Site Visit Report

Under the *European Union (Drinking Water) Regulations 2023*, the Environmental Protection Agency (EPA) is the supervisory authority in relation to Uisce Éireann and its role in the provision of public drinking water supplies. This audit was carried out to assess the performance of Uisce Éireann in providing clean and wholesome water to the public water supply named below.

The audit process is a sample of the performance of a water treatment plant and public water supply on a given date.

Water Supply Zone

Name of Installation	Lanesboro
Organisation	Uisce Éireann
Scheme Code	2000PUB1009
County	Longford
Site Visit Reference No.	SV30184

Report Detail

Issue Date	17/07/2024
Prepared By	Derval Devaney

Site Visit Detail

Date Of Inspection	26/06/2024	**Announced**	Yes
Time In	10:30	**Time Out**	13:35
EPA Inspector(s) **Additional Visitors**	Derval Devaney		
Company Personnel	Uisce Éireann (UÉ): Karina O'Grady, Joseph Moran, Micheál McGreal. Longford County Council (working in partnership with Uisce Éireann): Syl Healy, Liam Donlon.		

Summary of Key Findings

1. There is no standby UV unit in place at ESB water treatment plant and at Lisreevagh water treatment plant. There is no automatic switch-over between duty and standby chlorine dosing pumps at ESB water treatment plant.
2. There is no alarm and plant shutdown on final water pH, chlorine residual post contact time and water flow to ensure site specific target levels, critical treatment processes and statutory limits are protected.
3. The alarm and plant shutdown set points for parameters differed on display screens at ESB water treatment plant.
4. Supporting UV validation information was unavailable to enable an assessment of the suitability of UV alarms and plant shutdown to verify treatment processes operate within validated criteria ensuring adequate disinfection at all times.

Introduction

The Lanesboro public water supply is currently sourced from two groundwater sources, the 'ESB borehole' at ESB water treatment plant and 'borehole 2' at Lisreevagh water treatment plant. The ESB borehole (located adjacent to ESB land) is pumped continuously, and the Lisreevagh borehole supplements the supply. Treated water from the two boreholes produces approximately 2,800 m3/day and 1000 m3/day of that is supplied to the neighbouring Longford Central public water supply. The supply's production is currently reduced to 2,200 m3/day, while a temporary reservoir is in use. Each borehole has UV disinfection and chlorination in place.

The audit was undertaken to assess Uisce Éireann's performance in producing clean and wholesome water with a focus on the alarms and inhibits in place at the treatment plant and the procedures in place to ensure appropriate oversight of treatment processes.

Supply Zones Areas Inspected

The opening meeting commenced at ESB water treatment plant and continued on to Lisreevagh water treatment plant. The UV disinfection and chlorination processes and associated equipment and monitors were inspected at both plants during the audit.

1. Source Protection

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

Comment

1. There was a hole in the cap of borehole 2 at Lisreevagh water treatment plant (WTP) which presented a risk for contamination of the raw water source.

2. Disinfection

		Answer
2.1	Are duty and standby chlorine pumps/ UV units in operation?	No

Comment

1. There is no standby UV unit in place at the ESB WTP, which operates 24/7 or at the Lisreevagh WTP which supplements the supply.
2. While there are duty and standby chlorine dosing pumps at ESB WTP, they do not automatically switchover.

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

Comment

ESB WTP

1. The ESB WTP is fed from one on-site borehole. UV disinfection provides the primary source of disinfection (via a Berson InLine 450+ USEPA UV reactor) followed by secondary disinfection via chlorination. Treated water enters the Carrowroe service reservoir off-site.
2. The UV site specific target dose is 45 mJ/cm2 and was being met on the day of the audit. There is a UV dose lo alarm at 40 mJ/cm2 after 300 seconds and a UV Dose hi alarm at 50 mJ/cm2 after 300 seconds to protect this target.
3. Due to the lack data submitted in advance of the audit for flow (in m3/hr) and UVT to maintain a validation dose of 40 mJ/cm2 and due to the varying lo alarm set points in place for UVT (see point 5 below); it was not possible to determine if alarm and plant shutdown set points were appropriate to ensure the UV was operating within its validated range at all times.
4. There is an alarm and plant shutdown set point for max. flow at 82 m3/hr. Flow was 41.48 m3/hr on the day of the audit.
5. The alarm and plant shutdown set point for lo lo UVT, set at 85 % (after 900 seconds), is higher than the lo UVT set point set at 69 %. The UVT monitor was reading 95.2 % on the day of the audit.

Lisreevagh WTP:

1. The Lisreevagh WTP is served by groundwater from 'BH2-field well' currently, and supplements the supply from ESB WTP. The 'BH3 - site well' on the Lisreevagh WTP site has not been in use since January 2023, due to fine sand entering the water source from this well.
2. BH2 and BH3 are each filtered (via separate cartridge filters per line) and individually chlorinated followed by UV disinfection (via a Medium Pressure UV reactor. Model: Aquaray SLP DW 250-150-4W). UV provides secondary disinfection on-site and there is one reactor per line (duty only for each borehole). Treated water from both lines (when both are in use) then combine and continue to Carrowroe service reservoir which is off-site and serves the Lanesboro network.
3. The UV site specific target dose is 40 mJ/cm2.
4. The UV validation information submitted pre-audit did not specify: (i) the UV dose that would be achieved within the envelopes presented for UVI and flow; (ii) flow data in m3/hr; and (iii) UVT criteria. Therefore it was unclear how the site specific alarm set points for UVI, UVT and flow were chosen for BH2's UV unit to meet the validated criteria submitted. As a result, it was not possible to determine if alarm and plant shutdown set points were appropriate to ensure the UV was operating within its validated range at all times.
5. Information submitted in advance of the audit stated the alarm and plant shutdown set point for max. flow is 72 m3/hr to ensure adequate disinfection via UV treatment. However, there was no alarm and shutdown enabled for flow on the day of the audit. Flow was 41.36 m3/hr on the day of the audit.
6. There is a UVI lo alarm set point at 20 W/m2 and a lo lo alarm and plant shutdown set point at 19 W/m2 on BH2. The UVI monitor on BH2 was reading 29.77 W/m2 on the day of the audit. The time delay on the UVI alarms differed between BH2 and BH3's UV units.
7. There is a UVT lo alarm set point at 80 % and a lo lo alarm and plant inhibit set point at 75 %. The UVT monitor was reading 97.57 % on the day of the audit.

3. Reservoirs and Distribution Networks

		Answer
3.1	Are reservoirs adequately inspected and maintained?	Yes

Comment

1. The Carrowroe treated water reservoir located 800m away from the Lisreevagh WTP is undergoing maintenance works since mid June 2024, and as a result is offline.
2. A "pillow" tank, a temporary storage container, is in use for treated water storage while the main reservoir is undergoing maintenance works. UÉ provided contact time calculations for this temporary structure and had chlorine monitors in place (CL002 and CL003) on the outlet of the pillow tank to confirm adequate disinfection is being maintained.

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

1. The ESB and Lisreevagh WTPs may not be resilient enough to cope with raw water quality variations or supply demand issues as they do not have standby UV units in place.
2. Daily final water pH records at Lisreevagh WTP for June 2024 showed pH levels to be less than the 6.5 pH statutory limit. The lowest pH reading was 6.41 on 06/06/2024. There is no final water pH correction at Lisreevagh WTP to cope with pH variations in the raw water.

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

Comment

1. UÉ stated a source and sanitary survey had been completed in June 2022 for the ESB and Lisreevagh groundwater sources concluding a Log 3 treatment was required.
2. UÉ confirmed a log 3 treatment was provided by the UV unit at Lisreevagh WTP but was unable to confirm the log treatment provided at ESB WTP.
3. A raw water monitoring programme had commenced for ESB and Lisreevagh sources in 2024 but ceased in March due to budget constraints. There is no raw water monitoring programme in place for the groundwater sources currently.

5. Alarms, Inhibits & Oversight Audits 2024

		Answer
5.1	Is there a documented site specific incident response and incident escalation process?	No

Comment

1. While Uisce Éireann's Incident Communications Response Guidance Form was displayed at the ESB WTP, it did not contain site specific information; including up-to-date contacts for escalation, and site specific trigger levels to protect critical process at the WTP.
2. Uisce Éireann's Incident Communications Response Guidance Form was not displayed at Lisreevagh WTP.

		Answer
5.2	Were online monitors within their calibration dates?	Yes

Comment

1. There was a new chlorine pump fitted at Lisreevagh WTP and while it was stated it was calibrated, there was no calibration sticker to illustrate when it was calibrated or next due a service.

		Answer
5.3	Are suitable alarm settings in place to alert operators to deteriorating water quality or the failure of a critical treatment process?	No

Comment

1. There was no alarm and plant shutdown on the final water pH at the ESB and Lisreevagh WTPs.
2. There was no alarm and plant shutdown on flow to the UV unit at the Lisreevagh WTP.
3. There was no alarm and plant shutdown on the chlorine residual post contact time at Carrowroe Reservoir and the temporary Pillow Reservoir to ensure adequate disinfection is being achieved for water treated by the Lisreevagh WTP.
4. The hi hi alarm set point of 5 mg/l on the chlorine residual monitor CL001 at the ESB WTP is too high and not in line with EPA guidance. The site specific target concentration set for CL001 is 1.3 mg/l. A high level alarm with a maximum of 0.2 mg/l above the target concentration is recommended to prevent excess disinfection by-product formation and avoid customer complaints.
5. See Question 2.2 for further detail relating to alarm and plant shutdown issues relating to the UV units at ESB and Lisreevagh WTPs.

		Answer
5.4	Has UÉ carried out an alarm and inhibit review at the water treatment plant?	Yes

Comment

1. UÉ carried out an alarm and inhibit review at the WTPs in 2022.

		Answer
5.5	Were all findings of the UÉ alarm and inhibit review implemented?	No

Comment

1. Not all of the recommendations have been implemented. For example, a pH monitor was installed at the ESB WTP but is not trending on SCADA at the plant.

		Answer
5.6	Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network?	No

Comment

1. See Question 5.3 for more detail relating to the lack of plant shutdown arrangements on final water pH at ESB and Lisreevagh WTPs and chlorine residual post Ct at the Carrowroe Reservoir.
2. Plant alarm and inhibit set points for individual parameters varied between different screens on SCADA at the ESB WTP. For example, (i) the "Monitor No. 1 Set points" screen displayed a lo UVT set point of 69% and the "Stop Plant Alarm Set Points" screen displayed a lo lo UVT set point of 80%; and (ii) the "Stop Plant Alarm Set Points" screen displayed a lo lo chlorine residual of 1.1 mg/l and the "QT01-01 Chlorine Residual Meter" screen had a lo lo chlorine residual plant shutdown of 1 mg/l.

		Answer
5.7	Are plant performance trends accessible by operational staff at the water treatment plant?	No

Comment

1. Readings from the final water pH monitor at the ESB WTP are not trending on SCADA as it has yet to be hooked up to that system.

		Answer
5.8	Are plant performance trends accessible remotely?	No

Comment

1. Readings from the final water pH monitor at the ESB WTP are not trending on SCADA as it has yet to be hooked up to that system.

		Answer
5.9	Is there a documented alarm response procedure?	No

Comment

1. There was no documented site specific alarm response procedure setting out how alarms are responded to in order to protect water quality and public health.

		Answer
5.10	Are there appropriate procedures covering verification of alarms and inhibits status following maintenance or other work on site?	No

Comment

1. UÉ stated there was a procedure in place covering the verification of alarms and inhibits status following maintenance or other work on site but it needed to be reviewed and updated.

Recommendations

Subject	Lanesboro PWS Audit Recommendations 26.06.2024	Due Date	19/08/2024

Action Text

Uisce Éireann is responsible for ensuring a clean and wholesome supply of drinking water and should implement the following recommendations without delay.

1. **Source**:
   i. Put in place a raw water monitoring programme for the Lanesboro PWS groundwater source;
   ii. Seal the hole in the cap of borehole 2 at Lisreevagh WTP to prevent the risk of contamination of the raw water source.
2. **Alarms**:
   i. Put in place an alarm and plant shutdown on (i) final water pH at ESB WTP and Lisreevagh WTP; (ii) chlorine residual post contact time at Lisreevagh WTP; and (iii) flow at Lisreevagh WTP to ensure site specific target levels, critical treatment processes and statutory limits are protected;
   ii. Review the chlorine residual hi hi alarm setpoint at the ESB WTP to ensure it meets the guidance set out in the EPA's *Water Treatment Manual: Disinfection*;
   iii. ESB WTP: (i) Submit a copy of the UV validation certificate for the Berson InLine 450+ USEPA UV reactor unit at ESB WTP; (ii) confim protozoal compliance log treatment provided by the WTP; (iii) list the UV alarm and shutdown setpoints; and (iv) confirm alarm setpoints meet the UV validation criteria and trigger automatic shutdown if the UV unit operates outside its validated range;
   iv. Lisreevagh WTP: Provide (i) the WTP's target dose (mJ/cm2) for BH2's UV unit: Aquaray SLP DW 250-150-4W; (ii) supporting evidence verifying the UVI and UVT alarm settings chosen for max. flow of 72 m3/hour adhere to the UV validation criteria; (iii) an explaination as to why the alarm generation time delay differs between the UV units on BH2 and BH3;
   v. Review alarm and plant shutdown setpoints for critical parameters (for e.g. chlorine, UVT, flow) at ESB WTP and ensure they are consistent across all computerised systems and display screens at the plant;
   vi. Implement all findings of UÉ's Alarm and Inhibit Review.
3. Update and display at ESB WTP and Lisreevagh WTP the Uisce Éireann Incident Communications Response Guidance Form with site specific information including contacts for escalation and relevant trigger levels protecting critical processes at the water treatment plant.
4. (i) Put a documented procedure in place for responding to and escalating all alarms generated and incidents occurring at ESB WTP and Lisreevagh WTP. The procedure should clearly document corrective actions and set out delegation of responsibilities for operational and relief staff; (ii) ensure staff are trained on the procedure.
5. (i) Put a documented procedure in place for operators and contractors to check and sign-off that all alarms have been correctly re-set upon completion of any maintenance work at ESB WTP and Lisreevagh WTP; (ii) ensure staff are trained on the procedure.
6. Install a standby UV disinfection unit at ESB WTP and at Lisvreevagh WTP with automatic changeover in the event of failure of the duty UV unit to operate within its validated range.
7. Install automatic switchover between duty and standby chlorine dosing pumps at the ESB WTP.
8. Display calibration stickers clearly on all critical equipment such as pumps and monitors.
9. Investigate if pH correction is required at Lisreevagh WTP to ensure pH statutory limits are always met in the treated water.
10. Inform the EPA when the Carrowroe Reservoir is back in use following inspection and maintenance works.

Actions required by Uisce Éireann

During the audit, Uisce Éireann representatives were advised of the audit findings and that action must be taken by Uisce Éireann to address the issues raised.

Uisce Éireann should submit a report to the EPA on or before the above date detailing the actions taken and planned, with timescales, to close out the above recommendations.

The EPA advises that the findings and recommendations from this audit report should, where relevant, be addressed at other public water supplies.