Site Visit Report

Under the *European Union (Drinking Water) Regulations 2023*, the Environmental Protection Agency (EPA) is the supervisory authority in relation to Uisce Éireann and its role in the provision of public drinking water supplies. This audit was carried out to assess the performance of Uisce Éireann in providing clean and wholesome water to the public water supply named below.

The audit process is a sample of the performance of a water treatment plant and public water supply on a given date.

Water Supply Zone

Name of Installation	Foynes/Shannon Estuary PWS
Organisation	Uisce Éireann
Scheme Code	1900PUB1027
County	Limerick
Site Visit Reference No.	SV30316

Report Detail

Issue Date	26/08/2024
Prepared By	Orla Harrington

Site Visit Detail

Date Of Inspection	01/08/2024	**Announced**	Yes
Time In	11:00	**Time Out**	12:00
EPA Inspector(s) **Additional Visitors**	Orla Harrington		
Company Personnel	Uisce Éireann: Susan Cook, Duane O'Brien, Freddie Barlett, Pat Collins. Limerick City and County Council (working in partnership with Uisce Éireann): Ger Kelly, Dominic Hayes.		

Summary of Key Findings

1. The Foynes/Shannon Estuary public water supply was placed on a Boil Water Notice on 13/05/2023, on the advice of the HSE, following the detection of *Cryptosporidium.* The supply was placed on the EPA's Remedial Action List in Quarter 2 2023 due to inadequate treatment for *Cryptosporidium*.

2. Uisce Éireann have installed a new ultraviolet (UV) disinfection system at the Foynes/Shannon Estuary water treatment plant. Primary disinfection is achieved by chlorination, and the UV disinfection system is designed to inactivate *Cryptosporidium*. The use of both methods is a multi-barrier approach which provides full-spectrum pathogen control, to help safeguard drinking water.

3. The audit found that the new UV disinfection system was installed and operating within its validated range. Uisce Éireann has not completed the programme of verification monitoring to demonstrate that the UV disinfection system is operating within its validated range at all times. The EPA considers this is necessary for the removal of the supply from the remedial action list category inadequate treatment for *Cryptosporidium*.

Introduction

The Foynes/Shannon Estuary public water supply (PWS) serves a population of 6,986 people with 17,993 m3/day of treated water produced. Raw Water is abstracted from the River Deel and treatment consists of coagulation, flocculation, clarification and rapid gravity filtration. Disinfection is by chlorination and a newly installed UV disinfection system.

The supply is currently on a Boil Water Notice imposed on 13/05/2023 following the detection of *Cryptosporidium* in the Foynes/Shannon Estuary PWS on 12/05/2023 and 09/05/2023.

This supply is on the EPA's remedial action list (RAL) under two categories: 'Inadequate treatment for *Cryptosporidium*' and 'Elevated levels of Pesticides above the standard in the Drinking Water Regulations'. The purpose of the audit was to verify if Foynes/Shannon Estuary PWS can be removed from the EPA's RAL under the category - inadequate treatment for *Cryptosporidium*, focusing on the installation of UV disinfection at the plant to address the *Cryptosporidium* risk in the supply.

Supply Zones Areas Inspected

The audit included an assessment of the newly installed UV disinfection system in place at the water treatment plant.

1. Disinfection

		Answer
1.1	Is the disinfection system verified using monitors and alarms?	No

Comment

1. Primary disinfection is achieved by chlorination. Uisce Éireann confirmed that the River Deel has a protozoal log credit requirement of 3.5 log. Currently the rapid gravity filtration provides 3 log credit if operated in accordance with the log credit treatment performance approach. This gives a -0.5 log treatment deficit. Uisce Éireann installed a UV disinfection system at the plant to address the protozoal compliance log deficit.

2. UV validation documentation was submitted prior to the audit which outline limits for minimum UVT corresponding to maximum water flow through the UV units.

3. There is no automatic shutdown in response to the UVT alarm. At the audit, it could not be confirmed if there are alarm and shutdown settings for flow to meet the validation criteria outlined in the validation documentation.

		Answer
1.2	Is the UV system suitably validated?	Yes

Comment

1. The UV disinfection system consists of two LBX850 Wedeco reactors operating in parallel on a duty/duty basis with automatic switchover if either UV fails for any reason. The system can operate as a single unit and is validated up to a flow of 1,510m3/hr @ 75% UVT. Uisce Éireann stated that the UV disinfection system is being operated at a significantly lower throughput (maximum throughput 900 m3/hr) than each reactors design capacity (1,510 m3/hr.). The validated operating range of the UV system was provided to the EPA in advance of the audit. The system is validated in accordance with USEPA Ultraviolet Disinfection Guidance Manual (UVDGM), with requirements for a maximum flow rate of 900 m3/hr, minimum UV dose of 12 mJ/cm2 and minimum UVT of 65%. On the day of the audit the UV dose was 20.7 mJ/cm2 in both reactors while the UVT was 87% UVT.

2. The system automatically shuts down if the UV dose is <12 mJ/cm2. The low alarm setpoint is 65% UVT with 600 second delay. At the time of writing this report, two weeks of UVT verification data was provided and while it demonstrated that the UV unit was operating within its validated range, further monitoring data is required to ensure the units are operating within validation at all times.

2. Management and Control

		Answer
2.1	Have the recommendations from the previous EPA audit been satisfactorily addressed?	No

Comment

The following recommendations from the previous audit on 10/05/2022 have not been fully completed to date. These being:

No. 1 Uisce Éireann should replace and refurbish the sand media in the rapid gravity filters to a minimum of 1000m in accordance with the EPA Water Treatment Manual: Filtration.

Uisce Éireann outlined at the audit that refurbishment of filter no. 4 is complete. All remaining filters (1-3) will be refurbished by 2028 as only one filter can be taken out of service at any one time due to demand on the network. There are alarms and inhibits on the individual and combined filtered water and turbidity is used as a trigger for initiating backwash to verify and protect the barrier to *Cryptosporidium*. Following a backwash, the filter settles for 20 minutes after which there is a run to waste to check the turbidity. If the turbidity is 0.3NTU or less a slow start of the filter is initiated. The slow start takes approximately 20 minutes before the filter is fully operational. During the audit, the individual filters were displaying turbidity between 0.02 and 0.08 NTU. Combined filtered water was 0.03 NTU. SCADA trends for filtered water turbidity during June 2024 were provided to the EPA as part of the pre-audit information and were also checked on site. The trends showed acceptable turbidities less than 0.3 NTU on each filter outlet.

No. 9 Uisce Éireann should review the chemical arrangements in place at the WTP. Chemicals must be stored in bunded areas capable of containing at least 110% of the volume of chemicals stored therein.

Uisce Éireann will carry out a review of the existing chemical storage facilities in Quarter 4 2024.

3. Supply on the Remedial Action List

		Answer
3.1	Is further information needed to assess completion of the Remedial Action List upgrade?	Yes

Comment

1. The supply is on the EPA's remedial action list under two categories: 'Elevated levels of Pesticides above the standard in the Drinking Water Regulations' and 'Inadequate treatment for *Cryptosporidium*'. The purpose of the audit was to assess the suitability of the supply for removal from the EPA's remedial action list under the category 'Inadequate treatment for *Cryptosporidium*'. Uisce Éireann stated that the Foynes/Shannon Estuary PWS source has a protozoal log credit requirement of 3.5 log. Currently the rapid gravity filters if operated in accordance with the log credit performance approach provides a 3 log credit.

2. The audit found that a UV disinfection system was installed in May 2024 to address the 0.5 log deficit at the plant and was operating within its validated range. However, further verification monitoring data is required in order to demonstrate that actions taken have been adequate. This data includes two months of UVT and flow readings from the UV disinfection system to demonstrate that the UV system has been operating within its validated range. The EPA will consider removal of the supply from the RAL under the category 'Inadequate treatment for *Cryptosporidium*' pending receipt of satisfactory verification monitoring results.

4. Site Specific Issues

		Answer
4.1	Is the plant operator fully trained on the operation and control of the UV disinfection system?	No
	Comment	
	1. At the audit it was outlined that training of operational staff had not been fully completed following the upgrade works. Documented Alarm Response Procedures were not available for the new UV system.	

Recommendations

Subject	Foynes/Shannon Estuary PWS - Audit Report	**Due Date**	24/09/2024
Action Text	**Uisce Éireann is responsible for ensuring a clean and wholesome supply of drinking water and should implement the following recommendations without delay.** 1. Ensure (i) operators are fully trained in the operation and control of the UV disinfection system and (ii) that documented alarm response procedures are in place for the UV disinfection system. 2. Ensure appropriate alarm and shutdown settings for UVT and flow are in place to ensure that the UV system operates in accordance with the documented validation criteria at all times. 3. Provide 2 months of UVT and flow verification monitoring data to demonstrate that the UV disinfection system is operating within its validated range. 4. Replace and refurbish the sand media in the rapid gravity filters to a minimum of 1000m in accordance with the EPA Water Treatment Manual: Filtration. 5. Review the chemical arrangements in place at the water treatment plant. Chemicals must be stored in bunded areas capable of containing at least 110% of the volume of chemicals stored therein. **Actions required by Uisce Éireann** During the audit, Uisce Éireann representatives were advised of the audit findings and that action must be taken by Uisce Éireann to address the issues raised. Uisce Éireann should submit a report to the EPA on or before 24/09/2024 detailing the actions taken and planned, with timescales, to close out the above recommendations. The EPA advises that the findings and recommendations from this audit report should, where relevant, be addressed at other public water supplies.		