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	Caragh Lake PWS 022A
Organisation	Irish Water
Scheme Code	1300PUB1046
County	Kerry
Site Visit Reference No.	SV20415

Report Detail

Issue Date	27/10/2020
Prepared By	Regina Campbell

Site Visit Detail

Date Of Inspection	29/07/2020	**Announced**	Yes
Time In	11:15	**Time Out**	13:30
EPA Inspector(s) **Additional Visitors**	Regina Campbell		
Company Personnel	Irish Water: Deirdre O' Loughlin *, Kian Guihan **, Oliver Harney *, Sean Twohig ** Kerry County Council: Seamus O' Mahony *, Paul Neary **, Brian Lennon ***, John Horgan *** * Attended pre-site meeting on 23/07/20 & site visit on 29/07/20. ** Attended pre-site meeting only. *** Attended site visit only.		

Summary of Key Findings

1. The Caragh Lake Public Water Supply (PWS) is included on the EPA's Remedial Action List (RAL) since 2010 due to elevated levels of trihalomethanes (THMs) above the standard in the Drinking Water Regulations. The main remedial upgrade works that have been undertaken to address the THM formation risk are the installation of a DAF (Dissolved Air Flotation) unit (installed 2015), mixing tank and ancillary equipment (installed 2019). A pressurised containerised filtration system was also installed at the site in 2019. Monitoring in the network shows compliant THM levels since October 2019. Subsequent to the audit, trended data was submitted by Irish Water to demonstrate that the DAF is operating satisfactorily. On that basis the EPA will consider the removal of the Caragh Lake PWS from the THM category of the EPA's Remedial Action List.

2. A problem has been identified with backwashing of the pressure filters which Irish Water say resulted in aluminium exceedances in the supply that were notified to the EPA in 2019 and 2020. Subsequent to the audit Irish Water advised that the existing pressure filter is not the preferred option for this site. Irish Water need to submit a programme of works for the upgrade or replacement of the pressure filter and because of this issue the Caragh Lake PWS will remain on the EPA's Remedial Action List under the category EPA Audit Observations - Treatment and Management Issues.

3. The pressure filters at Caragh Lake Water Treatment plant are not currently being operated in accordance with the EPA's turbidity performance criteria of 0.2 NTU (using the turbidity approach) or 0.3 NTU (using the log credit performance approach). This means the performance of the plant's protozoal barrier cannot be verified. Irish Water should review and implement the turbidity alarms at the plant having regard to the EPA turbidity performance approach. Irish Water need to identify how the protozoal compliance log deficit at the plant will be addressed.

Introduction

The scope of the audit was to assess the status of RAL upgrade works being undertaken at Caragh Lake Water Treatment Plant to address the risk of THM formation in the supply. The Caragh Lake Public Water Supply (PWS) serves a population of 1,899 and produces 720 m3/day according to information on the EPA's EDEN system. Raw water is sourced from Lake Cummernamuck. The plant operates 24 hours a day. Approximately 80% of the water abstracted is treated by the DAF plant and a containerised pressure filtration system and 20% of the water is treated by slow sand filtration. The blended water is then disinfected by chlorination.

Irish Water advised at the audit that the protozoal log credit requirement for the source water is 4 log but that the methodology for source classification is currently under review. The DAF and pressure filtration treatment provides 3 log credit (treatment for 80% of source) and the slow sand filtration provides 2.5 log credit (treatment for 20 % of source) if operated in accordance with the log credit performance approach and this indicates that there is a log deficit at the plant.

Supply Zones Areas Inspected

Treatment processes inspected were the slow sand filters, DAF unit, coagulant and pH dosing systems, pressure filters and chlorination systems.

In light of Covid 19 social distancing and enhanced hygiene measures, the audit comprised of a video conference meeting with all relevant parties on 23/07/20 followed by a site visit with essential audit participants on 29/07/20.

1. Source Protection

		Answer
1.1	Is the abstraction source(s) adequately protected against contamination?	Yes

Comment

The source of the supply is Lake Cummernamuck, an upland lake located a short distance from the drinking water treatment plant. At the pre-audit meeting Kerry Council advised that the current production at the plant is 1,200 m3/day versus 720 m3/day previously reported to the EPA on EDEN. There are online turbidity and UVT monitors on the raw water. Typically UVT of the raw water is between 30-60% and can go as high as 75% at times. The lake was not visited on the day of the audit due to time constraints.

Irish Water said that the lake is currently classified as requiring a protozoal log credit requirement of 4 log but that the methodology for the classification of the source is currently under review.

2. Coagulation Clarification Flocculation (CFC) Stage

		Answer
2.1	Is the pH within a suitable range for the coagulant used?	Yes

Comment

The pH of the raw water is typically 5.9 and pH is adjusted using caustic soda. Duty and standby dosing pumps with automatic switchover are in place.

		Answer
2.2	Is the CFC process optimised to respond to changes in raw water quality?	Yes

Comment

The capacity of the single stream DAF plant is 40 m3/hr. Kerry County Council advised that the DAF plant is working well. The coagulant used is aluminium sulphate and dosing is controlled by a UVT monitor linked to the raw water. The main parameter used to monitor performance of the DAF is the online turbity monitor post DAF and this has a high turbidity alarm of 0.6 NTU. The online monitor read 0.27 NTU at the audit. Kerry County Council advised that turbidity post DAF is typically in the range of 0.2 - 0.5 NTU.

An online aluminium monitor is in place on the outlet from the DAF. Trends were not available as the monitor is not linked to SCADA. Daily results recorded in the logbook indicated that results are satisfactory.

		Answer
2.3	Are the CFC processes appropriately controlled?	Yes

Comment

There are duty and standby coagulant dosing pumps in place with automatic switchover. Since the last EPA audit in April 2019, an in-line static mixer post coagulant dosing has been installed, the location of the floc pH probe has been changed from the DAF tank to the pre-contact mixing tank, a floc mixer has been installed and plant dose rates have been optimised.

		Answer
2.4	Were the CFC processes visually observed to be operating appropriately during the audit?	Yes

Comment

The DAF was visually observed and no issues were identified.

3. Filtration

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

Comment

Slow sand filters - there are 4 no. slow sand filters in operation which treat up to 20% of the water abstracted. Normally only 2 no. slow sand filters (SSF) are in use at any time.

Containerised pressure filters - there are 4 no. pressure filters at the site which were fitted in Spring 2019. However only 3 no. were operational on the day of the audit with 1 no. out of service. Since the EPA audit in April 2019, a problem with the backwashing of the pressure filters has been identified. Backwash water does not get distributed evenly which means that the filters are only partially backwashed. Irish Water have attributed aluminium exceedances in 2019 and 2020 to the backwashing issues. Initially it was thought that an upgrade to the filters may take place by November 2020 but Irish Water advised at the audit that this timeframe is not achievable now and the filters may need to be replaced completely. The last aluminium exceedance notified to the EPA was for a sample taken on 02/03/20. Results for aluminium monitoring taken in July 2020 were compliant with the parametric value.

Backwashing takes place on an automatic timed basis once a day. Backwash water is run to waste for 6 minutes.

		Answer
3.2	Does monitoring indicate that the filters are operating effectively?	No

Comment

Slow sand filters - There is a continuous turbidity monitor on each filter. Trends submitted showed stable turbidity levels in filtered water from the slow sand filters. There is a high turbidity alarm of 0.45 NTU on slow sand filters 1 and 2 and a high turbidity alarm of 0.5 NTU on slow sand filters 3 and 4 . At the audit the turbidity after SSF 1 was 0.09 NTU and after SSF 2 was 0.083 NTU.

Pressure filters - There is no turbidity monitor or alarm on each individual pressure filter. The turbidity monitor on the water from the combined pressure filters does not have an alarm in place. The turbidity monitor on the combined water from the pressure filters displayed a reading of 0.09 NTU at the audit. A turbidity trend for the combined water from the pressure filters showed regular spikes in turbidity which Kerry County Council advised related to the backwashing problems.

There is a turbidity alarm of 0.7 NTU on the final water (blend of water from slow sand filters and from DAF/pressure filters). Turbidity monitor on the final water displayed 0.074 NTU at the audit.

The current turbidity alarms at the plant do not provide an adequate protozoal barrier when applying the EPA turbidity performance criteria.

4. Disinfection

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

Comment

Disinfection is by chlorination and treatment is verified using an online monitor with alarm. The target residual chlorine level is 1.2 mg/l with a low chlorine alarm (0.4 mg/l) and a high chlorine alarm (3.0 mg/l) in place.

		Answer
4.2	Are duty and standby chlorine pumps/ UV units in operation?	Yes

Comment

Duty and standby chlorine dosing pumps are in operation with automatic switchover.

		Answer
4.3	Is the chlorine dosed appropriately?	Yes

Comment

Chlorine is dosed flow proportionally with residual trim.

		Answer
4.4	Does the trend in chlorine residual at the treatment plant indicate adequate and stable levels of disinfection?	Yes

Comment

Trends submitted showed adequate and stable levels of disinfection.

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

Comment
The chlorine contact time is 19.67 mg.min/l which is adequate.

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

Comment
Records show that there are gaps of up to 5 and 6 days for residual chlorine monitoring in the network which is too infrequent to ensure that any water quality issues in the network are identified in a timely manner.

		Answer
4.7	Is there a chlorine residual ≥0.1 mg/l throughout the network?	Yes

Comment
Records show satisfactory residual chlorine levels in the network.

5. Reservoirs and Distribution Networks

		Answer
5.1	Are reservoirs adequately inspected and maintained?	No
	Comment	
	There are three reservoirs in the supply which were not visited on the day due to time constraints. Irish Water or Kerry County Council could not confirm at the audit when they were last inspected and cleaned.	

6. Management and Control

		Answer
6.1	Are suitable alarm settings in place to alert operators to deteriorating water quality and/or the failure of a critical treatment process?	No

Comment

There is no continuous turbidity monitor or alarm on each individual pressure filter and the turbidity monitor on the water from the combined pressure filters is not alarmed. A trend graph submitted showed regular spikes in turbidity from the pressure filters which Kerry County Council said were related to the backwashing issues.

The current turbidity alarms and shutdown setpoints on the filtered water do not provide an adequate protozoal barrier when applying the EPA turbidity or log credit performance approach.

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

Comment

During the audit, the final water UVT monitor displayed 92.3%. Kerry County Council advised that once UVT of the final water is >80%, that the risk of THM formation in the network is low. Sufficient trended data was not available at the audit for final water UVT as the instruments had only recently been connected to SCADA. Daily aluminium results recorded in the logbook for June and July 2020 for the water post DAF and the final water were satisfactory.

Subsequent to the audit, Irish Water submitted trended data to show that the DAF unit is performing satisfactorily and further compliant THM monitoring in the network.

All of the online monitors at the plant need to be connected to SCADA so that trended data can be gathered on an ongoing basis and used to verify that the treatment processes are working properly.

		Answer
6.3	Are instrument calibrations within date?	Yes

Comment

All instruments checked had calibrations within date,

7. Drinking Water Quality

		Answer
7.1	Have relevant failures to comply with the requirements of the European Union (Drinking Water) Regulations 2014, as amended, been notified to the EPA?	No

Comment

Two THM failures on 19/09/2019 and 07/06/2017 in the network were notified to the EPA on 22/07/2020. These failures had not been previously notified to the EPA and became apparent following a review of the data by Kerry County Council and Irish Water. THM monitoring results for samples taken in the network since October 2019 have been compliant with the parametric value.

Kerry County Council are carrying out a review of their procedures for recording drinking water results and for notifying exceedances.

The delays in notifying these exceedances indicates unacceptable issues in terms of the procedure to be followed when an exceedance is detected. Failure to notify the EPA in the case of an exceedance of the parametric values is an offence under Regulation 10(3) of the European Union (Drinking Water) Regulations 2014, as amended.

8. Supply on the Remedial Action List

		Answer
8.1	Do the audit findings support progress made with the Remedial Action List upgrades?	Yes

Comment

Significant works have taken place at Caragh Lake Water Treatment Plant to address the THM formation potential risk. A DAF unit, pressure filters, a mixing tank, in-line static mixer, and ancillary equipment have been installed between 2015 and 2019 and plant dose rates have been optimised. Monitoring for THMs in the network since October 2019 has been in compliance. Subsequent to the audit Irish Water submitted trended data for post DAF turbidity and final water UVT to show that the DAF is operating satisfactorily. On that basis the EPA will consider the removal of the Caragh Lake PWS from the THM category of the EPA's Remedial Action List.

However, since March 2019, there have been 8 no. aluminium exceedances notified to the EPA. In January 2020 a problem was identified with the backwashing of the pressure filters which Irish Water say was the cause of the aluminium exceedances. The last aluminium exceedance notified to the Agency was for a sample taken on 02/03/20. Network monitoring in July 2020 was in compliance with the aluminium parametric value. At the audit Irish Water advised that the initial remedial date for the pressure filters of November 2020 was not realistic and subsequently advised that the existing pressure filter is not the preferred option for this site. Irish Water need to submit a programme of works for the upgrade or replacement of the pressure filters and because of this issue Caragh Lake PWS will remain on the EPA's Remedial Action List under the category EPA Audit Observations - Treatment and Management Issues.

Recommendations

Subject	Caragh Lake Audit Recommendations	Due Date	27/11/2020
Action Text	**Recommendations** 1. Irish Water should submit details of the timeframe for the upgrade or replacement of the pressure filters. 2. Irish Water should review and implement turbidity alarms and shutdown setpoints at the plant to ensure that there is an adequate protozoal barrier in place at all times in accordance with the EPA turbidity performance approach. 3. Irish Water should confirm that the UVT monitor on the outlet of the DAF has been repaired. 4. Irish Water should ensure that all key operational monitoring equipment at the plant are connected to SCADA. 5. Irish Water should ensure that procedures are in place for the immediate identification and reporting of exceedances by laboratories to Irish Water so that the EPA and HSE are notified promptly. 6. Irish Water should submit details of how the log treatment deficit at the plant will be addressed. 7. Irish Water should ensure that the three reservoirs on the supply are on the Irish Water reservoir inspection and maintenance programme. 8. Irish Water should ensure that monitoring of residual chlorine in the network is undertaken several times a week so that any disinfection issues in the network are identified and addressed in a timely manner. 9. Irish Water should confirm the daily production volume of the plant and update EDEN if necessary. 10. Irish Water should continue to monitor the supply in accordance with the *Irish Water Rationale for determining the frequency of Cryptosporidium monitoring in Public Water Supplies.* **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 Dr. Michelle Minihan, Senior Inspection, Drinking Water Team. Irish Water should submit a report to the Agency by 27/11/2020 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 DW2007/544 in any future correspondence in relation to this Report.		