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	Athlone PWS
Organisation	Irish Water
Scheme Code	3200PUB1001
County	Westmeath
Site Visit Reference No.	SV25395

Report Detail

Issue Date	11/04/2022
Prepared By	Regina Campbell

Site Visit Detail

Date Of Inspection	25/03/2022	**Announced**	Yes
Time In	10:00	**Time Out**	13:20
EPA Inspector(s) **Additional Visitors**	Regina Campbell		
Company Personnel	Irish Water: Andrew Boylan, John Gavin, Ian Walsh. Westmeath County Council (acting under service level agreement to Irish Water): Cathal Kenny, Ciaran McCabe, Eamon Morris		

Summary of Key Findings

1. A Boil Water Notice (BWN) was placed on the Athlone PWS from 10/03/22 and 11/03/22. The BWN was placed as a small quantity of water (ranging between 0.04% and 0.16% of daily production) did not receive UV disinfection (used for primary disinfection) between 06/03/22 and 09/03/22 due to a fault with an actuated valve which was repaired. All final water was chlorinated, however adequate chlorine contact is not achieved prior to the first consumer on the supply. The audit found that there was a delay in recognising the impact of the faulty valve on UV disinfection and escalating the issue to Irish Water.

2. The audit found that the Athlone Water Treatment Plant was operating satisfactorily and providing good quality water as evidenced by trends reviewed.

3. A supplementary treatment process at the plant commenced operation on 22/02/22 consisting of Actiflo clarification, filtration, UV and chlorination treatment. It treats an estimated one third of overall treated water produced. This stream adds further capacity to the treatment plant and allows greater flexibility if further upgrades are undertaken.

Introduction

Irish Water said that the Athlone Public Water Supply serves a population of 19,013 which is less than the figure of 23,467 reported by Irish Water on the EPA Eden system. The supply volume is 9,500 m3/day (EDEN figure is 10,493 m3/day) and the source of the supply is the adjacent River Shannon.

The abstracted water is split after the addition of coagulant into two separate treatment streams as follows:

- Existing plant (treats 6,500 m3/day): clarification, filtration, UV and chlorination.
- Supplementary plant in operation since 22/02/22 (treats 3,000 m3/day): Actiflo clarification, filtration, UV and chlorination.

Both streams are combined at the Clear Water Tank, where fluoridation takes place, prior to entering the network. There is also a picket fence thickener, sludge holding tank and washwater tank for management of sludge and filter backwash water.

The plant operates 24 hours a day, seven days a week.

The audit was undertaken to assess the general operation and management of the plant and in response to a recent Boil Water Notice placed on the supply from 10/03/22 to 11/03/22.

Supply Zones Areas Inspected

The treatment processes for the existing and supplementary plants 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

A Boil Water Notice (BWN) was placed on the Athlone PWS from 10/03/22 to 11/03/22 due to a small amount of inadequately disinfected water entering the supply.

The incident was caused by the outlet valve on the UV1/UV2 stream at the existing plant not fully closing during plant start up following a plant shut down. This resulted in approximately 4 m3 of water over 2 minutes not receiving full UV disinfection (UV is used for primary disinfection) prior to chlorination and entering the clear water tank. Usually the UV outlet valve remains in the closed position until the UV disinfection system is fully operational.

This issue with the valve was first noticed on the 06/03/2022 during repair works being undertaken at the plant but the potential impact of the faulty valve on UV disinfection was not fully understood until the 09/03/2022 and this lead to a delay in escalating the incident to Irish Water and the HSE. The closure mechanism on the actuator was fixed on 10/03/22. Irish Water said that conservatively, it is calculated that approximately 0.1% of the daily production from the plant did not receive UV disinfection between 06/03/22 and 09/03/22 and so there was risk that impacted water was in the distribution network until 6pm on 11/03/2022.

Irish Water estimated that for a period of approximately. 2 min after each plant restart it is possible that approximately. 115 - 120m3/hr (~ 4m3 each time) passed through into the clear water tank, without receiving adequate UV disinfection.

Irish Water provided the following breakdown of water affected by the incident:

06/03/22 – 3 no. plant shutdown / restart – 0.12% of daily production

07/03/22 - 1 no. plant shutdown / restart – 0.04% of daily production

08/03/22 – 2 no. plant shutdown / restart – 0.08% of daily production

09/03/22 – 4 no. plant shutdown / restart – 0.16% of daily production

Irish Water also said that because Athlone WTP is located in the centre of Athlone that adequate chlorine contact time was not achieved for properties in the immediate vicinity of the plant as UV is used for primary disinfection.

Chlorine trends and turbidity trends for final water during the same time period were satisfactory and network sampling for chorine and microbiological parameters on 14/03/22 were satisfactory.

Irish Water consulted with the HSE on the potential risk to public health of the incident and on foot of that consultation a BWN was imposed on 10/03/22 until 11/03/22.

2. Source Protection

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

Comment

The source of the supply is the River Shannon. Westmeath County Council said that the raw water quality is fairly consistent. Abstraction is 520 m3/hr and there are a suite of online monitors including pH, conductivity, dissolved oxygen, temperature and turbidity.

There is a high turbidity alarm set at 3.5 NTU and a high hydrocarbons alarm at 40ppm with shutdown of the plant after 20 seconds on the latter.

Raw water readings noted at the audit were as follows: UVT was 32.4 %, turbidity 1.5 NTU and pH 8.10.

3. Coagulation Clarification Flocculation (CFC) Stage

		Answer
3.1	Are the CFC processes appropriately controlled?	Yes

Comment

Chemifloc 103 (high acid aluminium sulphate) is dosed flow proportionally at a static mixer. There are duty and standby dosing pumps with automatic changeover. Chemifloc 103 is dosed prior to the flow splitting into the existing and supplementary streams.

Existing stream

Poly is dosed into the contact tank/splitting chamber. It is dosed flow proportionally with duty/standby dosing pumps. Water then passes to 4 no. clarification units. There is a project underway to replace the lamella plates in the clarifiers with tube settlers and the clarifiers could not be inspected as access was restricted due to construction works.

There is a high turbidity alarm of 1 NTU on the combined settled water from Clarifiers 1 and 2 and from combined settled water from Clarifiers 3 and 4. At the audit the turbidity monitor after Clarifiers 1 and 2 combined was reading 0.52 NTU and the turbidity monitor after Clarifiers 3 and 4 was reading 1.21 NTU which is greater than the 1 NTU alarm. Westmeath County Council staff said that an alarm had been received and that the higher reading was due to an issue with the sample line which occurs intermittently and produces erroneous readings.

Supplementary Stream

The clarification process used at the supplementary plant is the Actiflo® system which is a rapid clarification unit that uses Microsand as ballast to accelerate the sedimentation process. There is a high alarm on the clariified water from the Actiflo of 2 NTU and the monitor was reading 1.27 NTU at the audit. No issues were observed with the process.

4. Filtration

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

Comment

Existing Plant

There are 8 no. rapid gravity filters in the existing stream. Settled water from Clarifiers 1 and 2 goes to Filters 1-4 and settled water from Clarifiers 3 and 4 goes to Filters 5-8. The filter media is sand. It has not been replaced since 2014 and the current depth of media in each filter could not be confirmed. Subsequent to the audit Irish Water submitted information that stated that media depths were all < 1000 mm which is the minimum depth required by the EPA Water Treatment Manual: Filtration. There are no media depth gauges on each filter. Westmeath County Council staff said that there are issues with some filters including uneven backwash, mudballing and cracks in the media.

Each filter is washed every 48 hours or if individual filter turbidity exceeds 0.3 NTU. There is a delayed start of 15 minutes before returning the filters to service. The following turbidity alarms are in place:

- 0.3 NTU after each filter; 0.5 NTU after Filters 1-4 combined and Filters 5-8 combined; 1 NTU shutdown pre UV disinfection.

Supplementary Plant

There are 4 no. rapid gravity filters in the supplementary plant operating at a design filtration rate of 5.4m/hr. There is dual media with 600 mm sand and 600 mm anthracite. The 4 filters can be operated at a throughput of up to 200 m3/hr when all are operating in parallel and at a reduced flow of 187 m^3/hr (whenever one is backwashing).

The following turbidity alarms and inhibits are in place:

- 0.29 NTU after each filter (5 minutes delay) triggers backwash; 0.3 NTU after each filter (5 minutes delay) triggers shutdown; 0.3 NTU (5 minutes delay) after combined filters triggers shutdown of supplementary plant.

Each filter is washed every 24 hours or if individual filter turbidity exceeds 0.29 NTU.

All filters from the existing and supplementary streams are combined at the clear water tank where there is plant shutdown if turbidity exceeds 0.5 NTU (time delay 1 minute).

		Answer
4.2	Does monitoring indicate that the filters are operating effectively?	Yes

Comment

Existing Plant

Turbidity readings from each filters no.s 1-8 were all reading < 0.1 NTU which is satisfactory and trends viewed at the audit were also satisfactory.

Supplementary Plant

At the audit turbidity readings from each filter in the new supplementary plant were < 0.1 NTU which is satisfactory. Trends submitted prior to the audit showed stable trends.

Final water turbidity for the combined existing and supplementary plants was 0.044 NTU.

5. Disinfection

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

Comment

Existing Plant

Primary disinfection is provided by UV with chlorination (using sodium hypochlorite) at the clear water tank provided for secondary disinfection. In the existing plant, the flow is divided into two streams with each stream treated by duty/standby Berson UV units (IL 1500+ Model) with automatic switchover in the event of failure of one of the UV disinfection units.14-15 % sodium hypochlorite is dosed into each line downstream of the UV unit and before the clear water tank. The chlorine is dosed at 2.1—2.3 mg/l with the aim to achieve 1.6 mg/l after the clear water tank. At the audit the dual validation monitors after the clear water tank were reading 1.65 mg/l which is satisfactory.

Supplementary Plant

Primary disinfection is provided by UV. Sodium hypochlorite is dosed in a static mixer located post UV disinfection. The water is then routed to the inlet chamber of the existing clear water tank where it combines with water from the main plant. The target chlorine dose is between 1.7mg/l and 2.1mg/l and at the audit it was noted to be 1.8 mg/l which is satisfactory. Chlorine trends viewed for the supplementary plant were satisfactory.

Chlorine alarms on the supplementary plant are high chlorine residual setpoint of 2.2 mg/l with shutdown after 10 minutes and low chlorine residual setpoint of 1.4 mg/l with shutdown after 10 minutes.

On the combined existing and supplementary plants there is a low chlorine alarm of 1.4 mg/l with shutdown at 1.0 mg/l and high chlorine alarm at 2.0mg/l with shutdown at 2.2 mg/l.

Data is trended and available to view at the plant and remotely. Trends viewed showed adequate and stable disinfection for UV and chlorine disinfection for both the existing and supplementary plants.

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

Comment

Duty and standby UV units with autoswitchover and chlorine dosing pumps with autoswitchover are operational on both the existing plant and supplementary plant. Chlorine dosing is flow proportional.

		Answer
5.3	Is the UV system suitably validated?	Yes

Comment

Existing Plant

While Irish Water and Westmeath County Council staff said that the existing UV units are validated, no evidence of the certified validated operating range was available for inspection on the day of the audit. A previous EPA audit conducted on 16/02/2018 confirmed on the day of the audit that the validated operating range of the Berson UV units was as follows: minimum UVT of 75%, maximum flow of 296 m3/hr, minimum flow of 12 m3/hr and a UV dose of at least 40 mJ/cm2.

UV 1 was displaying the following readings: 198.66 m3/hr, UVT 89.4% , UVI 117.1 W/m2 and UV dose 45.3 mJ/cm2

UV3 was displaying the following readings: 155 m3/hr, UVT 89.8%, UVI 92.5 W/m2 and UV dose 47.3 mJ/cm2.

There is also shutdown of the plant if turbidity is > 1 NTU pre UV units for combined filters 1-4 and combined filters 5-8.

Trends viewed showed that UVT generally averages around 88%.

Supplementary Plant

Irish Water submitted information subsequent to the audit to show that the new Xylem/Wedeco LEX 400e UV units were certified under the USEPA UVDGM methodology and operate on a calculated dose basis. However the information submitted did not provide evidence of the the range of validated UVT and flow rates for the new UV units.

Irish Water said that there is a low UVT setpoint of 75% which triggers shutdown. Trends submitted showed UVT between 80% and 85% generally. If the UV dose falls to 40 mJ/cm2, the process will switch to the standby UV unit and if this fails then the supplementary plant will shutdown.

At the audit the following readings were noted at the supplementary plant:

Combined filter turbidity pre UV 0.087 NTU (shutdown of plant if turbidity >1 NTU)

UV2 was operating at a flow of 134 m3/hr; UVT 86% and UV dose 50.5 mJ/cm2.

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

Comment

Records of manual chlorine tests in the network were not available at the audit. Records submitted after the audit showed chlorine measurements in the network recorded on 2 days in February. Chlorine residuals were > 0.1 mg/l on the days sampled. It should be ensured that chlorine sampling is undertaken several times a week at locations in extremities in the network and that results are recorded.

It is noted that online chlorine monitors are also in operation at 3 no. locations on the network and trends viewed were satisfactory.

6. Treatment Process Chemicals

		Answer
6.1	Are treatment process chemicals appropriately managed and stored?	No

Comment

The fill-point for the Chemifloc 103 tank was not locked and was not located in a bunded area.

7. Management and Control

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

Comment

Irish Water said that the protozoal log treatment requirement for the plant is log 4.

Backwash supernatant from the supplementary plant is recycled to the head of the works of the existing plant and it could not be verified at the audit if this had been considered when determining the protozoal log treatment requirement.

Settled backwash supernatant from the existing plant is discharged to the river and is not recycled to the head of the works.

		Answer
7.2	Is there a documented alarm response procedure?	Yes

Comment

Incident Response Training has been undertaken for all staff at the plant and a copy of the Incidence Response Guidance Chart was clearly displayed.

		Answer
7.3	Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network?	Yes

Comment

Shutdowns of the plant are in place if the UV units fail or operate outside of their validated ranges in the existing and supplementary plants, if turbidity > 0.5 NTU in the final water or based on high and low chlorine levels in the final water.

		Answer
7.4	Are suitable alarm settings in place to alert operators to deteriorating water quality and/or the failure of a critical treatment process?	Yes

Comment

Suitable alarm settings are in place for filtration, UV and chlorination.

However the plant would also benefit by the installation of high and low pH alarms on the final water.

	Answer

7.5	Are relevant alarms dialled out via a cascade system to allow a timely response by plant operators?	No

Comment

Alarms generated during out of hours are not currently dialled out. Alerts for shutdowns are dialled out to two plant operators simultaneously.

8. Fluoridation

		Answer
8.1	Is the fluoridation dosing system appropriately controlled?	Yes

Comment

Fluoridation takes place at the clear water tank. Dosing is flow proportional with duty and standby dosing pumps. The day tank is bunded and on a weighing scales with the dosing room vented.

		Answer
8.2	Are fluoride dosage calculations and monitoring records satisfactory?	Yes

Comment

All results viewed were satisfactory.

Recommendations

Subject	Athlone Audit Recommendations	Due Date	11/05/2022
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 that there is a regular check and maintenance schedule in place for all equipment and that a risk assessment is undertaken without delay if any faults are found with equipment. 2. Irish Water should undertake the following actions in relation to the filters a) increase depth of sand media in each filter, where feasible, to 1000mm as per the EPA Water Treatment Manual: Filtration; b) install a media depth gauge for each filter; c) install run to waste or slow start after filter backwashing where feasible; c) undertake actions to address uneven backwash distribution, mudballing and cracks in filter media. 3. Irish Water should a) confirm when the refurbishment of the clarifiers has been completed and b) take actions to ensure that the turbidity monitor after Clarifiers 3 and 4 is reading correctly 4. Irish Water should a) submit confirmation of the validated operating range of the new UV units in the supplementary stream and b) maintain evidence of the validated operating ranges of the UV units in the existing and supplementary streams at the plant. 5. Irish Water should ensure that critical plant alarms are dialled out when the plant is not manned. 6. Irish Water should ensure that the fill point for the Chemifloc 103 tank is locked and that it is located with a bunded area. 7. Irish Water should ensure that manual monitoring of residual chlorine is undertaken in the extremities of the network several times a week. 8. Irish Water should confirm that the recirculation of supernatant from the supplementary stream to the head of the works has been factored in to the log treatment requirement calculation for the plant. 9. Irish Water should install high and low pH alarms on the final water. 10. Irish Water should update the supply population figure and supply volume on EDEN to reflect the current situation. **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 11/05/2022 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 Compliance Plan DW20220027 in any future correspondence in relation to this Report.		