

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	Caherconlish PWS
Organisation	Irish Water
Scheme Code	1900PUB1015
County	Limerick
Site Visit Reference No.	SV24394

Report Detail	
Issue Date	21/03/2022
Prepared By	Orla Harrington

Site Visit Detail			
Date Of Inspection	25/02/2022	Announced	Yes
Time In	10:30	Time Out	12:10
EPA Inspector(s)	Orla Harrington		
Additional Visitors			
Company Personnel	Irish Water: Deirdre O'Loughlin, Duane O'Brien Limerick City and County Council (working under Service Level Agreement to Irish Water): Seamus Hassett, Adrian Barrett, Anthony Howard, Peter Fee.		

> Summary of Key Findings

1. The audit found that the UV disinfection system was operating within its validated range, providing broad spectrum disinfection, when *Cryptosporidium* was detected in a final water sample on 05/10/21. Based on audit findings, the EPA is satisfied that the *Cryptosporidium* detected was most likely inactivated by the treatment process and did not pose a risk to public health. Resampling undertaken on 11/10/21 were clear for both *Cryptosporidium* and Giardia.
2. Irish Water's chlorine residual target of 0.6 mg/l is aimed for before leaving the plant to ensure adequate disinfection in the distribution network. However, the low shutdown (0.2 mg/l) chlorine alarm currently in place at the Caherconlish water treatment plant is not currently aligned with this requirement and will not sufficiently alert the plant operators to a disinfection incident.

> Introduction

The Caherconlish public water supply (PWS) serves a population of 450 with a volume of approximately 573m³/day. The source of the supply is a spring located within the boundary of the water treatment plant (WTP). Treatment consists of ultraviolet (UV) primary disinfection and chlorination with sodium hypochlorite providing secondary disinfection. Treated water then travels south to a reservoir approximately 1km from the plant.

The purpose of the audit was to assess whether the UV disinfection system was operating within its validated range, when *Cryptosporidium* was detected in a final water sample on 05/10/21.

> Supply Zones Areas Inspected

The auditor inspected the UV and chlorination disinfection systems at Caherconlish water treatment plant.



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?	Yes
Comment	
<p>1. On the 08/10/21, Irish Water notified the EPA that <i>Cryptosporidium</i> had been detected in a final treated water sample at the Caherconlish WTP taken on 05/10/21 (0.0046 oocysts/10L). Irish Water and Limerick City and County Council consulted with the HSE on 08/10/21 and it was determined that the exceedance did not constitute a risk to public health, as the barrier to <i>Cryptosporidium</i> entering the supply is provided by a UV disinfection system. It was agreed that further <i>Cryptosporidium</i> sampling would be carried out. The <i>Cryptosporidium</i> resample taken on 11/10/21 was clear.</p> <p>2. Following the detection, Irish Water and Limerick City and County Council undertook an investigation of the operation of the plant. No specific issues or incidents were identified as having occurred that would result in <i>Cryptosporidium</i> being present. Irish Water confirmed that there was a validated UV in operation on the 05/10/21 at the plant. UV intensity (UVI) trended data from the WTP was examined and indicated that the UV disinfection system was working correctly at the time of the <i>Cryptosporidium</i> detection.</p> <p>3. Irish Water advised that <i>Cryptosporidium</i> samples should not have been part of the annual sampling plan for this supply as it is of no benefit because oocysts are inactivated and therefore of no risk.</p> <p>4. Where UV treatment is in place, the only situations where <i>Cryptosporidium</i> monitoring may be advisable is where the UV disinfection system has been bypassed, failed or is being operated outside its validated range.</p>	



2. Source Protection

	Answer
2.1	Is the abstraction source(s) adequately protected against contamination?
	Yes
Comment	
<p>1. The raw water is obtained from a spring source in a locked concrete chamber within the boundary of the water treatment plant. According to Limerick City and County Council, the maximum hourly abstraction rate is approx. 25m³/hr based on pump capacity.</p> <p>2. The landuse in the immediate vicinity of the spring is agricultural land. At the audit, it could not be confirmed if the landowners had been formally written to about the presence of a spring water supply in proximity to their lands and their obligations under the <i>European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 S.S. No. 31 of 2014</i>. Irish Water could not confirm whether the Zone of Contribution had been delineated for this supply.</p>	



3. Disinfection

3.1

Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?

Answer

No

Comment

1. Primary disinfection including 3 log *Cryptosporidium* inactivation is provided by a single UV disinfection unit at the plant, with chlorination used for secondary disinfection in the network.
2. Irish Water confirmed that UVT trend data was not in SCADA until 22/02/22, so no more than 2.5 days of data could be viewed at the site on the day of the audit trending from 99.28% to 99.25% UVT. Prior to that, UVT was recorded on a daily basis by the caretaker.
3. The chlorine monitor (CL001) is located post chlorine dosing where a chlorine residual target of 0.6mg/l is aimed for before leaving the plant. The chlorine monitor was reading 0.626mg/l on the day of the audit, which is satisfactory. The following alarm set-points were identified for CL001 prior to the audit: (i) low shutdown: 0.2mg/l, with a 5 minute time delay; and (ii) high shutdown: 1.5mg/l with a 5 minute time delay. There is no low chlorine alarm setting to allow plant operators react 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 disinfection.
4. Continuous chlorine residual trend data from 21/01/22 to 14/02/22 was submitted by Irish Water prior to the audit and trended between 0.53mg/l and 0.93mg/l. Limerick City and County Council explained that dips and spikes can be attributed to the abstraction pumps cutting out when the reservoir reaches a high level of 2.6m.
5. When there is UV disinfection in place, a monitor to verify residual chlorine after contact time is not deemed necessary, as chlorine only provides a residual disinfectant within the network. However, Irish Water also provided calculated chlorine contact times (Ct) which includes the reservoir 1km from the WTP. There is no chlorine monitor on the outlet of the reservoir serving the distribution network.
6. No daily manual residual chlorine tests are being undertaken to confirm the actual chlorine levels in the final water and check the accuracy of the continuous chlorine residual monitor.
7. Chlorine levels in the network are verified once per week at one location by the caretaker. The results meet the minimum recommended chlorine residual concentration of 0.1mg/l in the distribution network. However the frequency of hand held chlorine monitor measurements taken should be increased to several times per week at several locations to ensure that at least 0.1mg/l residual chlorine is present at the extremities of the network.

3.2

Is the UV system suitably validated?

Answer

Yes

Comment

1. Primary disinfection is by UV treatment in a WEDECO Spectrotherm WLR 30 unit validated to an international standard by the Austrian OVGW certification. The UV system is duty only and there is no standby provision in the case of failure or breakdown of the duty unit. Maintenance and servicing of the UV system is carried out by contractor staff. Limerick City and County Council confirmed that there are no water supply connections to consumers on the distribution network prior to the reservoir, which has approximately 12 hours storage capacity. Limerick City and County Council advised that the UV lamp was last replaced on 22/02/22 and required a 40 minute shutdown to facilitate the replacement.
2. The minimum validated dose is 40mJ/cm² which provides broad spectrum disinfection. Prior to the audit, Irish Water provided the validation certificate and a table which sets out the range of operating criteria (UVT, UVI and flow) at which this dose is achieved. Limerick City and County Council advised that the maximum abstraction rate at the plant is 26m³/hr based on the capacity of the pumps. Based on the validation certificate, the validated range of the UV unit is >90.8% UVT and >90.3 W/m² UVI for flows up to 26m³/hr. On the day of the audit, the UV was operating within the validation requirements.
3. The auditor also examined the plate attached to the UV reactor which stated that the UV operates at a minimum UVT of 91.9% (1cm) which does not align with the information contained in the validation certificate.
4. The UV unit is linked to a continuous UVI monitor. On the day of the *Cryptosporidium* detection (05/10/21), the UVI monitor was reading 143.49W/m² which demonstrates that the plant was being operated within its validated range.
5. Limerick City and County Council confirmed at the audit that there is automatic shutdown of the UV system if UVI 93.70 W/m² (5 minute delay)



4. Management and Control

		Answer
4.1	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	No
Comment		
Irish Water stated that the Caherconlish water supply source has a provisional 3 log protozoal treatment requirement. However the sanitary survey has not yet been completed. The plant has UV primary disinfection and provides 3 log credits when operated in accordance with EPA guidance.		

		Answer
4.2	Is there a documented alarm response procedure?	Yes
Comment		
There was a copy of the Irish Water Incident Communication Response Chart on display on the wall of the control room at the Caherconlish WTP. The chart outlines who is to be contacted in the event of an incident that is likely to have an effect on the quality of the drinking water and provides contact details for relevant personnel.		

		Answer
4.3	Are relevant alarms dialled out via a cascade system to allow a timely response by plant operators?	No
Comment		
There is no cascade system in place on this supply. The caretaker is the only person who is currently notified of the dial out alarms.		



5. Site Specific Issues

	Answer
5.1 Is the plant operator fully trained on the operation and control of the UV disinfection system?	No
Comment	
Limerick City and County Council confirmed at the audit that training has not been provided to the caretaker on the operation and maintenance of the UV disinfection system. Irish Water aim to ensure that all relevant staff are fully trained in the operation of the UV disinfection system without delay.	

Recommendations

Subject	Caherconlish Audit Recommendations [25/02/22]	Due Date	18/04/2022
Action Text	<p>Recommendations</p> <p>Irish Water is responsible for ensuring a safe and secure supply of drinking water. To address these issues, Irish Water should implement the following recommendations without delay:</p> <ol style="list-style-type: none"> 1. Irish Water should assess the feasibility of installing a back-up UV unit to enable the UV disinfection system to operate in duty and standby arrangement. 2. Irish Water should ensure that the operators of Caherconlish water treatment plant are fully trained in the operation and control of the UV disinfection system. 3. Irish Water should investigate the feasibility of reissuing the UV plate to align with the information contained in the validation certificate. 4. Irish Water should ensure that (i) the chlorine alarm set points are set at an appropriate level to ensure that the target residual concentration in the final water leaving the plant is met and (ii) free residual chlorine levels in the distribution network are monitored ideally several times per week at several locations to verify adequate disinfection of the water supply across the distribution network. 5. Irish Water should set up an alarm cascade system to ensure that alarms are responded to in an appropriate timeframe. 6. Irish Water should confirm the protozoal treatment requirement for the source following completion of the sanitary survey. 7. Irish Water should delineate the zone of contribution for the spring source and establish links with the Environment Section of Limerick City and County Council to ensure both parties are aware of the issues potentially impacting on the spring raw water abstraction point. 8. Irish Water should write to the local landowners to inform them of the presence of a spring water supply in proximity to their lands and to make them aware of their obligations under the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014). <p>Follow-Up Actions required by Irish Water</p> <p>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.</p> <p>This report has been reviewed and approved by Ruth Barrington, Drinking Water Team Leader.</p> <p>Irish Water should submit a report to the Agency on or before 18/04/22 detailing how it has dealt with the issues of concern identified during this audit.</p> <p>The report should include details on the action taken and planned to address the various recommendations, including time frame for commencement and completion of any planned work.</p> <p>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.</p>		