

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	Cootehill PWS
Organisation	Irish Water
Scheme Code	0200PUB0110
County	Cavan
Site Visit Reference No.	SV22680

Report Detail	
Issue Date	10/09/2021
Prepared By	Michelle Roche

Site Visit Detail			
Date Of Inspection	12/08/2021	Announced	Yes
Time In	10:00	Time Out	11:30
EPA Inspector(s)	Michelle Roche HSE: Dr. Ian Quintyne		
Additional Visitors			
Company Personnel	Irish Water: Yvonne McMonagle Pat Collins Pat O'Sullivan Peter Gallagher Fintan Ruddy Monaghan County Council: Gary Boyd Vincent Craig John Denning Gráinne Harte		

> Summary of Key Findings

1. Elevated manganese, above HSE health based limit of 120 µg/l, was detected in the Cootehill public water supply on 28/07/21 and a Do Not Consume notice was placed on the full supply on 30/07/21. Irish Water installed potassium permanganate treatment at the Coragh Lake source on 02/08/21 and subsequently cleaned the clarifier and scoured the distribution network. The Do Not Consume notice was lifted on 13/08/21 following verification that manganese results in the distribution network were consistently below 120 µg/l from 06/08/21.
2. Filter water turbidity was intermittently recording above 0.3 NTU at the outlet of both rapid gravity filters from 26/07/21 to 30/07/21 due to a blockage in the duty coagulant dosing pump. The incident coincided with the Do Not Consume notice in place due to elevated manganese. The dosing line was cleaned and new footvalve and diaphragm installed on the dosing system. Irish Water also conducted *Cryptosporidium* sampling in the network, and no *Cryptosporidium* was detected.
3. Irish Water are carrying out coagulation, flocculation, clarification (CFC) and disinfection upgrade works at the water treatment plant with the aim of increasing the treatment capacity, treated water storage capacity and overall resilience of the Cootehill public water supply. These works are expected to be complete in Q1, 2022.

> Introduction

The Cootehill public water supply serves a population of 2,191 with water from Coragh Lake treated at Cootehill water treatment plant. Treatment includes the following;

- pH correction with sulphuric acid
- manganese removal with potassium permanganate
- coagulation with aluminium sulphate
- clarification in one hopper bottomed clarifier
- filtration across two rapid gravity filter
- chlorination with sodium hypochlorite
- final water pH correction with caustic soda.

The audit was conducted in response to a number of manganese failures detected at the water treatment plant and in the distribution network from 28/07/21 to 30/07/21 and subsequent imposition of a Do Not Consume notice on the supply from 30/07/21. The Do Not Consume notice was lifted on 13/08/21. In addition to manganese failures the audit sought to establish the details of an increase in final water turbidity from 26/07/21 to 30/07/21.

> Supply Zones Areas Inspected

A virtual audit was conducted on 12/08/21 and covered all aspects of the Cootehill public water supply including source protection, treatment and management of the distribution network.



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>The audit investigated two separate water quality incidents which occurred at Cootehill water treatment plant between 26/07/21 and 30/07/21, elevated manganese in the final water and elevated turbidity in the final water. The incident response procedure in place between Cavan CC (Cavan County Council) and Irish Water was followed to ensure both incidents were alerted to Irish Water as soon as they were identified by plant operators. Both incidents were also notified promptly to the EPA and the Health Service Executive (HSE) was consulted in order to protect human health.</p>	
<u>Elevated Manganese in the Final Water</u>	
<ul style="list-style-type: none"> • Daily final water manganese samples are collected at Cootehill water treatment plant as part of the daily water quality verification programme. Results are typically between 30 and 40 µg/l, however on 28/07/21 and 29/07/21 the daily final water manganese results were 141 µg/l and 148 µg/l respectively. • Further investigative sampling in the distribution network on 29/07/21 detected a result of 88 µg/l and subsequent results of 109 µg/l, 129µg/l and 170 µg/l on 30/07/21. • Results on 30/07/21 were above the HSE health based limit of 120 ug/l and following consultation with the HSE Irish Water issued a Do Not Consume notice on the full Cootehill public water supply on 30/07/21. 	
<u>Corrective Action</u>	
<ul style="list-style-type: none"> • The EPA have an existing open compliance plan for persistent manganese failures in the Cootehill public water supply. Failures prior to this incident had been above the drinking water quality standard of 50 µg/l, but had not breached the HSE health based limit of 120 µg/l. • Under the existing compliance plan, Irish Water had informed the EPA of their plan to install a permanent potassium permanganate dosing system and pH correction (sodium hydroxide) on the raw water source. This installation was complete on 02/08/21. • Greensand filter media was installed in both rapid gravity filters and the distribution network was scoured on 04/08/21. • Daily manganese results leaving the Cootehill water treatment plant and in the distribution network were below 120 µg/l from 06/08/21 and the Do Not Consume notice was lifted on 13/08/21. 	
<u>Elevated Turbidity in the Final Water</u>	
<ul style="list-style-type: none"> • Continuous online turbidity monitors are in place on the outlet of both rapid gravity filters with alarm set-points at 0.3 NTU and a continuous online combined filtered water monitor is in place on the outlet of the clear water tank with an alarm set-point of 1 NTU. At the time of the audit there were no plant inhibits/shutdowns in place based on turbidity. • On 26/07/21 both filters experienced turbidities above 0.3 NTU, however the combined filtered water did not exceed 1 NTU on that day. Plant operators responded to and investigated the individual filter alarms but were unable to determine a cause at that time. The alarms were reported to Irish Water on the same day. • Later on the 26/07/21 individual filter turbidities dropped below 0.3 NTU again without any specific corrective action from the plant operators. • Individual filter water turbidities continued to fluctuate above and below 0.3 NTU on 27/07/21 and 28/07/21, and Cavan CC continued to investigate the cause of the elevated turbidities. Elevated manganese in the raw and final water at the plant was initially thought to have been the reason for the elevations. • On 29/07/21 the combined filtered water turbidity exceeded 1 NTU from 7:20am to 9:00am with a maximum reading of 2 NTU. • Irish Water consulted with the HSE and this incident, combined with the elevated manganese in the final water, resulted in a Do Not Consume notice being placed on the full Cootehill public water supply on 30/07/21 to protect human health. 	
<u>Corrective Action</u>	

- Cavan CC determined that the cause of elevated filter water turbidity was a partial blockage in the duty coagulant (aluminium sulphate) dosing pump. The pump was operating at approximately 30% capacity. There is a 12 hour automatic switchover cycle between the duty and standby dosing pumps, and when the standby pump was in operation filtered water turbidities returned to compliance.
- Once the fault was detected Cavan CC cleaned the dosing line on the duty pump and replaced the footvalve and diaphragm on the dosing system. The coagulant day tanks were also emptied and fresh aluminium sulphate added.
- *Cryptosporidium* sampling was also carried out in the network on 30/07/21 and no *Cryptosporidium* was detected.

Details of planned upgrade works to improve the resilience of Cootehill water treatment plant can be found in Section 2 of this audit report.



2. Coagulation Clarification Flocculation (CFC) Stage

2.1

	Answer
Is the CFC process optimised to respond to changes in raw water quality?	Yes
Comment	
<p>The raw water is measured using continuous online monitors for pH, turbidity and UVT as the raw water enters the water treatment plant. The raw water pH is currently adjusted using a fixed dose of sodium hydroxide at the source and the aluminium sulphate coagulant is subsequently dosed via a fixed dose at the water treatment plant. Dose rates can be adjusted by the plant operator based on existing dosing charts.</p> <p>Irish Water are currently undertaking CFC upgrade works at the plant, including installing a larger clarifier tank with tube settlers. Irish Water also plan to further optimise the CFC process by installing an automatic coagulant dose trim based on a pH monitor at the outlet of the clarifier.</p> <p>The aim of the CFC upgrades is to increase treatment capacity at the water treatment plant. The plant operates based on water levels in the reservoir, however in order to maintain adequate water levels the plant is currently operating 24 hours a day, leaving no additional storage capacity in the reservoir. CFC upgrades, combined with a new sodium hypochlorite disinfection contact tank would provide up to 15 hours storage at the reservoir. The upgrades have an estimated completion date of Q1, 2022.</p>	



3. Filtration

3.1

	Answer
Are the filters designed and managed in accordance with EPA guidance?	Yes
Comment <p>There are two rapid gravity filters at the treatment plant with sand and gravel media, however the depth of media in the filters was not known at the time of the audit. Greensand was added to the filters on 04/08/21 to assist with manganese removal.</p> <p>Filters are backwashed based on time, every 24 hours, and the backwash is observed by the plant operator. Following a backwash filters run to waste for four minutes and have a six minute settlement time before being brought back in to service. Cavan County Council stated that this procedure ensures filter turbidity is below 0.3 NTU before filters are brought back in to service.</p> <p>Each filter has a continuous online turbidity monitor in place with an alarm set-point of 0.3 NTU. Irish Water stated that they will investigate the possibility of installing an automatic plant inhibit/shutdown based on filter turbidity following completion of the CFC and disinfection upgrade works.</p> <p>Individual filter turbidity trends for the month of July were examined as part of the audit, and discounting the elevated turbidity incident at the end of July all trends were below 0.3 NTU.</p>	



4. Disinfection

		Answer
4.1	Is the chlorine dosed appropriately?	Yes
Comment		
<p>The sodium hypochlorite disinfection system was upgraded under the Irish Water Disinfection Programme in 2020. Duty standby dosing pumps are in operation with automatic switchover between the pumps. The chlorine dose is flow proportional with a chlorine residual trim to maintain a residual greater than 1.5mg/l at the outlet of the chlorine contact tank. There is also an additional trim setting which ensures a chlorine contact time greater than 15mg.min/l at the outlet of the contact taking into account the turbidity, pH and temperature of the disinfected water.</p> <p>There is a low chlorine residual alarm and plant inhibit/shutdown at 1.5mg/l and also an alarm in place if the minimum contact time of 15mg.min/l is not achieved.</p>		

		Answer
4.2	Is there a suitable monitoring frequency for residual chlorine in the network with records available?	Yes
Comment		
<p>Chlorine residuals are measured daily in the distribution network. Records for July and August were examined during the audit and all results were above 0.1mg/l</p>		



5. Management and Control

		Answer
5.1	Is the plant suitably managed and controlled to maintain the designed log credit on each treatment stage?	No
Comment		
<p>Irish Water have determined that the raw water source for Newbliss public water supply, Coragh Lake, has a protozoal compliance log treatment requirement of Log 3. Irish Water have withdrawn all log credits from the treatment process, until CFC upgrades at the water treatment plant are complete and appropriate alarms and inhibits can be installed on the filters. Irish Water are currently carrying out monthly <i>Cryptosporidium</i> monitoring in the distribution network in line with the Irish Water <i>Cryptosporidium</i> Monitoring Rationale for a supply with a protozoal log deficit.</p>		

Recommendations

Subject	Cootehill Audit Recommendations	Due Date	10/10/2021
Action Text	<p>Recommendation(s)</p> <ol style="list-style-type: none">1. Irish Water should assess the feasibility of automating the coagulant dose based on coagulation pH, following completion of CFC upgrade works at the water treatment plant.2. Irish Water should measure the media depth in the rapid gravity filters and ensure at least 1000mm of media is present at all times, in line with the EPA Filtration Manual.3. Irish Water should assess the feasibility of triggering a filter backwash based on filter water turbidity, following completion of treatment plant upgrade works.4. Irish Water should assess the feasibility of installing a plant inhibit/shutdown based on filter water turbidity, following completion of treatment plant upgrade works.5. Irish Water should ensure treatment at Cootehill water treatment plant is sufficient to provide 3 log protozoal compliance log treatment removal for parasites such as <i>Cryptosporidium</i>.6. Irish Water should carry out a daily check on all chemical dosing lines and chemical dose targets to ensure all water treatment chemicals are being adequately dosed to maintain final water quality. This should be carried out on all dosing points relevant to the CFC process, at a minimum until CFC upgrade works are fully complete and associated plant alarms and inhibits/shutdowns are in place. <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 Team Senior Inspector.</p> <p>Irish Water should submit a report to the Agency on or before 10th October 2021 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> <p>Please quote the Action Reference Number, DW20200246 in any future correspondence in relation to this Report.</p>		