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	Aughacasla PWS 005D
Organisation	Irish Water
Scheme Code	1300PUB1022
County	Kerry
Site Visit Reference No.	SV22746

Report Detail

Issue Date	04/10/2021
Prepared By	Regina Campbell

Site Visit Detail

Date Of Inspection	17/09/2021	**Announced**	Yes
Time In	11:00	**Time Out**	13:10
EPA Inspector(s) **Additional Visitors**	Regina Campbell		
Company Personnel	Irish Water: Deirdre O'Loughlin, Oliver Harney, Derek O' Toole, Kian Guihen*, Ian O' Mahony.* Kerry County Council: Paul Neary, Brian Lennon, Seamus O' Mahony, Brendan Hannafin**, Seamus King** * Attended pre site visit meeting on 16/09/21 only. ** Attended site visit on 17/09/21 ony.		

Summary of Key Findings

1. There have been 12 no. exceedances of the THM (trihalomethanes) parametric value of 100 ug/l notified to the EPA from 2016 to date with the most recent exceedances reported to the EPA for 3 no. samples taken on 27/04/21. The slow sand filtration treatment process at the plant is not capable of removing organic matter in the raw water (which is predominantly from a lake) to levels that minimise the risk of THM formation in the network on an ongoing basis. The EPA is considering adding this supply to the Remedial Action List (RAL) under the category of elevated THMs above the Drinking Water Regulations. Irish Water should submit a programme of works to address the risk of THM formation in the Aughascasla supply.

2. The audit found a number of shortcomings in relation of the management and oversight of chlorination in the supply. The low chlorine alarm was set too low to alert the operator to the breakdown of the trim chlorine dosing pump for 5 days between 25th and 30th August and the issue was not identified by review of SCADA trends. The chlorine flow proportional pumps remained in operation during the period in question. Irish Water submitted information that showed that the minimum chlorine contact time that was achieved during the period of the incident was 15.93 mg.min/l which is above the WHO (World Health Organisation) minimum recommendation of 15 mg.min/l. However chlorine residuals at the extremities of the network were not checked during the period of the incident. The HSE were notified of the chlorine dosing incident at the request of the EPA following discussions at the audit. Irish Water were not informed by Kerry County Council of the failure of the trim chlorine dosing pump until the day of the audit and a risk assessment of the impact of the failure of the pump on chlorine contact time and public health did not commence until the audit (over 3 weeks after the pump failure).

3. Irish Water advised that works under the disinfection programme works were due to start on the week of 20/09/21 and that this will include upgrades to the chlorine dosing and monitoring systems.

Introduction

The Aughacasla PWS serves a population of 353 with a supply production of 333 m3/day. The main source of the supply is a stream fed from Lake Acumeen with a secondary source from two boreholes drilled at the site which came into production in June 2021.

The raw water is treated by slow sand filtration followed by chlorination and the plant is in production 24 hours/day.

The audit was conducted in response to 12 no. exceedances of the THM (trihalomethane) parametric value that have been notified to the EPA from 2016 to date.

Supply Zones Areas Inspected

In light of Covid-19 restrictions, the audit comprised of a video conference call with Irish Water and Kerry Council on 16/09/21 followed by a site visit with essential participants on 17/09/21 The water treatment plant processes were inspected.

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

Prior to the audit the EPA requested that chlorine trends for final water leaving the plant in August 2021 be submitted for review. The EPA found that chlorine levels were lower than normal in the final water leaving the plant during the period between 17:00 on 25/8/21 and 9.15 on 31/8/21.

At the site visit, Kerry County Council explained that the drop in chlorine levels was due to the failure of the chlorine residual trim dosing pump during that time. The flow proportional pumps continued to operate which meant that chlorination continued. The low chlorine alarm setpoint of 0.3 mg/l was too low to alert the operator to the failure of the trim dosing pump.

As the site is not visited daily, the failure of the trim pump was not noticed until Monday 30/08/21 when the operator visited the site. The pump was fixed and chlorine levels restored to normal levels by the morning of 31/08/21. The plant is linked to SCADA and residual chlorine trends are available for viewing by Kerry County Council staff.

The target chlorine contact time calculation for the site is 24 mg.min/l. However during the period of the failure of the trim dosing pump the chlorine contact time achieved was less than the target but remained above the WHO minimum recommended chlorine contact time of 15 mg.min/l (at lowest chlorine levels in the final water the chlorine contact time achieved was 15.93 mg.min/l).

Irish Water were not informed by Kerry County Council of the failure of the trim chlorine dosing pump until the day of the audit. Kerry County Council and Irish Water notified the HSE of the chlorination issue on the day of the audit.

Irish Water advised that the the chlorination system at the plant will be upgraded as part of the Disinfection Programme works commencing during the week of 20/09/21.

This incident has highlighted a number of shortcomings in the management of the disinfection system at Aughacasla WTP as follows:

1. The low chlorine alarm was set too low at 0.3 mg/l which meant that the operator was not alerted to the lower than normal chlorine levels in the final water when the chlorine trim dosing pump failed over a period of 5 days.

2. This treatment plant was not visited during the period of the pump failure and it is not clear if SCADA trends were checked during this period remotely. It is unacceptable that the breakdown of key disinfection equipment appeared to have gone unnoticed for such a long period.

3. Irish Water were not informed by Kerry County Council of the failure of the trim chlorine dosing pump until the day of the audit and a risk assessment of the impact of the failure of the pump on chlorine contact time and public health did not commence until the audit (over 3 weeks after the pump failure).

4. There are no chlorine residual results for the extremities of the network during the period of 26th August to 1st September and so it cannot be determined if minimum chlorine levels of $\geq$ 0.1 mg/l were maintained at the extremities of the network during the time of the failure of the trim chlorine dosing pump.

Irish Water advised that the upgrade of the disinfection system at the site was commencing during the week of 20/09/21 and that the chlorine dosing and control systems would be upgraded as part of these works.

2. Source Protection

		Answer
2.1	Is the abstraction source(s) adequately protected against contamination?	No

Comment

The primary source of the supply is an intake from a stream fed from Lake Accumeen. The lake supplies approximately 9 - 10 m3/hr. The lake and stream are in a mountainous area with non intensive grazing in the area. There are no raw water continuous monitors at the plant but fortnightly raw monitoring of the lake is undertaken and Kerry County Council said that the lake water quality is generally stable. Since June 2021, the supply has been supplemented by two boreholes (BH1 supplies 2 m3/hr and BH2 supplies 4 m3/hr) which provide about 25% if the supply volume. The 2 no. boreholes have poor yield and there are no plans to increase volume from them.

A third trial borehole was drilled approximately 200m from the plant at the site of the old chlorine dosing house which is located beside the stream fed by Lake Acumeen. However the trial borehole liner collapsed. Kerry County Council said that yields from this borehole were very promising (up to 30 m3/hr) and that it is hoped to commence redrilling of the borehole in October 2021. Kerry County Council said that there are some access and technical issues to overcome at the proposed drill site.

Boreholes 1 and 2 have not been sealed or capped in accordance with EPA Drinking Water Advice Note No. 14: Borehole Construction and Wellhead Protection.

The EPA Eden system does not list the correct name of the lake source and does not list boreholes as sources.

3. Filtration

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

Comment

There are 3 no. slow sand filters at the plant which were installed in 2013. Both the surface water and groundwater sources pass through the filters. The sand has not been replenished since the filters were installed and Kerry County Council said that the operating depth is 500 mm of sand which is below the minimum operating depth of 600 mm specified in the EPA Water Treatment Manual: Filtration. There are no level markers provided to allow the sand depth to be easily read by operators. Kerry County Council said that the design capacity of the filters is greater than supply demand and that the filters perform very well. Turbidity trends submitted showed very stable and low turbidity from each filter and in the final water (<0.5 NTU). The filters are scraped about twice per year and are then run to waste until turbidity levels reduce (ripening takes at least a 5 days). The walls of the filters were clean and free from algae.

There is one monitor for measuring the turbidity in the water from the 3 no. filters which cycles between each filter. There is no alarm on this monitor. At the audit, the monitor was reading 0.03 NTU from Filter 3. There is a turbidity monitor on the combined final water with an alarm of 0.5 NTU (with 10 minute delay). There is no shutdown based on high turbidity. Trends submitted in advance of the audit showed that in August 2021, final water turbidity ranged from 0.07-0.14 which is satisfactory.

4. Disinfection

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

Comment

Duty and standby flow proportional chlorine dosing pumps are in operation with a third pump that doses based on residual chlorine. The flow proportional pumps changeover in the event of a failure and are manually switched over weekly to keep them primed. There is one chlorine monitor currently at the site which is located after the contact tank reservoir at the plant. This monitor is also used to adjust the trim chlorine dose rate. Chorine trends are available on SCADA.

The low chlorine alarm is set at 0.3 mg/l and the high chlorine alarm is set at 2 mg/l. There are no chlorine shutdowns at present, however provision for a shutdown is included within the scope of the disinfection upgrade that is currently underway.

		Answer
4.2	Is the residual chlorine monitored at a suitable sample location after contact time has been completed?	Yes

Comment

There is one chlorine monitor at the site and this is located after the contact reservoir at the site which is after contact time has been achieved.

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

Comment

Irish Water submitted a calculation to show that at a minimum of 0.35 mg/l chlorine in the final water that there is a minimum chlorine contact time of 16.35 mg.min/l achieved which is greater than the WHO minimum of 15 mg.min/l. However currently this falls short of the target that Irish Water have set for the site of 24 mg.min/l. This chlorine contact time calculation should be updated following completion of the Disinfection Programme Works which are expected to be completed by the end of 2021.

		Answer
4.3	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 5 days can be seen in the records. During the trim chlorine pump failure incident (see section 1.1) no monitoring of the network took place to demonstrate that residual chlorine was maintained at levels ≥ 0.1 mg/l as required.

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

Comment

The limited records viewed showed that a chlorine residual of ≥ 0.1 mg/l is being maintained throughout the network.

5. Reservoirs and Distribution Networks

		Answer
5.1	Are reservoirs adequately inspected and maintained?	Yes
	Comment	
	Irish Water confirmed that the Shantalliv reservoir (160 m3) was last cleaned on 28/05/2021.	

6. Management and Control

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

Comment

The calculated log treatment requirement for the source is 1.06. The sanitary survey has not been completed yet but if the +1 penalty is incurred then the log treatment requirement will round up to Log 3. The slow sand filtration in place at the plant provides a log credit of 2.5 if operated in accordance with the requirements of the EPA Water Treatment Manual: Filtration and so a treatment deficit of 0.5 log exists.

The supply is monitored in accordance with the Irish Water Rationale for Determining the Frequency of *Cryptosporidium* Monitoring in Public Water Supplies.

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

Comment

There is no shutdown at the plant based on high or low chlorine or based on high turbidity in the final water. This is a vulnerability as the site is not visited on a daily basis.

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

Comment

The low chlorine alarm of 0.3 mg/l is too low to alert the operator to an issue with chlorine dosing at the plant. (see Section 1.1 which outlines the incident which occurred between 25/08/21 and 31/08/21).

There are no turbidity alarms on each individual filter currently and this is required when implementing the log credit approach.

There is a cascade system of three people in place that respond to alarms that are dialled out.

		Answer
6.4	Are instrument calibrations within date?	Yes

Comment

All instruments inspected were within calibration date.

7. Site Specific Issues

		Answer
7.1	Is the treatment process adequate to minimise THM formation in the network?	No

Comment

At the moment, approximately 75% of the supply is obtained from an upland lake with the remainder provided by groundwater. Kerry County Council advised that the slow sand filters make little difference to the UVT levels in the water (UVT was 79% on the day of the audit) and that the risk of THM formation in the network remains despite dilution of the lake source with groundwater.

A trial using GAC (granular activated carbon) for removal of THM precursors was undertaken at the plant but the findings were inconclusive and Kerry County Council consider that the use of GAC as a long term option to address THM formation is not feasible.

There have been 12 no. THM exceedances notified to the EPA since 2016 with exceedances in two months notified to the EPA in 2020 and 2021.

The EPA is considering adding this supply to the Remedial Action List under the category of elevated THM levels above the Drinking Water Regulations.

Recommendations

Subject	Aughacasla Audit 17/09/21 Recommendations	Due Date	04/11/2021
Action Text	**Recommendations** 1. Irish Water and Kerry County Council should: a) ensure that there are documented incident notification and response procedures in place so that Irish Water, the HSE and the EPA are notified in a timely manner of any incidents that may have an impact on public health. Operators and other relevant staff should be trained in the procedures. b) ensure that SCADA trends are checked on a daily basis so that any failures of key disinfection equipment are identified in a timely manner and corrective actions are taken. 2. Irish Water should confirm when the disinfection upgrades have been completed and provide the following information: a) details of the works completed b) details of high and low chlorine alarms and shutdowns in place. c) confirmation that the target chlorine contact time for the supply is being achieved. 3. Irish Water should: a) submit a programme of works to address the THMs issue in the Aughacasla supply; b) continue to monitor THMs in the extremities of the network on a monthly basis and notify the EPA of any exceedances; 4. Irish Water should undertake the following works on the slow sand filters: a) Replenish the sand to ensure that a minimum of 600 mm operating depth is maintained; b) Install a continuous turbidity monitor on each individual filter; c) Install a filter media depth marker; 5. Irish Water should review and implement turbidity alarms & shutdowns on the filtered and final water to ensure that the plant operates in accordance with the EPA turbidity performance criteria in order to demonstrate that there is an effective protozoal barrier at the plant. 6. Irish Water should identify how the log treatment deficit at the plant will be addressed. 7. Irish Water should monitor residual chlorine in the network, including the extremities several times a week to ensure that a minimum residual chlorine of > 0.1 mg/l is maintained. 8. Irish Water should undertake any works necessary to ensure that the well-heads of Boreholes 1 and 2 are constructed, capped and sealed in accordance with EPA Drinking Water Advice No. 14: Borehole Construction and Wellhead Inspection. 9. Irish Water should update EDEN with the correct name of the surface water source and include the groundwater sources for the 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 Dr. Michelle Minihan, Senior Inspector, Drinking Water Team. Irish Water should submit a report to the Agency on or before 04/11/2021 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 Compliance Plan DW20160176 in any future correspondence in relation to this Report.		