

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	Obriens Bridge PWS
Organisation	Uisce Éireann
Scheme Code	0300PUB1020
County	Clare
Site Visit Reference No.	SV28162

Report Detail	
Issue Date	18/10/2023
Prepared By	Orla Harrington

Site Visit Detail			
Date Of Inspection	14/09/2023	Announced	Yes
Time In	10:00	Time Out	11:45
EPA Inspector(s)	Orla Harrington		
Additional Visitors			
Company Personnel	Uisce Éireann: Darragh Conneely, Liam Honan, Tommy Roche. Clare County Council (working in partnership with Uisce Éireann): Martin Nugent, Des O'Halloran		

> Summary of Key Findings

1. Failure of the UV disinfection system at O'Brien's Bridge water treatment plant resulted in inadequately disinfected water entering O'Brien's Bridge public water supply over a twelve month period before a Boil Water Notice was issued on 25/08/2023. A lack of communication between Clare County Council and Uisce Éireann resulted in a significant delay in the identification of the full extent of the deficiency in the disinfection system. The Boil Water Notice will remain in place on the supply until the appropriate remedial actions have been taken by Uisce Éireann to ensure that the UV disinfection system is operating within its validated range at all times.
2. Uisce Éireann's chlorine contact time calculations demonstrate that the final treated water is not achieving the World Health Organisation minimum recommended value of 15 mg.min/l. This means that the plant produced unsafe drinking water for a period of twelve months, due to the loss of the *Cryptosporidium* treatment barrier compounded by inadequate chlorine contact time.
3. O'Brien's Bridge water treatment plant is not currently capable of adequately treating the raw water due to variations in the raw water quality conditions following heavy rainfall. The audit found a lack of control over treatment at the plant due to the absence of an online turbidity monitor.

> Introduction

O'Brien's Bridge public water supply (PWS) produces approximately 479 m³/day serving a population of 944 in Montpelier, Co. Limerick and Bridgetown and O'Brien's Bridge, Co. Clare. Raw water is abstracted from one borehole located just outside the boundary of the water treatment plant (WTP) in Montpelier, Co Limerick but is owned and managed by Clare County Council. Treatment consists of disinfection by UV treatment and chlorination.

This audit was carried out in response to the notification by Uisce Éireann of the imposition of a Boil Water Notice (BWN) on the O'Brien's Bridge PWS on 25/08/2023 which related to UV disinfection system failure. The BWN remained in place on the date of the audit.

> Supply Zones Areas Inspected

The treatment processes at the water treatment plant were inspected.



1. Incident Management

1.1

	Answer
Was the incident suitably alerted to the plant operators, escalated and managed in order to maintain water quality and protect public health?	No
Comment	
<p>1. A UV disinfection system was installed in 2015/2016 to provide primary disinfection including 3 log inactivation of <i>Cryptosporidium</i> at O'Brien's Bridge WTP. Clare County Council advised that there have been frequent operational and maintenance issues with the UV system since it was installed and that these issues were not treated as incidents. Problems included; electrical faults, seal failures and no maintenance and servicing schedule in place. At the audit, it was confirmed that Clare County Council staff had not received training on the UV disinfection system and were unaware of incident and response procedures.</p> <p>2. On 25/08/2023 Uisce Éireann carried out an alarm and inhibit review of the plant and found that the UV disinfection was not operating within its validated range. Following consultation with the HSE, a BWN was issued on 25/08/2023 for protection of public health due to inadequate disinfection. On 28/08/2023 the EPA was notified of the UV disinfection failure at O'Brien's Bridge WTP. At the audit, Clare County Council stated that the UV disinfection system had been out of operation for twelve months prior to the imposition of the BWN. However, neither Clare County Council nor Uisce Éireann were able to confirm if the incident had been escalated at that time. Disinfection by chlorination remained in place while the UV disinfection system was out of service. Uisce Éireann's chlorine contact time calculations demonstrate that the final treated water leaving the plant is not achieving the World Health Organisation minimum recommended value of 15 mg.min/l. To achieve an effective contact time of 42.89 mg.min/l, the rising main from the WTP and reservoir is required. Uisce Éireann were unable to confirm the number of properties impacted by inadequate contact time.</p> <p>3. <i>Cryptosporidium</i> samples were taken by Clare County Council on 06/09/2023, 12/09/2023 and 13/09/2023. The samples returned clear results.</p> <p>4. Uisce Éireann did not notify the EPA and HSE of the failure of the UV disinfection system at O'Brien's Bridge for a prolonged period of time. This meant that a risk assessment of the incident on water quality and risk to public health did not commence in a timely manner. There is no routine supervision of WTP performance, water quality data or of online trended data by Uisce Éireann. Site operational staff do not have access to trended data for the early identification of deteriorating water quality. There is no turbidity monitor with alarms and shutdown at the plant to give appropriate warning to staff of process failure in order to allow timely intervention and corrective action.</p>	



2. Source Protection

		Answer
2.1	Is the abstraction source(s) adequately protected against contamination?	No
Comment		
<p>1. The supply is served by one borehole located in an underground chamber just outside the boundary of the WTP. The borehole is unsealed and construction details are unknown. Clare County Council estimate that this borehole was drilled in the 1970s.</p> <p>2. There is no turbidity monitor on the borehole to alert the operator to any changes in the raw water quality. Clare County Council advised at the audit that the raw water quality can deteriorate in heavy rain. Uisce Éireann has identified that the borehole requires 3 log protozoal treatment requirement to achieve protozoa compliance, due to risk of microbiological contamination in the raw water.</p>		



3. Disinfection

		Answer
3.1	Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?	No
Comment		
<p>1. Primary disinfection is achieved by UV disinfection. The UV validation certificate states that the UVT must be greater than 75.5% at a maximum flow of 21.9 m³/hr. There is a raw water UVT monitor installed at the plant and the monitor was reading 95.4% at the time of the audit however the UVT monitor is not alarmed.</p> <p>2. There is no continuous online turbidity monitor installed on the raw or final water at the plant. There was no treatment plant shutdown setpoint in place to prevent treated water with a turbidity in excess of the 1 NTU limit from entering the distribution network.</p> <p>3. Secondary disinfection is provided by dosing of sodium hypochlorite (15% concentration). There are duty and standby chlorine dosing pumps in operation with automatic switchover. The chlorine dose is flow proportional and linked to the chlorine monitor (CL17) in use at the WTP located post chlorine dosing, where a chlorine residual of 0.7 mg/l is aimed for before leaving the plant. This chlorine monitor was reading 0.71 mg/l on the day of the audit. There are no low or high chlorine alarms on the chlorine monitor CL17. There is automatic shutdown set at 0.3mg/l and 1.5mg/l. The lack of alarm settings prevents the operator from reacting in time when chlorine levels drop below the target level and may not ensure treated water at the extremities of the distribution network contains at least 0.1mg/l to ensure adequate residual chlorine.</p> <p>4. Plant performance trends are not accessible at the treatment plant. While all trend data is available on the countywide SCADA, it was not available on the day of the audit and there was no information on how often the data is reviewed by operational and supervisory staff.</p>		

		Answer
3.2	Are monitors and alarms operational via dial out and being responded to with a suitable cascade system in place?	No
Comment		
<p>1. There is no alarm cascade system in place on this supply to safeguard against non-response to alarms.</p> <p>2. The caretaker is the only person who is currently notified of the dial out alarms. Therefore there is no oversight of alarms and responses made to them.</p>		

		Answer
3.3	Is the UV system suitably validated?	Yes
Comment		

1. Primary disinfection including 3 log *Cryptosporidium* inactivation at the plant is provided by a "VISADES ST300K" UV disinfection system installed and commissioned at the O'Brien's Bridge WTP in 2015/2016. The UV system is validated to ONORM standards. A copy of the validation certificate was provided prior to the audit.

2. The validated operating range is a minimum of 75.5% UVT and 73 w/m² UVI for flows up to 21.9 m³/hr. The UV Unit No. 2, which was in operation at the time of the audit had a reading of 274.3 W/m² UVI, 95.4% UVT and 400 j/cm² UV dose indicating that the UV system was operating within its validated range during the audit. There is no automatic switchover in the event of a UV unit failure or alarm. The UV unit is alarmed and set to shutdown at 87 W/m² UVI. If the UV unit shuts down it will close a valve, which in turn will cause the abstraction at the borehole to shutdown on high pressure. There is no alarm or shutdown based on UVT if it drops below 75.5%.

3. Uisce Éireann stated that the UV disinfection system went back into operation on 06/09/2023 and that further works are required to ensure it operates within its validated range at all times.

		Answer
3.4	Is there a suitable monitoring frequency for residual chlorine in the network with records available?	No
Comment		
1. Residual chlorine monitoring in the network is not carried out by Clare County Council several times a week at different points of the network. There is one monitoring location, monitored on a daily basis.		



4. Reservoirs and Distribution Networks

	Answer
4.1 Are reservoirs adequately inspected and maintained?	No
Comment	
1. Uisce Éireann stated that the cleaning of the reservoir is scheduled for completion in the next two weeks.	



5. Management and Control

		Answer
5.1	Is there a documented alarm response procedure?	No
Comment		
1. The Uisce Éireann Incident Communications Response Guidance Form with site specific information including contacts for escalation and relevant trigger levels protecting critical processes at the water treatment plant was not displayed at the water treatment plant.		

		Answer
5.2	Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network?	No
Comment		
1. The chlorine shutdown settings are at 0.3 mg/l and 1.5 mg/l. There are no alarm settings in place. Staff said during the audit that the residual chlorine target is 0.7 mg/l leaving the plant. The low chlorine shutdown setpoint should be reviewed to ensure there is adequate warning in the event that the target chlorine level is not achieved.		
2. There was no plant shutdown setpoint at 1 NTU to prevent inadequately treated water from entering the distribution network.		



6. Site Specific Issues

		Answer
6.1	Were plant performance trends accessible at the audit?	No
Comment		
<p>1. The trends for the UV units were not available for viewing on site on the HMI. Uisce Éireann were unable to provide trend data in advance of the audit to verify the ongoing performance of the UV disinfection system.</p> <p>2. There was no trend data available for the chlorine monitor, post dosing (CL17).</p>		

Recommendations

Subject	O'Briens Bridge PWS -Audit Report	Due Date	21/11/2023
Action Text	<p>Uisce Éireann is responsible for ensuring a clean and wholesome supply of drinking water and should implement the following recommendation(s) without delay.</p> <ol style="list-style-type: none"> 1. Ensure that (i) the Uisce Éireann Incident Communication Response Guidance Form is displayed at the O'Brien's Bridge WTP; (ii) the Guidance Form contains site specific information including contacts for escalation and relevant site specific trigger levels protecting critical processes at the WTP; (iii) training is provided to WTP operators on the requirements of the Uisce Éireann Incident Communication Response Guidance Form to ensure incidents are recognised, escalated and acted upon promptly, and (iv) there is prompt and timely consultation with the HSE and notification to the EPA of incidents and all parametric failures. 2. UV Disinfection: (i) install automatic switchover between the duty and standby UV units in the event of the failure of the duty to operate within its validated range; (ii) submit two months of UV trend data (UVT, UVI, UV dose, flow) to verify that the UV unit is operating within its validated operating range; (iii) training to all staff on the operation of the UV system (iv) confirm the UVT alarm setpoints and shutdown and (v) continue to monitor for <i>Cryptosporidium</i> at the plant until the UV disinfection system can be verified. 3. Ensure that (i) trended performance data is available to operational and supervisory staff at the plant and via SCADA and (ii) there are robust systems of reviews and checks on the water treatment plant performance data which should include regular review of SCADA trends by operational and supervisory staff. 4. Install a turbidity monitor with appropriate alarm settings and shutdowns. 5. Install appropriate low and high residual chlorine alarms based on residual post chlorine dosing levels to ensure adequate residual chlorine in the network. 6. Ensure that residual chlorine monitoring is undertaken in the extremities of the network several times a week. 7. Ensure that there is an appropriate cascade system in place for responding to alarms generated at the plant which allows for verification that an alarm has been responded to. 8. Confirm the reservoir within the supply has been cleaned and inspected. 9. Ensure the borehole is maintained in accordance with EPA Advice Note No.14: Borehole Construction and Wellhead Protection. <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 21/11/2023 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>		