a dose of >13 MJ/cm3, which includes a verification factor.

2. UVT is measured at the combined inlet, and UVI and flow are measured at each reactor. The validated operating criteria are:

- 80%+ UVT up to 460 m3/hour per reactor (2,300 m3/hour capacity for 5 reactors)
- 75%+ UVT up to 365 m3/hour per reactor (1,825 m3/hour capacity for 5 reactors)
- 70%+ UVT up to 295 m3/hour per reactor (1,475 m3/hour capacity for 5 reactors)
- 65%+ UVT up to 287 m3/hour per reactor (1,435 m3/hour capacity for 5 reactors)
- 60%+ UVT up to 260 m3/hour per reactor (1,300 m3/hour capacity for 5 reactors).

Flows are not adjusted automatically, rather the UV system generates an alarm based on UVT and the operators adjust the flow as required. The alarms are set at 2% above UVT thresholds to give the operator time to react and reduce the flow, to ensure the system remains within its validated range.

If UVT drops below 60%, the UV system will generate an alarm and the operators will alert Dublin City Council and Irish Water, who will engage with the HSE regarding the risk to public health. The UV system will not automatically shutdown the flow of water, because Irish Water deems it essential to maintain the supply of water to the areas fed by Vartry water treatment plant.

3. The operational data measurements noted during the audit were:

- 1649 m3/hour flow rate split evenly between the 5 UV reactors;
- 85% UVT and 0.08 NTU in combined inlet water;
- 21.0 MJ/cm3 UV dose in UV reactor No. 1 (and similar dose for the other 4 reactors);
- 99 hours of lamp usage in UV reactor No. 1 (and similar lamp usage for the other 4 reactors).

4. Each reactor has an automatic wiper system for cleaning of lamp sleeves. If one lamp breaks, it will shut down the reactor and generate an alarm and the flow will automatically be redistributed across the other reactors. Spare lamps are kept on site. The site is equipped with an uninterrupted power supply.

5. During the audit, the UV system was operating within its validated range, with appropriate alarms and controls in place to ensure adequate disinfection. Following the audit, Irish Water provided 4 weeks of operational data (flow, UV dose, UVT & turbidity) which demonstrates satisfactory UV performance. However, the data identifies the need to implement a chemical cleaning schedule to prevent fouling of the lamp sleeves and UVI sensors with chlorine residue.

Recommendations

Subject	Vartry UV disinfection system	**Due Date**	25/06/2021
Action Text	**Recommendations** 1. Irish Water should ensure that the UV disinfection system operates within its validated range at all times, to ensure adequate disinfection of the Vartry water supply. 2. Irish Water should implement a chemical cleaning schedule for the lamp sleeves and UVI sensors in each reactor, to remove any chlorine residual build-up and prevent fouling of the equipment. **Follow-Up Actions required by Irish Water** During the audit, Irish Water representatives were advised of the audit findings and were asked to submit operational data to verify the performance of the UV disinfection system. On 24/06/21, Irish Water submitted 4 weeks of operational data (flow, UV dose, UVT & turbidity) which demonstrates satisfactory performance of the UV system. However, the operational data has identified the need to implement a chemical cleaning schedule to prevent fouling of the lamp sleeves and UVI sensors with chlorine residue. This report has been reviewed and approved by Dr. Michelle Minihan, Senior Inspector, Drinking Water Team. The EPA 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.		