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	Avoca Ballinaclash Public Supply
Organisation	Irish Water
Scheme Code	3400PUB1024
County	Wicklow
Site Visit Reference No.	SV20099

Report Detail

Issue Date	17/02/2020
Prepared By	Aoife Loughnane

Site Visit Detail

Date Of Inspection	28/01/2020	**Announced**	Yes
Time In	13:30	**Time Out**	15:30
EPA Inspector(s) **Additional Visitors**	Aoife Loughnane		
Company Personnel	Irish Water: Andrew Boylan, Edward Haythornthwaite, Peter Thornton, Eamonn Connolly, Pearse Cassidy, Mark Claffey Wicklow County Council: Tom Griffin, Tom O'Leary, Kevin McEvoy, Shane Kinsella, Noel Doody		

Summary of Key Findings

1. Irish Water has upgraded Ballinaclash water treatment plant in line with the Remedial Action List action programme and the requirements of the EPA Direction issued on 02/04/19. The upgrade works include the installation of two new raw water balancing tanks, which allows for more controlled operation of the dissolved air flotation and filtration (DAFF) plant, and the production of a much more stable and safer water supply.

2. The management and operational control of the treatment processes has vastly improved since the previous EPA audit, with critical plant alarms and automatic shutdown facilities in place, new on-site laboratory facilities, daily monitoring and checks of raw, in-process & treated water quality, a jar testing programme to ensure optimum chemical dosing, and excellent record keeping practices.

3. Based on the audit findings, Avoca Ballinaclash public water supply was removed from the EPA's Remedial Action List in the Q4 2019 update published on 31/01/20.

Introduction

The source of Avoca Ballinaclash public water supply is a mountain stream tributary of the Avonbeg River. Treatment at the plant consists of pH correction, coagulation, flocculation, dissolved air flotation and filtration (DAFF), UV disinfection, final pH correction and chlorination. The plant produces 316 m3/day and serves 1,343 people.

Avoca Ballinaclash has been on the EPA's Remedial Action List (RAL) since 2008 due to elevated levels of THMs. In March 2019, a second RAL category was added '*EPA Audit Observations - Treatment & Management Issues*' based on the EPA audit on 25/02/19 which found serious deficiencies in the operation and control of the treatment processes.

Avoca Ballinaclash public water supply was on a Boil Water Notice for 120 days in 2019, from 25/03/19 to 23/07/19, due to elevated turbidity at the water treatment plant which meant the performance of the UV disinfection system was compromised, and Irish Water could not verify adequate disinfection of the water supply.

The EPA issued a Direction to Irish Water on 26/02/19 under Regulation 16 of the *European Union (Drinking Water) Regulations 2014 as amended*, seeking an action programme to improve the management and control of Ballinaclash water treatment plant. Following submission of an action programme, the EPA issued a further Direction to Irish Water under Regulation 9, which required Irish Water to implement the action programme to upgrade Ballinaclash water treatment plant by 30/09/19.

Supply Zones Areas Inspected

The purpose of the audit was to verify if Avoca Ballinaclash public water supply can be removed from the RAL following the completion of upgrade works to address THM formation potential and the requirements of the EPA Direction issued on 02/04/19.

The audit covered the raw water abstraction and treatment processes and controls at Ballinclash water treatment plant.

The audit found that the upgraded plant was performing very well and the UV disinfection system was operating within its validated range at a flow of 19.86 m3/hr, UVI of 52.23 W/m2 and UVT of 99.65%.

1. Supply on the Remedial Action List

		Answer
1.1	Is the Action Programme on track to meet the Remedial Action List completion date?	No

Comment

The RAL action programme, and the EPA Direction issued on 02/04/19, required the upgrade of Avoca Ballinaclash public water supply by 30/09/19. The audit found that while the RAL completion date and Direction deadline was not achieved, Ballinaclash water treatment plant has now been upgraded and has achieved the overall outcome of a safer and more secure water supply to 1,343 consumers.

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

Comment

1. Irish Water has upgraded Ballinaclash water treatment plant as follows:

- Two new raw water balancing tanks (36 m3 capacity each) installed and commissioned in October 2019.
- Raw water turbidity control system installed and commissioned in October 2019. This new system shuts off the raw water abstraction if the stream turbidity exceeds 120 NTU. Raw water abstraction resumes once the stream turbidity drops to 60 NTU.
- A new filter backwash regime for the DAFF triggered by time and/or loss of head was implemented in September 2019.
- New UVT monitors on the raw and post-DAFF water were installed and commissioned in June 2019.
- DAFF cover installed in December 2019.
- Control upgrades implemented at the plant resulted in the Boil Water Notice being lifted on 23/07/19.
- A streaming current meter has been installed to automate the coagulant dosing, however it won't be brought into operation until the full range of coagulant dosing bands corresponding to raw water colour variations is established over time. In the meantime, the plant PLC controls the coagulant dosage according to flow rate and colour of the raw water.

2. The management and operational control of the treatment processes has vastly improved since the previous EPA audit, with new on-site laboratory facilities, daily monitoring and checks of raw, in-process & treated water quality at the plant, a jar testing programme to ensure optimum chemical dosing, excellent record keeping practices, and plant alarms and automatic shutdown facilities in the event that on-line instruments detect a significant deterioration in critical control parameters.

3. The improvements to the treatment processes has reduced the risk of THM formation in Avoca Ballinaclash public water supply. Irish Water has undertaken a programme of verification monitoring which demonstrates 3 rounds of compliant THM results in the distribution network.

2. Site Specific Issues

		Answer
2.1	Has Irish Water satisfactorily addressed the recommendations of the EPA audit carried out on 25/02/19?	Yes

Comment

1. Irish Water has undertaken the following actions at Ballinaclash water treatment plant to address the recommendations of the previous EPA audit:

1. Wicklow County Council Operations Technician has been trained and given responsibility for monitoring and managing plant performance.
2. A jar testing programme is now in place, to determine the optimum chemical coagulant dose and pH for treatment of the water.
3. There is daily monitoring of residual aluminium in treated water, with results recorded in the operator's daily log book.
4. Following a backwash of the DAFF filter, the water runs to waste for 5 - 10 minutes, and is only returned to service when the turbidity level reaches a setpoint of 0.3 NTU.
5. The UV disinfection system has automatic switchover between the duty and standby UV reactors, and a fault with both reactors will cause an immediate plant shutdown.
6. The cover at the chlorine injection points chamber has been secured so it cannot be opened by unauthorised persons.
7. A *Cryptosporidium* monitoring programme of the treated water was commenced, and *Cryptosporidium* (0.01 oocysts per 10 litres) was detected in a sample taken at Ballinaclash reservoir on 01/05/19 while the supply was on a Boil Water Notice. Following confirmation by Irish Water that the UV disinfection system was operating satisfactorily, and with the agreement of the HSE, *Cryptosporidium* monitoring of the treated water ceased on 09/07/19.
8. The concrete tank located to the rear of the treatment plant building has been confirmed as the backwash water tank (36 m3 capacity).

2. Irish Water and Wicklow County Council confirmed that the incident response procedure, as recommended in the previous audit, is being developed and will be finalised shortly.

3. The final water pH correction system consists of a single sodium hydroxide dosing pump, with no standby dosing pump as back-up.

4. The document "*Ballinaclash Water Treatment Plant - Process Control Philosophy*" sets out details of the plant alarm setpoints for critical parameters. The following setpoints need to be revised:

- Final water UVT low-low setpoint of 70% is below the 85% minimum validated operating range of the UV disinfection system;
- Final water pH low setpoint of 6.0 and low-low setpoint of 5.0 is outside the pH parametric range of 6.5 - 9.5 in the Drinking Water Regulations.
- Final water turbidity high-high setpoint of 0.3 NTU is currently programmed to automatically shutdown the plant. There is scope for increasing this setpoint up to a maximum of 1 NTU, given that there are multiple treatment barriers to *Cryptosporidium* (DAFF and UV disinfection) at Ballinaclash water treatment plant.

		Answer
2.2	Is the distribution network adequately monitored to protect drinking water quality?	No

Comment

Monitoring of residual chlorine levels in the distribution network is currently carried out once per week, rather than the recommended frequency of several times per week.

Recommendations

Subject	Avoca Ballinaclash Audit Recommendations	Due Date	18/03/2020
Action Text	**Recommendations** 1. Irish Water should review the alarm setpoints for final water UVT, pH and turbidity to ensure they are set at an appropriate level to verify compliant drinking water quality. 2. Irish Water should install a standby sodium hydroxide dosing pump (with automatic switchover arrangement) on the treated water pH correction system, to ensure that sodium hydroxide will continue to be dosed in the event of a failure of the duty pump. 3. Irish Water should prepare and implement a documented procedure for the communication and escalation of incidents affecting drinking water quality in Avoca Ballinaclash public water supply. The procedure should cover responsibilities and criteria where it is necessary to consult with the HSE and EPA to determine if there is a potential danger to human health associated with the public water supply. 4. Irish Water should ensure that chlorine levels in the distribution network are monitored and recorded on a regular basis, ideally several times per week, to ensure that at least 0.1 mg/l free residual chlorine is present at the extremities of the distribution network for adequate disinfection of the water supply, and in order to detect any potential drinking water quality issues at the earliest opportunity. **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 Mihinan, Senior Inspector, Drinking Water Team. Irish Water should submit a report to the Agency on or before 18/03/20 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 Action Reference Number DW2019/144 in any future correspondence in relation to this Report.		