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	Pallasgreen PWS
Organisation	Irish Water
Scheme Code	1900PUB1044
County	Limerick
Site Visit Reference No.	SV25932

Report Detail

Issue Date	07/10/2022
Prepared By	Orla Harrington

Site Visit Detail

Date Of Inspection	09/09/2022	**Announced**	Yes
Time In	10:30	**Time Out**	12:15
EPA Inspector(s) **Additional Visitors**	Orla Harrington		
Company Personnel	Irish Water: Patrick Duggan, Duane O'Brien Limerick City and County Council (acting under service level agreement to Irish Water): Diarmuid O'Dea, Willie Hurley.		

Summary of Key Findings

1. A bacteriological failure in the Pallasgreen Public Water Supply and disinfection failure at the water treatment plant were notified to the EPA on 24/08/2022 when coliform bacteria were found in samples at two locations (12 No./100ml & 15 No./100ml) on the network. The cause of the bacteriological failure was identified as inadequate residual chlorine in the network due to a blockage of the chlorine injection lines at the water treatment plant.

2. The audit found a number of shortcomings in relation to the management and oversight of chlorination in the supply. The low chlorine alarm is set too low to alert the operator of low chlorine levels in the final water leaving the plant. There were no residual chlorine trends provided in support of the audit or available for inspection on the day of the audit. SCADA was disconnected so data from the continuous chlorine monitor was not accessible to the operator. The chlorine contact time calculation submitted demonstrated that while the final treated water is achieving the World Health Organisation minimum recommended value of 15 mg.min/l, it fails to achieve Irish Water's site-specific target chlorine contact time of 23.40 mg.min/l, to ensure there is a margin of safety in verifying that primary disinfection is being achieved at the plant under all circumstances. Irish Water's National Disinfection Programme identified this deficiency when the plant was surveyed and assessed in 2017. The plant has not been upgraded yet under the Programme.

3. There is no treatment barrier in place at the Pallasgreen water treatment plant to prevent *Cryptosporidium* entering the supply. At the audit, Irish Water advised that arrangements have been made to install and commission a UV disinfection system under the County Limerick Disinfection Programme.

Introduction

The Pallasgreen Public Water Supply (PWS) serves a population of 1,164 and produces 400 m3/day. The supply is from a spring and borehole which are both located at the treatment plant site, serving 16m3/hr and 5m3/hr respectively. Treatment at the Pallasgreen Water Treatment Plant (WTP) consists of chlorination.

The audit was undertaken to assess Irish Water's performance in producing clean and wholesome water following two detections of Coliform Bacteria and low residual chlorine detected during investigative monitoring on the network on 23/08/2022.

Supply Zones Areas Inspected

The audit comprised of a site visit to Pallasgreen water treatment plant. The auditor inspected the chlorination processes and raw water abstraction points.

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?	No

Comment

1. A bacteriological failure in the Pallasgreen Public Water Supply and disinfection failure at the water treatment plant were notified to the EPA on 24/08/2022 when coliform bacteria were found in samples at two locations (12 No./100ml & 15 No./100ml) on the network. The cause of the bacteriological failure was identified as inadequate residual chlorine in the network.

2. Irish Water investigations identified the root cause of the incident as a mechanical failure of the chlorine dosing system due to a blockage of the duty and standby injection points. The chlorine monitor malfunctioned and froze on a chlorine residual reading of 0.31 mg/l. There is no alarm on the chlorine dosing tank when the level does not change over a predetermined period of time and no residual chlorine alarm triggered as the chlorine monitor did not go below the low chlorine alarm of 0.2 mg/l. Neither Irish Water or Limerick City and County Council could confirm the exact time when the chlorine dosing lines became blocked and how long undisinfected water had been entering the supply. Limerick City and County Council advised that the operator visits the plant on a daily basis for approximately one hour and was unaware of any abnormalities at the plant on 22/08/2022, the day before the incident.

3. On the day of the audit, SCADA was disconnected at the plant. The chlorine monitor had not been linked to a recording device for the previous 10 days, so it was not possible to view if there had been a gradual decline in the chlorine levels as the injection pipes became blocked. There were no residual chlorine trends provided in support of the audit or available for inspection on the day of the audit which is unacceptable. Limerick City and County Council were unable to provide detail on how the SCADA malfunction happened.

4. The HSE were notified by Irish Water of the incident on the 23/08/2022. On 02/09/2022 Irish Water informed the EPA that the HSE deemed that the incident did not pose a risk of such significance that consumers should be notified immediately. The agreed outcome of the consultation process was for Irish Water to proceed with follow up monitoring and keep the HSE informed of the results.

5. The chlorine dosing pumps were reactivated, and normal dosing restored on 23/08/2022 by cleaning the valves on the injection points, which were subsequently fully replaced. On the 24/08/2022, the residual chlorine levels at the water treatment plant returned to 0.38 mg/l. The residual chlorine level at one location in the network was also monitored and a level of 0.4 mg/l was recorded. The auditor advised Irish Water to submit three consecutive compliant bacteriological samples, taken on different dates from within the distribution network to ensure compliance with the parametric value.

2. Disinfection

		Answer
2.1	Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?	No

Comment

1. Disinfection is achieved using sodium hypochlorite, which is dosed using duty/standby pumps with automatic switchover. The chlorine dose is flow proportional. There is one chlorine monitor located post dosing, before adequate contact time has been achieved, where a chlorine residual target of 0.5 mg/l is aimed for before leaving the plant. The chlorine monitor was reading 0.55 mg/l on the day of the audit, which is satisfactory. Chlorination alarms are as follows: a) warning low: 0.2 mg/l and b) warning high: 1.20 mg/l. The warning alarms have a 300 second delay. The low chlorine alarm setpoint is not set at an appropriate level to provide adequate warning of low chlorine levels in the final water leaving the plant. There were no automatic shutdown setpoints provided for residual chlorine in the final water leaving the plant.

2. On the day of the audit, there was no recording device or SCADA in operation so that either a sudden increase in chlorine demand or a failure of the chlorine dosing system could be immediately detected. The auditor was unable to review any trends in chlorine demand at the plant. Irish Water stated that SCADA had been out of operation for 10 days prior to the audit resulting in a lack of control and proper management of the treatment process. Irish Water advised that this equipment malfunction would be addressed within the next few days.

3. The auditor checked Irish Water's reporting to the EPA of progress against its National Disinfection Programme. The report for Quarter 2 2022 stated that Phase 1 (site assessment) of the Disinfection Programme for Pallasgreen WTP was surveyed on 22/11/2017 and the report received on 08/01/2018. According to Irish Water, this assessment listed six properties being supplied off the rising main before the reservoir and not achieving the target contact time of 23.40 mg.min/l before the first customer. There was no update on Phase 2 (site installation).

		Answer
2.2	Is the residual chlorine monitored at a suitable sample location after contact time has been completed?	No

Comment

1. The chlorine disinfection system is inadequate and does not meet the standards set out in the *EPA Drinking Water Advice Note No 3 - E.Coli in Drinking Water*. There is no chlorine monitor installed and alarmed after the appropriate contact time has been achieved to ensure that an immediate response can be made in the event of inadequate levels of chlorine in the final water.

2. A residual chlorine monitor is located post dosing at the WTP. Contact time is achieved within the rising main and reservoir.

		Answer
2.3	Is there adequate chlorine contact time before the first connection?	Yes

Comment

1. Irish Water submitted a calculation to show that at a minimum of 0.56 mg/l chlorine in the final water that there is a minimum chlorine contact time of 16.14 mg.min/l achieved which is greater than the WHO minimum of 15 mg.min/l before the first customer is reached. This contact time is achieved within the rising main but before the reservoir. There is no chlorine monitor here to validate that the minimum free chlorine concentration is being achieved and the contact time falls short of the target that Irish Water have set for the site of 23.40 mg.min/l which is a more considered site-specific approach to setting Ct values.

2. Irish Water's National Disinfection Programme identified this deficiency when the plant was surveyed and assessed under that programme in 2017 and was not progressed further.

		Answer
2.4	Is there a suitable monitoring frequency for residual chlorine in the network with records available?	No

Comment

Records viewed showed that residual chlorine in the network is not being monitored several times a week in order to demonstrate that a minimum residual chlorine level of > 0.1 mg/l is being maintained. Gaps of up to seven days can be seen in the records. The records available meet the minimum recommended chlorine residual concentration of 0.1mg/l in the distribution network.

3. Reservoirs and Distribution Networks

		Answer
3.1	Are reservoirs adequately inspected and maintained?	No

Comment

There is one reservoir located <1 km from the Pallasgreen WTP, situated on top of a hill. There was no record of the reservoir having been cleaned.

4. Management and Control

		Answer
4.1	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	No

Comment

1. Information provided in support of the audit states that the protozoal log credit requirement for the source is 3 log. The sanitary survey has not been completed yet and the supply may have the potential to exceed a log requirement of 3 upon failure of the survey.

2. There is no barrier against Cryptosporidium at the plant so a treatment deficit of 3 log exists. The plant is currently not being monitored in accordance with the Irish Water Rationale for Monitoring Cryptosporidium in Public Water Supplies.

		Answer
4.2	Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network?	No

Comment

1. During the audit it was noted that there was no plant shutdown on the basis of the regulatory turbidity limit of 1 NTU in final water leaving Pallasgreen WTP. It is regarded as necessary to implement a 1 NTU alarm and plant inhibit on the final treated water, activated on a three-minute time delay, as described in the EPA *Water Treatment Manual: Filtration.*

2. There was no shutdown setpoints based on low and high chlorine levels in the final water leaving the plant provided in support of the audit.

Recommendations

Subject	Pallasgreen Audit Recommendations [09/09/2022]	Due Date	28/10/2022
Action Text	**Recommendations** **Irish Water is responsible for ensuring a safe and secure supply of drinking water. To address these issues, Irish Water should implement the following recommendations without delay:** 1. Irish Water should a) confirm the log treatment requirement for the plant b) submit a programme of works to address the log treatment deficiency at the plant c) undertake *Cryptosporidium* monitoring in Pallasgreen public water supply in accordance with Irish Water's Rationale for Determining the Frequency of *Cryptosporidium* in Public Water Supplies until a *Cryptosporidium* barrier at the plant can be verified d) consult with the HSE in relation to the lack of a *Cryptosporidium* at the plant and 3 log requirement deficit. 2. Irish Water should a) undertake immediate works to ensure that the total effective chlorine contact time is sufficient to meet Irish Water's site-specific target of 23.40 mg.min/l for Pallasgreen water treatment plant b) ensure that the chlorine alarm setpoints are based on the contact time calculations, to ensure the water leaving the plant has achieved primary disinfection. 3. Irish Water should ensure that a) automatic shutdown of the plant is linked to low and high residual chlorine alarm settings b) a residual chlorine monitor is installed at an established contact time validation point, linked to SCADA and alarmed appropriately c) frequent monitoring of residual chlorine in the network, including the extremities, is carried out several times a week to ensure that a minimum residual chlorine of >0.1 mg/l is maintained. 4. Irish Water should ensure that a plant inhibit controlled by the regulatory 1 NTU turbidity on final treated water is provided at Pallasgreen water treatment plant. 5. Irish Water should ensure that all key operational monitoring equipment at the plant and in the network are connected to SCADA. 6. Irish Water should ensure that the reservoir is included in the Irish Water Reservoir Inspection and Maintenance Schedule. **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 Regina Campbell, Drinking Water Team Leader. Irish Water should submit a report to the Agency on or before 04/11/2022 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 DW20220111 in any future correspondence in relation to this Report.		