

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	Inisboffin PWS
Organisation	Irish Water
Scheme Code	1200PUB1024
County	Galway
Site Visit Reference No.	SV25975

Report Detail	
Issue Date	03/10/2022
Prepared By	Ruth Barrington

Site Visit Detail			
Date Of Inspection	14/09/2022	Announced	Yes
Time In	12:49	Time Out	16:20
EPA Inspector(s)	Ruth Barrington		
Additional Visitors	HSE: Emer O'Connell, Peter Gaffey, Maria Curran, Julianne Harte, James O'Connell, Kathleen McDonnell, Cian Dowling- Cullen		
Company Personnel	Irish Water: Pat O'Sullivan, Ronan Daly, Eoin Hughes		
	Galway County Council (working under Service Level Agreement to Irish Water): Pierce Faherty, Jim O'Connell, Aidan Day		

> Summary of Key Findings

1. Irish Water and Galway County Council failed in their respective roles to deliver safe and secure drinking water to Inisboffin public water supply between 05/08/2022 and 25/08/2022 due to the absence of any managerial oversight and lack of operational control of the performance of the water treatment plant.
2. Galway County Council operational staff (working under Service Level Agreement to Irish Water) failed to follow incident reporting procedures in the response to the deterioration of treatment processes, and did not escalate the problems quickly to Irish Water. This resulted in a delay in consulting with the HSE to assess the potential risk to human health, and a delay in notifying the EPA.
3. Underlying the above organisational failures, water levels in Lough Fawna were very low due to drought conditions in summer 2022. Algae was visible in the lake and carrying over into the filters and sludge at the time of the audit. The treatment processes on-site are unable to cope responsively to raw water changes of this scale.

> Introduction

Inisboffin Public Water Supply serves a resident population of 165 (seasonally variable due to tourism). Water is abstracted from Lough Fawna, the capacity of which was increased in the 1990's by the construction of impoundment walls. Treatment processes in place include pH adjustment, coagulation, flocculation, clarification and filtration within a DAFF unit and disinfection by chlorination and UV treatment.

This audit was undertaken in response to the imposition of firstly a Boil Water Notice and then a Do Not Consume Notice on the supply, on 25/08/2022 and 03/09/2022 respectively. These notices were placed following consultation between Irish Water and the HSE to protect public health, when Irish Water became aware of the failure of treatment processes at the Inisboffin Water Treatment Plant.

> Supply Zones Areas Inspected

A tour of the Inisboffin Water Treatment Plant processes and raw water abstraction source was included in 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?	No
<p>Comment</p> <p>1. Changing raw water conditions caused by low water levels and algal growth in the source water resulted in an increase of raw water turbidity since July 2022. Typical turbidity levels of around 1 NTU in the raw water on 01/07/2022 increased to above 7 NTU by 25/8/2022.</p> <p>2. By early August, turbidity had increased beyond the water treatment plant's removal capacity, with turbidity spikes above 1 NTU in filtered water. In the same timescale UVT had dropped below the minimum 85% required for validated UV treatment. This meant that by 05/08/2022 the barriers to <i>Cryptosporidium</i> entering supply had failed. Rising turbidity also meant that by 13/08/2022 the disinfection barrier (chlorination) had failed.</p> <p>3. The Inisboffin WTP operates on a fixed coagulant dose and pH regime. Changes to dosing are made manually on intervention by the specialist contractor. The contractor was called in on several occasions during early August 2022 by site operational staff but the process reviews carried out were unsuccessful in restoring adequate treatment.</p> <p>4. No escalation of the situation was made by site operational staff to Galway County Council engineering staff or Irish Water until 24/08/2022. On that date a request to Galway County Council engineering staff to replace filter media triggered a check of plant performance on the SCADA system. On 25/08/2022 this review resulted in a recognition by Galway County Council management staff of the treatment failures.</p> <p>5. Irish Water were notified by Galway County Council on 25/08/2022 and the subsequent Irish Water consultation with the HSE resulted in a Boil Water Notice being imposed the same day, for the protection of public health from inadequate disinfection.</p> <p>6. There is no routine supervision of WTP performance, water quality data or of online trended data by Galway County Council. Site operational staff do not have access to trended data for the early identification of deteriorating water quality. Most critical process alarms were set incorrectly at levels which do not match regulatory limits or EPA guidance, and so would not give appropriate warnings to site operational staff of process failure to allow timely intervention and corrective action.</p> <p>7. The site log book includes site operational staff records of high turbidity levels and of alarms triggered on low UV dose during August 2022. These turbidity levels and UV dose alarms were not escalated to Galway County Council engineering staff as described in the Irish Water <i>Incident Communication Response Chart</i>. It was confirmed that Galway County Council staff had received incident awareness and response training. The training and procedures were not adhered to in this instance.</p> <p>8. The Boil Water Notice placed on the supply on 25/08/2022 was replaced by a Do Not Consume Notice on 03/09/2022 based on Irish Water and Galway County Council's consultation with the HSE on results from network emergency sampling carried out on 02/09/2022 which indicated high levels of manganese, at 911 ug/l compared to the parametric value of 50 ug/l. The HSE cited a World Health Organisation guideline limit of 80 ug/l to protect public health.</p>	



2. Coagulation Flocculation and Clarification (CFC) Stage

2.1

Are the CFC processes appropriately controlled?

Answer

No

Comment

1. The pH adjustment and coagulant dosing is achieved on a fixed dose basis. Adjustments to this must be made manually and are controlled by the specialist contractor under the maintenance contract. This means that dose changes cannot be made in rapid response to changing water conditions.

2. The day prior to the audit, the specialist contractor attended the WTP to change the chemical dose regime. This was based on the results of jar test samples which were taken on 26/08/2022. Further jar test samples were taken on 09/09/2022 and may result in additional dose changes.

3. This arrangement of manual changes in response to infrequent jar testing means that changes to dosing are not responsive to changing raw water quality.



3. Filtration

3.1

	Answer
Does monitoring indicate that the filters are operating effectively?	No
Comment	
<p>1. The DAFF turbidity trend for 31/08/2022 to 14/09/2022 examined during the audit indicated a potential issue with the sample line or probe. All data was in excess of 2 NTU but with no dips or spikes.</p> <p>2. Final water turbidity trends during August 2022 supplied by Irish Water were consistently higher than 0.3 NTU since early August and in excess of 1 NTU since mid August. The turbidity level of 0.3 NTU set out in <i>EPA Water Treatment Manual- Filtration</i> protects the filtration barrier to <i>Cryptosporidium</i> entering supply. Turbidity of 1NTU is the regulatory level specified in the <i>European Union (Drinking Water) Regulations 2014 as amended</i>.</p> <p>3. The DAFF filter media had been blinded by the under-performance of the coagulation stage and carry over of material onto the filter. This had been replaced with new sand by the specialist contractor on 13/09/2022. The coagulant dose rate was also amended by the contractor on 13/09/2022. If successful, this would improve the performance of the coagulation process, and reduce the amount of material carrying onto the filter.</p>	



4. Disinfection

		Answer
4.1	Is the UV disinfection system operating within its validated range?	No
Comment		
<p>1. Based on trends provided by Irish Water, the UVT was operating outside the validated UVT level of 85% since mid-August.</p> <p>2. During the audit, a UV low dose alarm was visually displayed on the UV system panel. This dose alarm was also recorded by site operational staff in the WTP log book pages provided by Irish Water prior to the audit, starting from 19/08/2022. No action taken in response to alarms was recorded in these log book records.</p> <p>3. It was noted that the UV system is duty only, there is no standby in the event of breakdown, malfunction or operation outside validation of the UV unit. A robust system of alarms and shutdown of the water treatment plant is not in place to mitigate against this risk.</p>		

		Answer
4.2	Is the residual chlorine monitored at a suitable sample location after contact time has been completed?	No
Comment		
<p>1. There is no online monitoring of residual chlorine after contact time has been achieved. The only continuous chlorine monitor takes a sample from the chlorine dosing tank, so it verifies only that dosing is taking place, but not how effective it is. Continuous chlorine residual monitoring post-contact time forms part of the EPA's minimum criteria for validation of chlorine disinfection. This must be accompanied by appropriate dial out alarms and inhibits along with data storage to validate disinfection and prevent inadequately disinfected water from entering supply.</p> <p>2. Irish Water have placed an order for a chlorine residual monitor to be located on the reservoir outlet after contact time has been achieved. A delivery date for this equipment was not available at the time of the audit.</p>		



5. Management and Control

		Answer
5.1	Are suitable alarm settings in place to alert operators to deteriorating water quality and/or the failure of a critical treatment process?	No
Comment		
<p>1. Alarm settings at Inisboffin WTP are not appropriate to alert operators to deteriorating water quality or failure of a critical process. For example, the alarm setting for high DAFF turbidity was 3 NTU rather than the 0.3 NTU which would protect the filtration barrier. The alarm setting for treated water turbidity was 20 NTU rather than the 1 NTU which would protect the regulatory limit. The low UVT alarm was set at 0% where the UV unit requires a UVT over 85% to operate within validation.</p> <p>2. No records were available to confirm whether the alarm settings were ever correct. Galway County Council staff stated that a site visit in July 2021 had confirmed correct alarm settings, but there is no audit trail available in the system to verify this. A previous EPA audit in 2015 had also referred to incorrect alarm settings and made a recommendation that these would be corrected.</p> <p>3. Information provided by Galway County Council indicated that there is no access at site operator level to change alarm settings.</p>		

		Answer
5.2	Are relevant alarms dialled out via a cascade system to allow a timely response by plant operators?	No
Comment		
<p>1. There is no cascade system for alarm dial outs. Alarms dial out to one person only (the site operator) and are not escalated in any way if they are not responded to.</p> <p>2. Alarms must be dialled out to more than one person to allow an acceptable level of response. This should include site operator level and also at supervisor/engineer and Irish Water level to provide cover and oversight.</p> <p>3. The combination of incorrect alarm settings and the lack of additional personnel on the cascade system means that there was no oversight of the deteriorating performance of the water treatment plant. Had these controls of critical plant processes been in place, the public health advice on the basis of failing barriers could have been sought almost three weeks earlier than 25/08/2022.</p>		

		Answer
5.3	Is the data obtained from sampling and monitoring used to actively inform the processes on site and in the distribution network?	No
Comment		

1. Routine monitoring undertaken at the water treatment plant during August indicated increasing problems with treatment processes. This monitoring was noted and recorded locally, but not escalated in the correct way to allow a coordinated response to protect public health.
2. It is vital that monitoring results are used as a tool to manage the water treatment plant processes. Any indication that these are not meeting the required standards as set out and displayed in the site procedures in the WTP office, should be communicated and escalated using the *Incident Communication Response Chart*.
3. Data from the continuous online monitors is not accessible to the site operational staff through SCADA. While Galway County Council engineering staff have remote access to SCADA, there are no scheduled or procedural reviews of the data to verify performance of the water treatment plant. Irish Water do not have routine access to the SCADA trends either, meaning that the performance of the Inisboffin water treatment plant was entirely unsupervised by Irish Water and Galway County Council management staff for an unknown period until 24/08/2022.
4. At the audit, Irish Water staff provided information on an initiative to gain access to daily data extracted from SCADA in order to assess trends at Inisboffin in the future. The indication was that the specialist contractor would download this data and provide it to Irish Water each day.

Recommendations

Subject	Inisboffin Audit Recommendations 14/09/2022	Due Date	28/10/2022
Action Text	<p>Recommendations</p> <p>Irish Water is responsible for providing safe and secure drinking water to the Inisboffin public water supply. The audit findings highlight significant failings by Irish Water and Galway County Council in relation to managerial oversight, operational control and responsiveness. To address these findings Irish Water should implement the following recommendations as a matter of urgency.</p> <ol style="list-style-type: none"> 1. Irish Water and Galway County Council should ensure there are robust systems of reviews and checks on water treatment plant performance to identify deteriorations in water quality and act on them to protect public health and maintain drinking water quality. This recommendation covers actions on staff training, operating procedures, and establishing managerial and process oversight of process operations and data. 2. Irish Water should provide refresher training to Galway County Council staff on incident awareness and response. 3. Irish Water should ensure that appropriate alarm settings, inhibits with dial out and cascade systems are put in place at Inisboffin WTP to verify critical treatment processes. 4. Irish Water should provide suitable SCADA access to site operators. 5. Irish Water should install the proposed CI17 monitor, to provide continuous verification of primary disinfection through online monitoring of chlorine residual after contact time. 6. Irish Water should report on steps taken or planned to restore a safe and secure public water supply to Inisboffin, addressing the lack of optimisation of Inisboffin WTP to changes in raw water conditions and the vulnerability of the Lough Fawna source to drought and algal blooms. <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 Michelle Minihan, Drinking Water Senior Inspector.</p> <p>Irish Water should submit a report to the Agency on or before 28/10/2022 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>		