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	Ballivor
Organisation	Irish Water
Scheme Code	2300PUB1002
County	Meath
Site Visit Reference No.	SV20117

Report Detail

Issue Date	12/03/2020
Prepared By	Daryl Gunning

Site Visit Detail

Date Of Inspection	21/02/2020	**Announced**	Yes
Time In	11:45	**Time Out**	14:00
EPA Inspector(s) **Additional Visitors**	Daryl Gunning Michelle Roche		
Company Personnel	Irish Water: Francis Glancy, Aodhnait Ni Chathasaigh Meath County Council: Martin Gallagher, Norbert McMahon, Christina Sweeney, Helen McDonnell, David O'Reilly		

Summary of Key Findings

1. Irish Water has not complied with the Regulation 16(1) Direction issued by the EPA for Ballivor public water supply, due to the failure to commission the new Ultraviolet (UV) disinfection system by the specified date of 31/12/19. However, Irish Water is actively seeking a solution to the problem identified during commissioning (fouling of UV lamps) and is engaging with the EPA to resolve the deficiency as soon as practicable.

Introduction

Approximately 90% of the water supplied to the Ballivor Water Supply Zone (WSZ) is treated at the Kilmurray water treatment plant (WTP). The remaining (approx.) 10% of the treated water provided to the Ballivor WSZ is supplied by the Earl's Mill WTP. This WTP was not visited as part of this audit. At the Kilmurray WTP, a borehole provides 687 m3/day to a population of 2,493. Treatment consists of sodium hypochlorite dosing prior to filtration to oxidise manganese and iron in the raw water, pressure filtration, UV disinfection (commenced operation in December 2019), post-UV chlorination with sodium hypochlorite (secondary disinfection), and fluoridation. The fluoridation system is not currently operating due to a health and safety risk (trip hazard) of the dosing point which is due to be relocated.

As part of Irish Water's National Disinfection Programme site assessments carried out in Meath public water supplies, Irish Water identified that the chlorine contact time at Kilmurray WTP did not meet the minimum requirement of 15 mg.min/l to ensure adequate disinfection of the water supply. To address this treatment deficiency, Irish Water committed to install a UV disinfection system to provide a dual dinsinfection barrier at Kilmurray WTP.

On 22/11/19, the EPA issued a Direction to Irish Water under Regulation 16(1) of the European Union (Drinking Water) Regulations 2014, as amended. The Direction required Irish Water to install and commission the UV disinfection system at Kilmurray WTP by 31/12/19.

Supply Zones Areas Inspected

This audit of Killmurray WTP (Ballivor WSZ) sought to verify the installation of UV disinfection treatment as per the requirements of the Regulation 16(1) Direction issued by the EPA on 22/11/19. A full site tour of the WTP was conducted, including an inspection of the onsite borehole.

1. Source Protection

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

Comment

The borehole, located at the WTP site, was visited during the audit.

1. The borehole was drilled in 2011. Irish Water has classified it as G3 (high risk of microbiological contamination).
2. The borehole was adequately capped and located in a lockable chamber.
3. No ingress of surface water into the chamber was evident.
4. There is a second borehole at the WTP site, however, it is not plumbed to the WTP.

2. Filtration

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

Comment

1. There are 2 pressure filters at Kilmurray WTP.
2. Filter media was replaced in 2018. Filter media consists of sand and manganese dioxide to remove manganese and iron from the raw water.
3. Sodium hypochlorite (14-15%) is dosed prior to pressure filtration to oxidise the manganese and iron. Removal performance of the manganese and iron from the raw to final water is >95%. However, removal rates are reduced when the filters are in backwash.
4. Backwashing of each filter occurs once per day. Each backwash takes approximately 15 minutes. During the backwash process there is no water entering the network.
5. Chlorinated water is being used to backwash the filters.
6. There is no run-to-waste process on the filters post backwash cycle and this is causing iron and manganese particles to be carried over into the UV units after a backwash and building up on the UV bulbs.
7. Periodically, post filtration turbidity spikes above or close to 1 NTU.

3. Disinfection

		Answer
3.1	Is the UV disinfection system operating within its validated range?	No

Comment

1. A "VISADES T860F" (2 reactors) UV disinfection system was installed at the Kilmurray WTP in December 2019. The commissioning works were still ongoing on the day of the audit.
2. In the early stages of commissioning, the UV system experienced iron and manganese fouling of the UV lamps which was causing the UV dose to drop below the validation set-point and the UV unit going into automatic shut-down. The UV system does not have self-cleaning lamps which would have avoided this problem. As a temporary solution, the UV lamps are being manually cleaned approximately every 3 days to ensure the UV disinfection system remains in operation.
3. The UV system is alarmed for UVT and UV dose as follows: (i) low-low UVT: 75%; (ii) low UVT: 80%; (iii) low-low dose: 35 mJ/cm2. The plant will shutdown when a low-low UV alarm setpoint is reached.
4. The UV system is also alarmed for UVI. On the day of the audit the low-low (alarm and automatic shutdown at this setpoint) and low alarm setpoints were different for reactor 1 and 2 as follows: (i) low-low reactor 1: 8.44 mW/cm2; (ii) low reactor 1: 8.94 mW/cm2; (iii) low-low reactor 2: 6.88 mW/cm2; (iv) low reactor 2: 7.38 mW/cm2.
5. A cascade system is in place to alert staff in the event of an alarm being triggered.
6. UV was being dosed at 44.70 mJ/cm2 at the time of the audit.
7. Automatic switch-over of duty and standby UV pumps occurs every 12 hours.
8. Manganese and iron particles that are carried over from the end of the filter backwash are coating the UV lamps and causing the UV system to automatically shutdown periodically. The automatic shutdown of the UV system results in the plant automatically shutting down, subsequently, no treated water is entering the network. As the water tower on the network only has a 2 hour storage capacity, plant shutdowns can cause low pressure issues in the network (Irish Water has received low pressure complaints from consumers since the UV unit was installed at the plant).

		Answer
3.2	Is the chlorine dosed appropriately?	Yes

Comment

1. Sodium hypochlorite (14-15%) is dosed prior to filtration to oxidise the manganese and iron in the raw water. A chlorine residual of 0.9 mg/L is aimed for prior to filtration. There is one chlorine dosing pump prior to each filter.
2. Sodium hypochlorite (14-15%) is also dosed prior to the final water leaving the plant as secondary disinfection to maintain a residual level of disinfection in the distribution network. A chlorine residual of 0.5 mg/L is aimed for in the final water leaving the WTP.
3. There is no requirement for chlorine boosting in the network. A chlorine residual of >0.1 mg/L is being achieved in the network.

4. Reservoirs and Distribution Networks

		Answer
4.1	Are reservoirs adequately inspected and maintained?	Yes

Comment

1. There is a 135m3 capacity water tower on the network (approximately 2 hour storage).
2. The water tower was last cleaned on 15/11/17.
3. Irish water plan to build an on-site reservoir at Kilmurray in 2020.

Recommendations

Subject	Ballivor Audit Recommendations	Due Date	09/04/2020
Action Text	**Recommendations** 1. Irish Water should submit an action plan to the EPA detailing the steps that will be taken to resolve the problem of UV lamp fouling following a filter backwash, to ensure that the UV system is operating optimally and providing adequately disinfected water to consumers. 2. Irish Water should ensure that filtered water turbidity is <1 NTU prior to UV treatment. 3. Irish Water should submit a copy of the commissioning and validation certificate for the newly installed UV system. 4. Irish Water should provide clarification on why the alarm setpoints for low-low and low UVI are different for each UV reactor and review these setpoints to ensure they are appropriate to the operation of the UV system at Kilmurray WTP. **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 09/04/20 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 Reference Number DW2019/174 in any future correspondence in relation to this Report.		