

Site Visit Report

Under the *European Union (Drinking Water) Regulations 2014* as amended, 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	Limerick City Environs PWS
Organisation	Uisce Éireann
Scheme Code	1900PUB1032
County	Limerick
Site Visit Reference No.	SV27537

Report Detail	
Issue Date	20/03/2023
Prepared By	Orla Harrington

Site Visit Detail			
Date Of Inspection	22/02/2023	Announced	Yes
Time In	09:30	Time Out	12:35
EPA Inspector(s)	Orla Harrington		
Additional Visitors			
Company Personnel	Uisce Éireann: Aine Butler, Darragh Conneely. Limerick City and County Council (working in partnership with Uisce Éireann): Anne Peters, Peter Fee, Johnny Howard. Veolia: Ben Heaslip.		

> Summary of Key Findings

1. Limerick City Environs Public Water Supply (PWS) was placed on the EPA's Remedial Action List (RAL) in Quarter 2 2022 due to persistent exceedances of the trihalomethanes (THM) parametric value of 100 ug/l. Uisce Éireann has indicated that upgrade works to enable the removal of the supply from the RAL are progressing more slowly than planned and the current completion date of December 2023 will not be met. The upgrade works include the installation of a new Chlorine Dioxide unit, unidirectional flushing of the network, reservoir cleaning and further testing to fully understand the THM formation profile in the supply. No timeframes for completion of the works were available at the time of the audit.
2. Uisce Éireann confirmed that the Limerick City Environs PWS source has a protozoal log treatment requirement of 3.5 log. Currently treatment at the plant provides 3 log credit if operated in accordance with the log credit performance approach. This gives a -0.5 log treatment deficit. Uisce Éireann's intention is to determine if an additional 0.5 log credit can be achieved by adjusting the filter shut down to 0.15 NTU. Weekly monitoring for *Cryptosporidium* will continue until the log deficit is addressed. All monitoring has been clear to date.
3. Uisce Éireann is progressing works that will allow the automation of coagulation dosing at the plant. There was no timeframe for completion provided at the audit.

> Introduction

The Limerick City Environs PWS serves a population of 114,864 and produces 42,983 m³/day (EDEN figures). The treatment plant has a design capacity to produce 87,000 m³/day of water and is therefore operating below design capacity. Uisce Éireann is progressing works to increase its capacity to approximately 100 ML/day to allow for the supply to both replace and augment a number of satellite water supply zones.

The Clareville water treatment plant (WTP) is operated by Veolia on behalf of Uisce Éireann and is manned 24/7. There are two sources of raw water for the WTP, namely a canal feed adjacent to the plant linked to the River Shannon and a gravity feed from the Clonlara headrace, which supplies water to Ardnacrusha hydroelectric power station. Both sources are downstream from Lough Derg. Treatment comprises of screening, pH correction using sulphuric acid, coagulation, flocculation, clarification (Degremont and Actiflo clarifiers), pH correction using lime, rapid gravity filtration, further pH adjustment using lime, chlorination (using chlorine gas and chlorine dioxide depending on trihalomethane formation), ortho-P dosing and fluoridation. There is sludge treatment on-site, consisting of a picket fence thickener and centrifuges.

The audit was undertaken to assess the operation and management of the water treatment plant and to assess progress with the recommendations from the previous audit undertaken by the EPA on 24/09/2020. The Limerick City Environs PWS has been on the EPA RAL since 30/09/2022 under the category persistent THM exceedances.

> Supply Zones Areas Inspected

The audit consisted of an on-site inspection of the Clareville WTP. The fluoride dosing, sludge treatment and reservoirs were not inspected during the audit.



1. Filtration

	Answer
1.1	Are the filters designed and managed in accordance with EPA guidance? No
Comment	
<p>1. There are no media depth gauges installed in any of the seven rapid gravity filters at Clareville WTP.</p> <p>2. UÉ were unsure as to the depth of the filter media. Limerick City and County Council stated that filters 1 - 5 were refurbished approximately 10 years ago and that there was no evidence of filters losing media.</p>	



2. Disinfection

		Answer
2.1	Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?	No
Comment		
<p>1. Treated water from the WTP receives a further chlorine boost at Newcastle and Friarstown reservoirs located approximately 4.5 km from the plant.</p> <p>2. There are no alarms at the chlorine booster stations to alert operational staff to issues with chlorine levels at the booster stations.</p>		



3.1

	Answer
Have the recommendations from the previous EPA audit been satisfactorily addressed?	No
<p>Comment</p> <p>The following recommendations from the previous audit on 24/09/2020 have not been fully completed to date. These being:</p> <p><i>No. 2 Irish Water should optimise the pH dosing systems at Clareville water treatment plant to improve the performance of ortho-phosphate treatment, in order to minimise the levels of lead in drinking water.</i></p> <p>As part of Uisce Éireann's Asset Management Improvement Plan (AMIP), a minimum extremity pH requirement of 7.2 to ensure optimum ortho-phosphate treatment has been identified. Currently the pH leaving the plant is approximately 7.1 and UÉ state that this needs to be raised up to 7.5 to achieve the required extremity pH. This work is ongoing and no timeframes for completion were available at the time of the audit.</p> <p><i>No. 10 Irish Water should identify how the protozoal compliance log deficit is to be addressed at Clareville water treatment plant.</i></p> <p>Uisce Éireann advised that the protozoal log treatment requirement for the source water is 3.5 log. The treatment processes at the plant provide 3 log credits if operated in accordance with the log credit performance approach and this indicates that there is a -0.5 log deficit at the plant. Regarding the log deficit, Uisce Éireann advised that the intention is to determine whether an additional 0.5 log credit can be achieved by adjusting the filter shut down to 0.15 NTU.</p> <p>Improvements to the filtration processes at Clareville WTP have been undertaken since the previous audit on 24/09/2020 which included reviewing alarm setpoints and backwash trigger levels to ensure that the filters meet the 3 log removal credit. A backwash is triggered on an individual filter if the turbidity exceeds 0.3 NTU and will not be returned to service until filtered water turbidity drops to 0.25 NTU. The Programmable Logic Controller (PLC) at the plant was also adjusted since the last audit so that the filtered water turbidity monitors on each filter will stop reading on initiation of and during backwash to remove the spikes in turbidity being recorded when backwash is introduced. Uisce Éireann advised that further investigations will now get underway to determine if the lime dosing arrangement pre filtration can be eliminated to see if further reductions in turbidity are feasible. Weekly monitoring for <i>Cryptosporidium</i> will continue until the log deficit is addressed. All monitoring to date has been clear.</p> <p>The coagulant dose is flow proportional and any adjustment is manual regardless of changes in raw water quality. Uisce Éireann propose to switch over to an upgraded automatic coagulation dosing system. However this has not been implemented as further raw water monitoring capability of the combined sources has recently been installed and UÉ advised that six months of data is required to better understand the raw water quality supplying the plant during wet and dry periods in order to develop the appropriate dose bands.</p> <p>Uisce Éireann said that optimisation of the coagulation and filtration stage at the Clareville WTP should provide 3.5 log removal when operated within the performance criteria specified in the EPA Water Treatment Manual: Filtration.</p> <p><i>No. 11 Irish Water should ensure that the treated water storage reservoirs at Newcastle and Friarstown are inspected and cleaned as a matter of priority. Irish Water should also inspect Knockalishen Reservoir and undertake reservoir cleaning if necessary.</i></p> <p>At the audit, Limerick City and County Council confirmed that Friarstown and Knockalishen Reservoirs have been cleaned. The Newcastle reservoir will be complete by mid-April.</p> <p>These outstanding recommendations have been included in this audit report.</p>	



4. Supply on the Remedial Action List

	Answer
4.1	Is the Action Programme on track to meet the Remedial Action List completion date? Comment <p>1. Limerick City Environs PWS has been on the EPA RAL since 30/09/2022 due to elevated levels of THMs above the parametric value of 100 ug/l. Uisce Éireann indicated that upgrade works to enable the removal of the supply from the RAL are progressing more slowly than planned and that the current completion date of December 2023 will not be met. A revised completion date for the RAL upgrade works was not provided at the audit.</p> <p>2. Uisce Éireann stated that works are continuing to remove the organic precursors of THMs. On the day of the audit, Limerick City and County Council advised that strategic network sampling is ongoing at 12 locations to understand the THM formation profile. It is anticipated that this information will provide a better understanding on leakage, retention times, water age, organic levels and chlorine dosing on the network. Following this, Uisce Éireann intend to commence a targeted unidirectional flushing of the network to remove any debris or blockages from the pipes. Uisce Éireann stated that monitoring and investigation works will be complete in Quarter 3 2023 and then flushing will be carried out.</p> <p>3. Further remaining works include installation of a new automated Chlorine Dioxide unit, which is currently manually turned on if THM levels are >60 mg/l leaving the plant. Uisce Éireann advised that the current Chlorine Dioxide unit is old and a more robust automated system is required to deal with future increased flows through the plant. This project is currently at a planning stage and there was no timeframe for completion provided at the audit.</p> <p>4. At the audit, Veolia provided THM monitoring results for 2023 to date of the final water. All results are compliant for the THM parametric value and the most recent values reported were 37.78 mg/l and 24.92 mg/l on 07/02/2023 and 31/01/2023.</p>

Recommendations

Subject	Limerick City Environs PWS - Audit Report	Due Date	20/04/2023
Action Text	<p>Uisce Éireann is responsible for ensuring a clean and wholesome supply of drinking water and should implement the following recommendations without delay.</p> <ol style="list-style-type: none"> 1. THMs: (i) provide a RAL action programme with timeframes to address the THMs issue in the supply; (ii) once the upgrade works are complete carry out a six month verification monitoring programme to demonstrate that the works completed are effective in ensuring ongoing compliance with the THMs parametric value; (iii) THM monitoring should be undertaken at a fortnightly frequency at representative locations throughout the network and (iv) complete proposed unidirectional flushing of the network. 2. Log Credit: (i) provide a timeframe to address the log treatment deficit at the plant; (ii) continue monitoring for <i>Cryptosporidium</i> in accordance with Uisce Éireann's <i>Rationale for Determining the Frequency of Cryptosporidium Monitoring in Public Water Supplies</i>. 3. Progress the proposed upgrade works on optimisation of coagulation and filtration and provide a timeframe for completion. 4. Filtration: (i) install a media bed depth gauge on each filter and (ii) ensure filter media depths in all rapid gravity filters are maintained in accordance with the EPA Water Treatment Manual: Filtration. 5. Install chlorine alarms at the booster stations and ensure that the alarms will dial out to staff on the cascade system. 6. Optimise the pH dosing systems at Clareville water treatment plant to improve the performance of ortho-phosphate treatment, in order to minimise the levels of lead in drinking water. 7. Confirm that the Newcastle reservoir has been inspected and cleaned. <p>Actions required by Uisce Éireann</p> <p>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.</p> <p>Uisce Éireann should submit a report to the EPA on or before 20/04/2023 detailing the actions taken and planned, with timescales, to close out the above recommendations.</p> <p>The EPA advises that the findings and recommendations from this audit report should, where relevant, be addressed at other public water supplies.</p>		