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	Boolavogue Housing
Organisation	Irish Water
Scheme Code	3300PUB1414
County	Wexford
Site Visit Reference No.	SV20490

Report Detail

Issue Date	09/09/2020
Prepared By	Daryl Gunning

Site Visit Detail

Date Of Inspection	27/08/2020	**Announced**	Yes
Time In	11:00	**Time Out**	11:40
EPA Inspector(s) **Additional Visitors**	Daryl Gunning		
Company Personnel	Irish Water: Patrick Duggan, Siobhan Clifford*, Tara Foley* Wexford County Council: Paul Delahunty, Barry Hammel, Fionnuala Callery* *Attended pre-site visit meeting (25/08/20) only. All other personnel attended both pre-site meeting and site visit (27/08/20)		

Summary of Key Findings

1. Ultraviolet (UV) disinfection was installed at the Boolavogue water treatment plant (WTP) in May 2019. From August 2019 to January 2020, the UV system was not in operation because fouling of the UV sleeves and sensors with iron and manganese resulted in the UV system shutting down. This failure of the UV system was not notified by Wexford County Council to Irish Water until January 2020. The UV failure was also not notified to the EPA or the HSE, which meant there was no assessment of the associated risk to public health.

2. The UV system also shut down on two occasions in August 2020, as a result of iron and manganese fouling. These failures were reported to Irish Water, the EPA, and the HSE in a timely manner.

3. During periods when the UV system is out of operation, 4 properties on the network (approx. population of 10) are receiving water that has not been adequately disinfected. Secondary disinfection (chlorination) provides adequate disinfection to all other properties on the network, however, for 4 properties closest to the water treatment plant, chlorine contact time is not adequate (<15 mg.min/l).

4. Irish Water is actively seeking a solution to the UV fouling problem and is engaging with the EPA to resolve the deficiency as soon as practicable.

Introduction

The Boolavogue Housing public water supply (PWS) produces approximately 14-20 m3/day of water serving a population of 42. Raw water is abstracted from a borehole at the Boolavogue WTP. Treatment consists of UV disinfection (primary disinfection), pH correction via caustic soda dosing, and chlorination (secondary disinfection).

This audit was carried out in response to repeated failures of the UV disinfection system resulting from iron and manganese fouling of the UV sleeves and sensors and the failure to notify the EPA of the UV system failure from August 2019 to January 2020.

Supply Zones Areas Inspected

All areas of the treatment process at the water treatment plant were inspected during the audit.

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

On 15th January 2020, the EPA were informed by Irish Water that the UV system at the Boolavogue WTP had not been operational since August 2019. This resulted in 4 properties on the network receiving water that had not been adequately disinfected because the secondary disinfection (chlorination) system does not have adequate chlorine contact time before the water reaches those properties.

Wexford County Council failed to notify Irish Water of the failure of the UV system. When Irish Water became aware of the UV system failure in January 2020, they reminded Wexford County Council personnel of the need to immediately report issues with treatment processes when they are identified or where critical equipment is not operating correctly. This issue was also raised at a senior level between Irish Water and Wexford County Council to ensure that any such failure to notify Irish Water, the EPA, or the HSE would not occur again.

Investigations determined that iron and manganese present in the raw water were fouling the UV sleeves and sensors, resulting in UV system shutdown. Contractors repaired and serviced the UV system on 16/01/20. A 5 micron cartridge filter was also installed on this date to remove iron and manganese from the raw water prior to UV disinfection.

Despite the cartridge filter being replaced once a month since installation, the UV system shut down again at approximately 18:30 on 05/08/20 due to iron and manganese fouling the UV sleeves and sensors. Contractors completed repairs of the UV system on 11/08/20, with UV reactor 1 (UV1) returned to service by 18:00 on 11/08/20. Auto changeover of UV 1 and 2 was re-initiated on 18/08/20.

At 18:00 on 25/08/20, the UV system shut down for a third time, as a result of iron and manganese fouling of the UV sleeves and sensors. Contractors repaired the UV system on the 26/08/20 and Wexford County Council replaced the 5 micron cartridge filter. The UV system was operational again by 14:30 on 26/08/20.

The failures of the UV system which occurred in August 2020 were notified to Irish Water, the EPA, and the HSE in a timely manner.

2. Source Protection

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

Comment

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

1. Irish Water has identified that the borehole requires 3 log credit treatment to achieve protozoan compliance, due to the high risk of microbiological contamination in the raw water.
2. The borehole was adequately capped and located in a locked chamber.
3. No ingress of surface water into the chamber was evident.

3. Disinfection

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

Comment

For all UV failures, the caretaker received a UV shutdown alarm notification and arrived at the WTP within the hour, returning the supply of water to the network within 1-2 hours. Secondary disinfection (chlorination) was operational at all times during the UV system shutdowns. The caretaker ensured that a chlorine residual of at least 0.6 mg/l was present in the final water leaving the WTP. Consumers on the network will experience a reduction in water supply within a few minutes of plant shutdown.

		Answer
3.2	Is the UV disinfection system operating within its validated range?	Yes

Comment

1. A "VISADES T130" (2 reactors) UV disinfection system was installed and commissioned at the Boolavogue WTP in May 2019. The UV system is validated to an international validation standard by the Austrian Association for Gas and Oil (OVGW certification). A copy of the validation certificate was provided at the audit.
2. UV was being dosed at 819 J/m2 (60.6 W/m2 - UVI) at the time of the audit. The validated range of the UV system is 34.7 W/m2 to 150 W/m2.
3. Automatic switch-over of duty and standby UV pumps occurs every 24 hours.
4. Turbidity was 0.58 NTU prior to UV disinfection at the time of the audit.
5. The UV system is alarmed for UVI as follows: (1) alarm low: 34.6 W/m2 and (2) shutdown low: 29.6 W/m2. The WTP will shut down when the "shutdown low" alarm is triggered.
6. A cascade system is in place to alert staff in the event of an alarm being triggered.
7. Iron and manganese particles that are not captured by the 5 micron cartridge filter are coating the UV sleeves and sensors, causing the UV system to automatically shutdown periodically.

		Answer
3.3	Is the chlorine dosed appropriately?	Yes

Comment

1. Sodium hypochlorite (10-12%) is also dosed prior to the final water leaving the plant as secondary disinfection to maintain a residual level of chlorine in the distribution network. At the time of the audit, a chlorine residual of 0.88 mg/l was in the final water leaving the WTP. A chlorine residual of >0.1 mg/l is being achieved in the network.
2. Chlorination alarms are as follows: (1) warning low: 0.3 mg/l; (2) warning high: 1.2 mg/l; (3) shutdown low: 0.15 mg/l; (4) shutdown high: 1.5 mg/l. The warning alarms have a 5 minute delay and the shutdown alarms have a 15 minute delay. The 15 minute delay presents a risk of inadequately disinfected water being supplied to consumers before the plant automatically shuts down. The WTP will shut down when the "shutdown low" or "shutdown high" alarm is triggered.
3. A cascade system is in place to alert staff in the event of an alarm being triggered.
4. Caustic soda is dosed post UV disinfection and prior to chlorination to correct the pH. A pH of 6-6.8 is aimed for in the final water leaving the WTP. A pH of 6.72 was recorded in the final water leaving the WTP at the time of the audit.

		Answer
3.4	Is there adequate chlorine contact time before the first connection?	No

Comment

The chlorine contact time is not adequate for the first 4 properties on the network (7.07 mg.min/l; which is below the minimum requirement of 15 mg.min/l). Subsequently, when the UV system is not operational, these properties are not receiving adequately disinfected water.

Adequate chlorine contact time (19.64 mg.min/l) is achieved at all other properties on the network and chlorine residuals at the extremities of the network are maintained above 0.1 mg/l.

Chlorine residuals in the network are monitored twice per month. The network is small, only serving a population of 42 people.

Recommendations

Subject	Boolavogue audit recommendations	**Due Date**	09/10/2020
Action Text	**Recommendation(s)** 1. Irish Water should identify and implement a permanent solution to prevent excessive fouling of the UV sleeves and sensors, in order to ensure the Boolavogue Housing Public Water Supply is adequately disinfected at all times. 2. Irish Water should ensure that the UV disinfection system at the Boolavogue water treatment plant operates within its validated range at all times. 3. Irish Water should review the 15 minute time delay on the low chlorine plant shutdown alarm, in order to minimise the risk of inadequately disinfected water being supplied to consumers. **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 within one month of the issuing of this audit report 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 (DW2020/70) in any future correspondence in relation to this Report.		