

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	Crossmolina PWS
Organisation	Uisce Éireann
Scheme Code	2200PUB1013
County	Mayo
Site Visit Reference No.	SV28458

Report Detail	
Issue Date	20/12/2023
Prepared By	Derval Devaney

Site Visit Detail			
Date Of Inspection	04/12/2023	Announced	Yes
Time In	11:10	Time Out	13:15
EPA Inspector(s)	Derval Devaney Veronica Boland		
Additional Visitors	Health Service Executive (HSE): Kathleen Lydon, Tim Coffey		
Company Personnel	Uisce Éireann: Vinny McGrath Mayo County Council (working in partnership with Uisce Éireann): Brian Conmy, Kevin Ginty		

> Summary of Key Findings

1. A chlorine pump failure resulted in undisinfected water entering the Crossmolina public Water Supply (PWS) from approximately 5 am to 3 pm on 22/11/2023. An alarm sent by text to alert staff of the failure at 11:47 pm on 21/11/2023 was not responded to. The plant does not have automatic shutdown in the event that a critical alarm is not responded to.
2. The plant was visited at approximately 2:40 pm on 22/11/2023 and disinfection was restored at 3 pm that day. The lack of alarm response and resultant delay in communicating the incident presented a risk to human health. The Boil Water Notice (BWN) was not placed on the supply until the evening of 22/11/2023.
3. The standby chlorine pump was out of service in the lead up to the incident and was not reported or actioned for repair. Chlorine residuals were not being taken in the network since May 2023.
4. The BWN was rescinded on 27/11/2023 following remedial action and satisfactory results.

> Introduction

The Crossmolina Public Water Supply (PWS) produces approximately 650 m³/hour serving a population of 1,153. Raw water is abstracted from a spring located approximately 1km from the water treatment plant (WTP). Treatment consists of disinfection via chlorination and treated water is stored at an on-site reservoir.

> Supply Zones Areas Inspected

The treatment processes at the water treatment plant and the on-site reservoir were inspected in addition to the spring source located approximately 1 km away from the water treatment plant.

The management and control of the disinfection process in addition to the response to the disinfection incident on 22/11/2023 was also inspected and discussed.



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	
<ol style="list-style-type: none"> 1. At 11.47 pm on Tuesday 21/11/2023 a low chlorine alarm occurred, originating from the chlorine monitor CL001 (located at the inlet to the reservoir on-site post chlorine dose) and a text was sent alerting designated staff. There was an low chlorine alarm time delay of 10 minutes (which has since been adjusted appropriately to 5 minutes). An additional alarm was sent by text alerting the same staff at 00:03 am 22/11/2023 of a chlorine dose pump failure. These alarms were not responded to. 2. At 2.20 pm on 22/11/2023 staff logging into SCADA remotely observed the aforementioned alarms and visited the WTP promptly. They found (i) unchlorinated water had left the WTP and entered the on-site reservoir over 15 hours (from midnight to 3pm on 22/11/2023) due to failure of the duty chlorine pump, (ii) the standby chlorine pump was out of service and did not operate when the duty pump failed, and (iii) site staff had not communicated that the standby pump was out of service and due a repair and it was not known for how long this critical piece of equipment was out of service for. 3. At 4:16 pm Uisce Éireann (UÉ) was informed of the serious incident. At 4:45 pm UÉ consulted with the Health Service Executive (HSE) and it was agreed that a BWN be imposed on the supply. 4. Staff dosed the inlet and outlet of the reservoir manually with chlorine to achieve adequate disinfection from 3 pm 22/11/2023. Additional resources were deployed to carry out flushing and take chlorine residual readings in the network on 22/11/2023. 5. At 6:29 pm Wednesday the 22/11/2023 the EPA was notified of a Boil Water Notice (BWN) which was imposed on the Crossmolina PWS that evening, following the failure of the disinfection treatment process at Crossmolina WTP. 6. Samples for microbiological parameters were not taken until the following day; on the 23/11/2023. 7. The issue with the chlorine pumps was attributed to 'low differential pressure' affecting one pump and a 'discharge leak' on the other. A contractor visited the plant on the evening of 22/11/2023 and replaced a multi-function valve on one chlorine pump. On 23rd the standby chlorine pump was replaced with a new pump. 8. Based on the unverified contact time calculations submitted, inadequately disinfected water entered the network for 10 hours (from approximately 5 am to 3 pm on 22/11/2023). 9. Chlorine residual readings taken in the network from 7 pm on 22/11/2023, on 23/11/2023 and 24/11/2023 were satisfactory and microbiological samples taken on 23/11/2023, 24/11/2023 and 25/11/2023 were also satisfactory. 10. UÉ consulted with the HSE to update it on the outcome of its investigations and remedial action taken to reinstate both chlorine pumps and monitoring results. The Boil Water Notice was rescinded on 27/11/2023. 11. There are no plant inhibits to enable the plant to automatically shutdown should a critical alarm not be responded to. Equipment to enable this action is on-site but has not yet been installed. It was stated that it is planned to carry out this work in early January 2023. 	



2. Source Protection

2.1

	Answer
Is the abstraction source(s) adequately protected against contamination?	No
Comment	
<ol style="list-style-type: none">1. The supply is served by a spring approximately 1 km from the WTP. The spring source is underneath a housing unit which was once used to store equipment and chemicals to disinfect the water supply. The housing unit at the spring source contained a redundant drum with liquid in that was not labelled to determine its contents. Disinfection treatment now occurs at the WTP located next to the on-site reservoir.2. A raw water monitoring programme was in place pre-Covid (from 2017 - 2020). It is planned to reinstate the raw water monitoring programme from 11 December 2023.3. The source is monitored for <i>Cryptosporidium</i> on a monthly basis throughout the entire year. <i>Cryptosporidium</i> has not been detected in the supply since monitoring commenced in 2017. UÉ identified a 4 log credit requirement for the source water to achieve protozoa compliance. There is a 4 log protozoal treatment deficit at the Crossmolina water treatment plant (WTP).	



3. Disinfection

		Answer
3.1	Are monitors and alarms operational via dial out and being responded to with a suitable cascade system in place?	No
Comment		
<p>1. The incident found that while alarms are being dialled out under a cascade system they are not being responded to.</p> <p>2. The alarm and incident response procedure did not refer to relevant staff when communicating a critical alarm or equipment failure.</p>		
		Answer
3.3	Is there a suitable monitoring frequency for residual chlorine in the network with records available?	No
Comment		
<p>1. Records inspected during the audit showed there were no chlorine residual results recorded for the network since May 2023.</p>		
		Answer
3.2	Is there adequate chlorine contact time before the first connection?	No
Comment		
<p>1. It was not possible to undertake an assessment on the adequacy of the chlorine contact time as there were various calculations used to determine effective contact time that differed in their conclusion.</p> <p>2. The contact time calculation submitted in the pre-audit information provided a contact time (Ct) of < 15 mg.min/l for the treatment plant which is inadequate for adequate disinfection. An additional Ct calculation was presented during the audit which stated the target Ct for the plant was 22.5mg.min/l. The Ct alarm on SCADA was set at higher value than the latter, at 25.74 mg.min/l. There were also differing volumes provided for the reservoir's storage capacity (220m³, 250m³ and 330 m³) which would have an impact on the Ct calculation.</p>		



4. Reservoirs and Distribution Networks

	Answer
4.1 Is treated water in tanks and reservoirs suitably protected against contamination?	No
Comment	
1. Some vents on the treated water reservoir were not secured against animal entry as the mesh covers were absent.	



5. Management and Control

	Answer
5.1 Are instrument calibrations within date?	Yes
Comment	
1. While the instrument was within its calibration date, the monitor on the inlet to the reservoir measuring pH and Temperature was displaying a warning signal.	

Recommendations

Subject	Crossmolina Audit Recommendations	Due Date	22/01/2024
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> <p>1. Source Protection:</p> <ol style="list-style-type: none"> 1. Put in place a raw water monitoring programme for the Crossmolina PWS source. 2. Discard the obsolete drum containing liquid in the housing unit at the spring source. <p>2. Incident Response</p> <p>Ensure that:</p> <ol style="list-style-type: none"> 1. there is an appropriate cascade system for responding to alarms generated at the plant which allows for verification that an alarm has been responded to promptly; 2. the site specific alarm response procedure is updated to include relevant staff; 3. training is provided to all relevant staff on the procedures; 4. a record of any fault or breakdown of critical equipment and action taken to rectify the matter is maintained; 5. training is provided to staff on the Water Incident Communication Response Chart displayed at the site to ensure incidents are communicated promptly, actioned and responded to without delay to protect human health. Response should also include network sampling during the incident to inform risk to human health. <p>3. Treatment and Control</p> <ol style="list-style-type: none"> 1. Install appropriate plant inhibits on critical treatment equipment (for example final water turbidity and chlorine residual monitors and associated pumps) to ensure inadequately treated water does not enter supply and human health is protected. 2. Submit the contact time calculation for the Crossmolina PWS and confirm the reservoir's capacity within the calculation. Ensure the chlorine residual target concentration and alarm settings are appropriate to ensure adequately disinfected water enters supply. 3. Provide (i) details on how the protozoal 4 log deficit will be addressed and (ii) ensure <i>Cryptosporidium</i> monitoring continues to be undertaken as per "Irish Water Rationale for Determining the Frequency of <i>Cryptosporidium</i> Monitoring in Public Supplies" until such time as the deficit is addressed. <p>4. Reservoirs and Distribution Networks</p> <ol style="list-style-type: none"> 1. Install mesh covers on reservoir vents. This recommendation was raised previously, during the EPA's audit in 2016. 2. Undertake the monitoring of residual chlorine in the network several times a week to ensure at least 0.1 mg/l is being maintained at all times throughout the network. Keep a record of the results. <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 the above due date 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>		

