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	Rathkeale PWS
Organisation	Irish Water
Scheme Code	1900PUB1046
County	Limerick
Site Visit Reference No.	SV25597

Report Detail

Issue Date	23/06/2022
Prepared By	Orla Harrington

Site Visit Detail

Date Of Inspection	20/05/2022	**Announced**	Yes
Time In	10:30	**Time Out**	13:00
EPA Inspector(s) **Additional Visitors**	Orla Harrington		
Company Personnel	Irish Water: Duane O'Brien, Tommy Roche Limerick City and County Council (acting under service level agreement to Irish Water): Declan O'Connor, Neal Boyle, Anne Peters, Dom Hayes.		

Summary of Key Findings

1. A Boil Water Notice was placed on the Rathkeale Public Water Supply from 13/04/2022 to 20/04/2022 due to an increase in turbidity to levels > 1 NTU. This increase coincided with works undertaken at the Kilcolman water treatment plant on 13/04/2022 to replace valves on the duty and standby pumps which feed the reservoir. The audit found that the incident was suitably escalated and managed to protect human health.

2. The audit found that Kilcolman Water Treatment Plant was performing well and producing safe drinking water on the basis of primary disinfection being achieved by UV disinfection at the plant.

3. One audit recommendation from the previous audit on 18/10/2018 has not been fully completed to date. The auditor noted that while Keating's Well is enclosed in a secure chamber, the well head is not capped. In accordance with EPA Advice Note 14 the top of the pump chamber casing should be sealed by a strong cap that is not wielded or glued to the top of the casing.

Introduction

The Rathkeale Public Water Supply (PWS) is served by two drinking water treatment plants (WTP) located at Clouncagh and Kilcolman, Co. Limerick. Both plants supply water to the same reservoir located approximately 5km south of Rathkeale town for distribution to a population of 6,633. The audit focussed on the Kilcolman WTP, which is served from two boreholes producing 90m3/hr supplying approximately 3,000 people. Treatment at the plant consists of UV primary disinfection and chlorination with sodium hypochlorite providing secondary disinfection.

The audit was carried out to assess the operation and management of Kilcolman WTP following the placing of a Boil Water Notice on the Rathkeale PWS on 13/04/2022 and to assess Irish Water's progress in implementing the recommendations of the previous EPA audit on 18/10/2018.

Supply Zones Areas Inspected

The auditor inspected all areas of the treatment process at Kilcolman WTP, including boreholes and reservoir.

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

1. On Thursday the 14/04/2022 the EPA was notified that a precautionary boil water notice (BWN) had been issued on the Rathkeale public supply on 13/04/2022. The BWN was placed on the supply due to elevated turbidity recorded in the final water that coincided with the replacement of valves on the duty and standby pumps at Kilcolman WTP which feed the reservoir.

2. These works were complete at approximately 2pm on 13/04/2022. Attempts made to restart the pumps were unsuccessful due to the triggering of the final water turbidity alarm (>1 NTU). At 3.15pm the turbidity alarm was bypassed to get the pumps restarted, as it was felt that any high turbidity would drop off very quickly. A high turbidity reading of 10.01 NTU was initially recorded. Improvements in turbidity levels was slower than expected and at 4.30pm the pumps were shutdown with a turbidity reading of 3.15 NTU. Irish Water advised that turbidity in excess of 1 NTU was recorded for a period of 2 -3 hours and estimated that approximately 108m3 of water was pumped to the reservoir prior to pump shutdown. The HSE were consulted and a decision was then made to issue a BWN on 13/04/2022.

3. Limerick City and County Council observed additional turbidity spikes (> 1 NTU) over a number of days following the incident and investigations determined that high turbidity is occurring when the plants transfer pumps go offline (i.e. the reservoir is full and no water is being pumped). Final water with turbidity > 1 NTU is not entering the network during this time. The sample feed to the turbidity monitor was moved from the clear water tank to a pipeline tapping prior to disinfection under Irish Water's Disinfection Programme. Limerick City and County Council believe that when the transfer pumps go offline the pressure in this pipeline drops substantially resulting in an abnormally high turbidity reading. The systems turbidity alarm/shutdown then prevents the pumps from coming back online. To get the supply back online the systems turbidity alarm needs to be temporarily disabled (< 30 seconds). Limerick City and County Council advised on the day of the audit that turbidity results will be monitored closely for 4 weeks to determine whether the location of the turbidity monitor is adequate to ensure the reliable monitoring of turbidity levels in the final water.

4. Irish Water took the following actions following the incident:

- cleaned out the clear water sump
- adjusted the outlet valve downstream of the turbidity monitor
- all alarms enabled and functioning
- *cryptosporidium* sampling rig was installed and a monitoring programme was put in place
- initiated a run to waste facility

5. Following the incident, Limerick City and County Council estimated that it would take approximately 15 hours for water leaving the plant to reach the extremities of the network and exit the system. Resampling results for microbiological parameters, chlorine and turbidity at four locations in the network on 19/04/2022 was satisfactory. Sampling for *Cryptosporidium* and Giardia on 15/04/2022 was also clear.

6. The BWN was rescinded on 20/04/2022 following satisfactory monitoring results and consultation with the HSE.

2. Source Protection

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

Comment

1. The supply is fed by two groundwater boreholes, referred to as; 6" trial borehole and Keating's Well.

6" trial borehole

The borehole is located on the site of the WTP. Irish Water informed the auditor that this trial borehole was drilled and commissioned in 2018, however there were no details on borehole construction available on the day of the audit. The borehole is not grouted, capped or located within a secure kiosk or chamber and therefore vulnerable to contamination by surface water ingress. Irish Water advised that this is an interim solution and that a permanent production borehole would be drilled in 6 to 8 weeks time < 20m from the trial borehole. It was not confirmed at the audit whether the 6" trial borehole would be still in use or replaced by the new production well, once commissioned.

Keating's well

Keating's Well is located in a securely fenced off compound surrounded by agricultural land approximately 1km from the WTP. The EPA had recommended in a previous audit (18/10/2018) that Irish Water complete an upgrade of Keating's Well borehole in accordance with EPA Advice Note 14: Borehole Construction and Wellhead Protection in so far as it is technically feasible. While the borehole is enclosed in a secure chamber, the auditor noted that the wellhead itself is not capped.

2. There is one redundant borehole unsuccessfully drilled in 2020 at Kilcolman WTP that has yet to be decommissioned and presumed to be located within the same groundwater body / aquifer as the 6" trial borehole. The auditor advised that this borehole will need to be dealt with appropriately as it may provide a conduit to the aquifer.

3. At the audit, it could not be confirmed when the landowners within the zone of contribution were written to, to inform them of their obligations under the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 S.I. No. 31 of 2014.*

3. Disinfection

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

Comment

1. Primary disinfection including 3 log *Cryptosporidium* inactivation is provided by UV disinfection at the plant, with chlorination used for secondary disinfection in the network.

2. The chlorine monitor (CL001) is located post chlorine dosing where a chlorine residual target of 0.8mg/l is aimed for before leaving the plant. The chlorine monitor was reading 0.75mg/l on the day of the audit, which is satisfactory. The following alarm set-points were identified for CL001 at the audit: (i) low shutdown: 0.3mg/l; and (ii) high shutdown: 2mg/l. The auditor found that the residual chlorine alarm settings are too low to allow plant operators react in time when chlorine levels drop below the target level and may not ensure treated water at the extremities of the distribution network contains at least 0.1mg/l to ensure adequate disinfection.

3. Chlorine residual continuous monitoring results at the plant between 25/04/2022 to 26/05/2022 were provided subsequent to the audit. Results ranged from 0.37mg/l to 0.85mg/l over that time.

		Answer
3.2	Are monitors and alarms operational via dial out and being responded to with a suitable cascade system in place?	Yes

Comment

There are three people on the cascade system; caretaker, foreman and engineer. If an alarm is triggered, all three people on the cascade receive a text alert. Alarm process flows and contact lists have been developed and provided to Limerick City and County Council.

		Answer
3.3	Is the UV system suitably validated?	Yes

Comment

1. Primary disinfection including 3 log *Cryptosporidium* inactivation at the plant is provided by an ATG SX 225-8 UV disinfection system consisting of a duty/standby arrangement with automatic switchover if the duty UV unit fails for any reason. There is also a scheduled changeover of the UV units every 24 hours.

2. The auditor examined plates attached to both reactors indicating the validation criteria for the units. The units are validated under the USEPA protocol and based on this criteria, the validated range of the UV unit is 85% UVT for flows up to 90m3/hr. The UV units are also validated to deliver a dose rate of 40mJ/cm2. On the day of the audit, the UV was operating within the validation requirements.

3. The UV units are linked to a continuous UVT monitor. The HMI displayed the following for Unit No. 2, which was in operation at the time of the audit: UVT 99.59%, Dose 52 mJ/cm2 and flow 94m3/hr. Limerick City and County Council confirmed at the audit that there is automatic shutdown of the UV system if UVT <85% (delay of 3 minutes). The minimum validated dose is 40 mJ/cm2 and the plant is alarmed and programmed to automatically shutdown if the UV dose falls below 40 mJ/cm2.

4. The UV disinfection system is verified using monitors and alarms, with trended data recorded and accessible on SCADA. Subsequent to the audit, Irish Water submitted UVT trend data from 26/04/2022 to 21/05/2022 on 27/05/2022, which confirmed that the plant is operating within validation. For all UV failures, the foreman, caretaker and area engineer get an alarm text notification.

5. Irish Water advised that there is a maintenance schedule in place to ensure that monitoring equipment is regularly maintained and service.

		Answer
3.4	Is the chlorine dosed appropriately?	Yes

Comment

Secondary disinfection is provided by dosing of sodium hypochlorite. There are duty and standby chlorine dosing pumps in operation with automatic switchover. The chlorine dose is flow proportional and linked to the chlorine monitor in use at the WTP, where a chlorine residual of 0.8 mg/l is aimed for before leaving the plant.

4. Management and Control

		Answer
4.1	Is the water treatment plant resilient enough to cope with significant variations in raw water quality or demand?	No

Comment

Raw water from two boreholes is drawn into the raw water sump at the WTP, prior to disinfection. Treated water is then pumped in a single rising main towards a reservoir which is located 1 km on top of a hill. Limerick City and County Council advised that there is a flow restriction caused by the size and capacity of the rising main between Kilcolman WTP and the reservoir, resulting in 40m3/hr of raw water running to waste. Irish Water may have to consider resizing the pumps to accommodate the capacity of the rising main to increase the efficiency of the plant.

		Answer
4.2	Have the recommendations from the previous EPA audit been satisfactorily addressed?	No

Comment

One audit recommendation from the previous audit on 18/10/2018 has not been fully completed to date.

- Irish Water should complete an upgrade of Keating's Well Borehole in accordance with EPA Advice Note No. 14: Borehole Construction and Wellhead Protection in so far is technically feasible;

The auditor noted that while Keating's Well is enclosed in a secure chamber, the wellhead is not capped. In accordance with EPA Advice Note 14 the top of the pump chamber casing should be sealed by a strong cap that is not wielded or glued to the top of the casing.

Recommendations

Subject	Rathkeale Audit Recommendations [20/05/2022]	Due Date	20/07/2022
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 ensure the turbidity monitor is in the correct location and representative of final water quality. 2. Irish Water should ensure chlorine setpoints are set at an appropriate level to ensure that the target residual chlorine concentration in the final water is met. 3. Irish Water should assess the feasibility of upgrading the rising main from Kilcolman water treatment plant to reservoir or resizing the pumps to accommodate the capacity of the rising main to ensure there is sufficient capacity to meet the future needs of Rathkeale public water supply. 4. Irish Water should ensure that all redundant boreholes are decommissioned in accordance with best practice guidelines, to prevent the risk of presenting a preferential pathway for the entry of contaminants to the aquifer. 5. Irish Water should ensure that all boreholes in use are constructed, sealed and protected in accordance with EPA Advice Note No. 14: Borehole Construction and Wellhead Protection. 6. Irish Water should liaise with Limerick City and County Council and confirm that relevant landowners have been written to in relation to setback distances in accordance with the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014, as amended for the source of 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 Michelle Minihan, Drinking Water Team Leader. Irish Water should submit a report to the Agency on or before 20/07/2022 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 DW20180173 in any future correspondence in relation to this Report.		