

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	Ballina-Wherrew
Organisation	Uisce Éireann
Scheme Code	2200PUB1003
County	Mayo
Site Visit Reference No.	SV28101

Report Detail	
Issue Date	24/08/2023
Prepared By	Ruth Barrington

Site Visit Detail			
Date Of Inspection	21/07/2023	Announced	Yes
Time In	09:21	Time Out	12:12
EPA Inspector(s)	Ruth Barrington Maria O'Connell		
Additional Visitors			
Company Personnel	Uisce Éireann: Vincent McGrath, Ronan McDonald Mayo County Council (working in partnership with Uisce Éireann): Brian Conmy, Seán Keane, Mark Gilroy, Deirdre Beattie, Eddie Walsh, Eddie Munnelly		

> Summary of Key Findings

1. Investigations by Uisce Éireann and the EPA have not established a direct cause for the detections of *Cryptosporidium* and *Giardia* in the sample taken on 14/06/2023. Three follow up investigative samples and the scheduled July sample were clear of *Cryptosporidium* and *Giardia*.
2. Significant upgrades of the Ballina-Wherrew WTP are in progress, including electrical works, installation of tube settlers at the clarifiers, raw water and backwash pump replacement, new air blowers for filter backwash and automation of coagulant dosing. Additional shutdowns on critical treatment processes will also be enabled. These works will contribute to the continuous verification of the protozoal barrier.
3. Delays have occurred in servicing contracts for calibration of equipment, emergency sampling and chemical deliveries. These delays may pose a risk to the safety and security of the public water supply and should be pursued by Uisce Éireann under the relevant contracts.

> Introduction

Ballina-Wherrew public water supply provides treated water to a population of 3,123 people. Treatment processes on site at Ballina-Wherrew water treatment plant (WTP) include coagulation, flocculation and clarification (CFC), rapid gravity filtration and disinfection using sodium hypochlorite.

This audit was undertaken following the notification to the EPA of a detection of *Cryptosporidium* and *Giardia* in a sample taken at the water treatment plant on 14/06/2023.

> Supply Zones Areas Inspected

Treatment processes on site were inspected as part of the audit.



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. Seasonal monitoring is carried out at Ballina-Wherrew water treatment plant for <i>Cryptosporidium</i> and <i>Giardia</i>, during the months of February to July inclusive. The June 2023 sample, taken on 14/06/2023, was found on 19/06/2023 to contain both <i>Cryptosporidium</i> and <i>Giardia</i>. On receipt of this information, Uisce Éireann and Mayo County Council initiated an investigation and consulted with the HSE as required, and made arrangements to carry out follow up sampling at the water treatment plant and in the network.</p> <p>2. The follow up <i>Cryptosporidium</i> and <i>Giardia</i> samples were taken on 21/06/2023, 22/06/2023 and 26/06/2023 and analysed by a contract laboratory. This is considered a reasonable timeframe since the sample is collected over 24 hours. The samples were analysed within a reasonable timeframe as they were processed as emergency samples within 24 hours of receipt.</p> <p>3. The network microbiological samples were taken by a separate contract laboratory on 23/06/2023, a delay of four days after the meeting with the HSE that recommended emergency microbiological sampling in the network. The results of these samples were not finalised by the laboratory until 26/06/2023. This turnaround time does not facilitate a timely emergency response to be made to protect public health.</p> <p>4. The results of the samples taken under Point 3 above showed adequate disinfection and no coliforms or <i>E. coli</i> present, however they may not be representative of conditions during and immediately following the incident several days previously.</p>	



2. Coagulation Flocculation and Clarification (CFC) Stage

		Answer
2.1	Is the CFC process optimised to respond to changes in raw water quality?	No
Comment		
<p>1. Chemical dosing is done manually, using a combination of operator experience, reference charts and log book history focused on pH, colour and turbidity.</p> <p>2. The WTP upgrade will incorporate automated dosing based on flow and UVT.</p> <p>3. The WTP upgrade will also include physical changes to the CFC process to enhance performance, to increase the size of inlet piping, install tube settlers and extend the sludge bleeds.</p>		

> 3. Filtration

		Answer
3.1	Are the filters designed and managed in accordance with EPA guidance?	No
Comment		
<p>1. The rapid gravity filters at Ballina-Wherrew WTP were refurbished in 2018 with new sand (depth 830 mm) and support media, additional freeboard on the weirs, and run to waste linked to individual filter turbidity.</p> <p>2. Filters are backwashed on time or turbidity reaching 0.3NTU. To bring a filter back into service after backwash a turbidity <0.3NTU is required, if this is not achieved the run to waste is automatically activated. The 0.3NTU backwash trigger is instantaneous with no time delay applied.</p> <p>3. The current upgrade will facilitate turbidity linked shutdowns of the WTP to be enabled.</p>		

		Answer
3.2	Does monitoring indicate that the filters are operating effectively?	Yes
Comment		
<p>1. On the day of the audit the filters were showing good levels of turbidity on the outlets, with values of 0.058, 0.065 and 0.060 NTU on filters 1, 2 and 3 respectively.</p> <p>2. Questions had been raised before the audit by the EPA on the basis of filter turbidity trends during the period before the <i>Cryptosporidium</i> and <i>Giardia</i> detections. These focused on (i) a raw water turbidity spike up to 99.9 NTU on 10/06/2023 to 11/06/2023, and (ii) a 20 minute gap in raw, filtered and final water turbidity readings on 11/06/2023. These observations were further discussed during the audit.</p> <p>3. The high raw water turbidity readings referred to in 2(i) above occurred during the context of the upgrade works being carried out on site. The area around the turbidity monitors and sample lines was being used by works contractors for storage and a sample line was found by site staff to have been trapped under a pallet. In addition, the raw water turbidity probe had been placed in error into the UVT sample basin, which is not correctly sized for a representative turbidity sample. The 99.9NTU value returned to turbidity readings within the expected range once the probe was relocated, so these readings may be regarded as unrepresentative.</p> <p>4. The 20 minute gap in turbidity trends referred to in 2(ii) above was due to a power cut at Ballina-Wherrew WTP. Staff confirmed that no untreated water enters the network in this event.</p>		



4. Disinfection

4.1

Is there a suitable monitoring frequency for residual chlorine in the network with records available?

Answer

No

Comment

1. Monitoring of residual chlorine in network locations is carried out once per week.

2. This finding was previously raised in an EPA disinfection audit carried out at Ballina-Wherrew WTP on 11/10/2022. Uisce Éireann's Q1 2023 response to the audit recommendation stated that the frequency was increased to two to three times per week.



5. Treatment Process Chemicals

		Answer
5.1	Are treatment process chemicals appropriately managed and stored?	No
Comment		
<p>1. Temporary changes to chemical storage arrangements have been during the ongoing construction at the WTP, with tanks having been moved from their normal locations. Residues were noted in the bunds of both sodium hypochlorite and aluminium sulphate tanks.</p> <p>2. Movement of chemical storage tanks may pose a risk to tank, pipework or bund integrity or health and safety requirements and should be overseen by WTP staff rather than being left to the construction contractor.</p> <p>3. Site staff referred to some delays in completing process chemical deliveries. Adequate stocks of process chemicals to maintain treatment are required at all times.</p>		



6. Management and Control

		Answer
6.1	Is the water treatment plant resilient enough to cope with significant variations in raw water quality or demand?	No
Comment		
<p>1. Ballina-Wherrew WTP is undergoing major upgrades to enhance treatment processes and controls. The upgrade includes electrical works, installation of tube settlers at the clarifiers, raw water and backwash pump replacements, new air blowers for filter backwash and automation of coagulant dosing. Additional shutdowns on critical treatment processes will also be enabled for final water turbidity and chlorine residuals.</p> <p>2. Completion dates for the above works were not available during the audit.</p>		

		Answer
6.2	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	Yes
Comment		
<p>1. The protozoal log treatment requirement has been identified by Uisce Éireann as a 3-log requirement. The combination of CFC processes, rapid gravity filtration and appropriate controls on these critical processes will allow at least a 3-log treatment capacity. Upgrades are required to deliver a continuously verified 3-log removal capacity at the WTP.</p>		

		Answer
6.3	Is there a documented alarm response procedure?	Yes
Comment		
<p>1. The Uisce Éireann Incident Communication Response Guidance Form was available and displayed at the site for reference during an incident. It was noted that p2 of this document, which normally contains site specific trigger levels to define an incident, was missing.</p>		

		Answer
6.4	Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network?	No
Comment		
<p>1. Treated water turbidity is controlled via the 0.3NTU backwash and run to waste triggers at individual filter level, which operate with no time delay. As part of the upgrade further turbidity controls will be programmed including a final water shutdown capacity to protect filtration and disinfection barriers.</p> <p>2. High and low chlorine residuals are dealt with via alarms and 24 hour call out. There is no automatic shutdown on high and low chlorine residuals, as previously found at the EPA disinfection audit carried out on 11/10/2023. Shutdowns linked to high and low chlorine residual set points will be programmed as part of the upgrade.</p>		

6.5

	Answer
Are instrument calibrations within date?	Yes
Comment	
<p>1. Turbidity monitors had service stickers showing calibration was carried out on 17/07/2023.</p> <p>2. Previous to the audit, Uisce Éireann had confirmed that the turbidity monitors had been due for calibration by contractors in February 2023, but this had not been carried out. Between February 2023 and 17/07/2023 the turbidity monitors were not calibrated according to manufacturer's recommendations.</p>	



7. Drinking Water Quality

	Answer
7.1	Have failures of the parametric values or the detection of pathogenic micro-organisms or parasites in the water supply been adequately investigated?
Comment	
<p>1. No direct cause of the detection of <i>Cryptosporidium</i> and <i>Giardia</i> has been established.</p> <p>2. Uisce Éireann determined as part of their investigation the need for a procedure for undertaking protozoal sampling, including processing of the filters and handover of cartridges to the contract laboratory. These steps involve both WTP staff and an external courier. The procedure was being developed at the time of the audit.</p>	

Recommendations

Subject	Ballina-Wherrew Audit 21/07/2023	Due Date	25/09/2023
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. Progress the upgrades at Ballina-Wherrew WTP to allow verification of 3-log treatment and assist plant operators in their work. Provide completion dates to the EPA for the upgrades and the commissioning and operation of revised turbidity and residual chlorine alarms and inhibits. 2. Implement a procedure for <i>Cryptosporidium</i> and <i>Giardia</i> sampling, including the set-up and removal of filters and the handover of cartridges to the courier. 3. Ensure that contracts for equipment calibration, emergency sampling and process chemical deliveries are fulfilled as required. Consideration should be given to having standby arrangements if a contractor is unavailable, where critical processes may be affected by delays. 4. Complete the works on the new raw water sample line and raw water sample wells and probes. 5. Complete the works at chemical storage areas to locate tanks, bunds and pumps to their final locations and clean spills within the aluminium sulphate and sodium hypochlorite bunds. 6. Display the full Uisce Éireann Incident Communications Response Guidance Form including site specific incident triggers at Ballina-Wherrew WTP where it can be accessed and used during an incident. 7. Review the frequency of residual chlorine monitoring in the network, which was reported to the EPA in Q1 2023 as being carried out several times per week. <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 25/09/2023 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>		