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	Clare Island PWS
Organisation	Irish Water
Scheme Code	2200PUB1030
County	Mayo
Site Visit Reference No.	SV22501

Report Detail

Issue Date	23/07/2021
Prepared By	Michelle Roche

Site Visit Detail

Date Of Inspection	25/06/2021	**Announced**	Yes
Time In	11:00	**Time Out**	13:00
EPA Inspector(s)	Michelle Roche		
Additional Visitors	HSE: Marie Tonra Maria Horkan		
Company Personnel	Irish Water: Thomas Gibbons Ger Greally Tommy Kearney Margaret Dunleavy Mayo County Council: Colette Scahill Ronan McDonnell Eithne McDevitt		

Summary of Key Findings

1. A boil water notice was placed on the Clare Island public water supply on 18th June 2021 following a detection of *Cryptosporidium* in the final water on 15th June 2021. The boil water notice remains in place at the time of issuing this audit report.

2. The slow sand filters at the Clare Island water treatment plant are not currently operating to the requirements outlined in the EPA Filtration Manual. Irish Water plans to undertake remedial works at the plant to address the deficiencies in filter operations.

i) There are no online monitors or measuring gauges to provide a measurement of headloss for the purpose of initiating filter cleaning.

ii) There are no alarm set-points in place on the continuous online turbidity monitors installed on each filter to ensure individual slow sand filters are operating in accordance with the requirement of final water turbidities below 0.5 NTU. There is a combined filtered water turbidity monitor in place after the filters with an alarm set-point of 0.5 NTU.

iii) There is no run to waste facility on the filters to allow filter water turbidity return to below 0.5 NTU before filtered water enters the distribution network.

3. Based on the audit findings, the EPA is considering adding the Clare Island public water supply to the EPA Remedial Action List.

Introduction

The Clare Island public water supply serves a resident population of 160, however that can rise to approximately 200 during the Summer months. The supply is sourced from the spring-fed Knockmore Stream and the raw water then passes through two slow sand filters before being chlorinated with sodium hypochlorite generated by an on-site electrochlorination system. Treated water is stored in a treated water reservoir at the water treatment plant and gravity fed to the distribution network and to a second reservoir, Kill Reservoir, downgradient of the water treatment plant.

The audit was conducted in response to a detection of *Cryptosporidium* in a sample taken at the outlet of the water treatment plant reservoir on 15th June 2021, and subsequent imposition of a boil water notice on the supply from 18th June 2021. An earlier detection of *Cryptosporidium* in the final water on 9th March 2021 also resulted in a boil water notice being placed on the supply from 12th to 22nd March 2021.

Supply Zones Areas Inspected

A virtual audit was conducted on 25th June 2021 and covered all aspects of the Clare Island public water supply including source protection, treatment and management of the distribution network.

1. Incident Management

		Answer
1.1	Was the incident suitably alerted to the plant operators, escalated and managed in order to maintain water quality and protect public health?	Yes

Comment

A water quality sample taken on 15th June 2021 at the outlet of treated water reservoir at the Clare Island water treatment plant detected *Cryptosporidium* in the order of 1 oocyst in 10 litres. The sample result was reported to Irish Water by the testing laboratory on Friday 18th June 2021 and Irish Water immediately initiated consultation with the HSE. A boil water notice was placed on the Clare Island public water supply on 18th June 2021, to protect public health. The EPA were also notified of the *Cryptosporidium* detection and boil water notice at approximately 12:00pm on 18th June.

Irish Water investigations determined that the cause of the *Cryptosporidium* break-through was associated with cleaning of the slow sand filters at the water treatment plant. There are two slow sand filters at the water treatment plant which provide the only treatment removal of parasites such as *Cryptosporidium* from the raw water. Neither filter has a run to waste installed, therefore when filter turbidities rise at the end of a filter lifespan or following a filter cleaning event there is a risk of *Cryptosporidium* break-through in the filters and entering the distribution network.

Irish Water's Process Optimisation team visited the Clare Island public water supply on 31st May 2021 following an earlier detection of *Cryptosporidium* on the supply on 9th March 2021 and associated boil water notice from 12th to 22nd March 2021. Irish Water plans to undertake remedial works at the plant, including installing a run to waste facility, with contractors due to begin work on the week of 26th July 2021.

2. Filtration

		Answer
2.1	Are the filters designed and managed in accordance with EPA guidance?	No

Comment

There are two slow sand filters at Clare Island water treatment plant both consisting of 540mm of sand media above 300mm of granular activated carbon (GAC), and a further 250mm of silica sand below the GAC layer. The GAC layer was added to the filters to enhance the removal of trihalomethane precursors from the raw water. Both filters were installed in 2000 and last fully re-sanded in 2019. The maximum filtration rate through the slow sand filters is 0.3 m3/m2/hr which is in line with the maximum filtration rate outlined in the EPA Filtration Manual.

The EPA audit found a number of deficiencies in the design and management of the slow sand filters at Clare Island water treatment plant.

1. Filter cleaning is currently initiated based on headloss, but this criteria is only determined when the filter bellmouth can no longer be adjusted downwards, no online monitoring infrastructure or measurement gauge is in place to measure headloss. Combined filtered water turbidity trends are also not currently used as a criteria to initiate filter cleaning.

2. There is a combined continuous online filtered water turbidity monitor in place after the slow sand filters with an alarm set-point of 0.5 NTU, however there are currently no alarm set-points on the individual turbidity monitors on each slow sand filter. This will be addressed under the Irish Water Process Operations Improvement Plan.

3. There is no run to waste in place on either filter to allow the filter bed to fully ripen and filter water turbidities to return below 0.5 NTU before filtered water enters the distribution network and is delivered to consumers taps. A lack of run to waste facility creates a serious risk of *Cryptosporidium* break-through in the filters after cleaning.

4. At the time of the audit Irish Water had drafted a standard operating procedure for filter cleaning, however the document cannot be implemented by the Clare Island water treatment plant operator until a run to waste facility is installed.

A run to waste facility and appropriate individual online turbidity monitors set-points on the outlet of each filter are fundamental to the effective operation of slow sand filters as a treatment barrier for parasites such as *Cryptosporidium.*

3. Disinfection

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

Comment

The disinfection system on the Clare Island public water supply was upgraded to the Irish Water Disinfection Programme specifications in 2017. An on site electrochlorination system (OSEC) was installed to ensure a secure supply of sodium hypochlorite disinfectant on the island. Hypochlorite is generated using low bromate salt, however the current storage time of the hypochlorite product from the OSEC system can be up to 6 days which is above the 1.5 day recommended storage time outlined in the EPA Disinfection Manual.

The chlorine dose is flow proportional via duty standby dosing pumps with automatic switchover between the pumps. The pumps are also alarmed in the case of pump failure. There is a chlorine residual trim on the chlorine dose set to maintain a chlorine residual of 1.4mg/l measured at the outlet of the water treatment plant reservoir.

The disinfection system is controlled with a low chlorine alarm and call out of 0.8mg/l and a high chlorine alarm and call out of 5mg/l at the outlet of the water treatment plant reservoir. The reservoir provides a chlorine contact time of 155.5mg.min/l. The audit reviewed final water chlorine trends for the month of June and all readings were satisfactory.

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

Comment

Chlorine residuals in the distribution network are measured every 2-3 days and measured every day when final water UVT is low. Network chlorine residuals for the month of June were examined during the audit and all readings were above 0.38mg/l.

There is a continuous online final water UVT monitor in place at the water treatment plant, however the monitor was out of calibration and not reading accurately at the time of the audit. Daily UVT readings were being taken using a hand-held UVT unit.

4. Management and Control

		Answer
4.1	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	Yes

Comment

Irish Water have identified that the protozoal compliance log treatment requirement of the Knockmore Stream source is 3 log. Where slow sand filtration treatment meets the requirements outlined in the EPA Filtration Manual it provides a log treatment value of 2.5 log credits, meaning that the Clare Island public water supply has a protozoal log deficit of 0.5 log. Irish Water currently have a monthly *Cryptosporidium* monitoring programme in place on the supply to monitor the final water *Cryptosporidium* risk posed by this deficit.

Recommendations

Subject	Clare Island Audit Recommendations	Due Date	23/08/2021
Action Text	**Recommendation(s)** 1. Irish Water should upgrade the slow sand filter infrastructure at Clare Island water treatment plant to meet the requirements of the EPA Filtration Manual for the purpose of providing 2.5 protozoal log treatment removal for parasites such as *Cryptosporidium*. Irish Water should ensure that upgrade works include the following; i. Install a method of measuring headloss in the slow sand filters for the purpose of initiating filter cleaning. ii. Install alarm set-points on the individual online continuous turbidity monitors on each filter to ensure filtered water remains below 0.5 NTU at all times. iii. Install a run to waste facility on each filter to allow filter water turbidity return to below 0.5 NTU before filtered water enters the distribution network. 2. Irish Water should ensure that sodium hypochlorite generated from on-site electrochlorination is not stored for longer than 36 hours prior to use. 3. Irish Water should ensure that all continuous online water quality monitors are calibrated in accordance with the manufacturers requirements and reading accurately at all times. 4. Irish Water should identify how the protozoal compliance log deficit will be addressed at Clare Island public water supply. **Follow-Up Actions required by Irish Water** 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. This report has been reviewed and approved by Aoife Loughnane, Drinking Water Team Leader. Irish Water should submit a report to the Agency on or before 23rd August 2021 detailing how it has dealt with the issues of concern identified during this audit. 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. 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. Please quote the Action Reference Number, DW20210029 in any future correspondence in relation to this Report.		