Drinking Water Audit Report

County:	Co. Louth	**Date of Audit:**	05/02/2019
Plant(s) visited:	South Louth East Meath PWS (Staleen Water Treatment Plant) Scheme Code 2100PUB1019	**Date of issue of Audit Report:**	15/02/2019
		File Reference:	DW2019/40
		Auditors:	Ruth Barrington Michelle Minihan
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014), as amended*. • *The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)* • The recommendations in the previous EPA audit dated 01/12/2016.		

MAIN FINDINGS

i. **There was a failure of the disinfection system at Staleen Water Treatment Plant for approximately 8 hours on 30/01/2019, which resulted in inadequately disinfected water entering the public water supply.**
ii. **Irish Water should ensure that operational controls at Staleen Water Treatment Plant are suitable to address the power supply issues to the site in the interim until the power supply is upgraded as planned within the current contract. Suitable measures in this regard are the maintenance of a reliable uninterruptible power supply (UPS) and automatic shutdowns of the plant in the event of failure of critical treatment systems.**
iii. **Irish Water should review the alarm settings for the newly introduced plant shutdowns based on high and low chlorine residuals, to ensure that adequate primary disinfection of the water supply is achieved and the maximum levels of protection are in place for public health.**

1. INTRODUCTION

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 in response to the notification by Irish Water on 30/01/2019 of the failure of the disinfection system at Staleen Water Treatment Plant (WTP) in the early hours of 30/01/2019.

South Louth East Meath public water supply serves a population of approx. 58,000 across Counties Louth and Meath. The majority of the supply is treated at the Staleen Water Treatment Plant, but it is augmented by boreholes in parts of Co. Meath. The supply is on the EPA's Remedial Action List (RAL) due to elevated levels of trihalomethanes and poor turbidity removal, and Staleen WTP is being upgraded under the RAL action programme to enhance water quality. The contractor for the works, Murphy Process Engineering, is operating Staleen WTP on behalf of Irish Water. The upgrade is due to be complete in Quarter 2 of 2019.

The opening meeting commenced at 10.30 a.m. at Staleen Water Treatment Plant. The scope and purpose of the audit were outlined at the opening meeting. The audit process consisted of interviews with staff, review of records and observations made during an inspection of the treatment plant. The audits observations and recommendations are listed in Section 2 and 4 of this report.

The following were in attendance during the audit.

Representing Irish Water: Fran Glancy – Drinking Water Compliance Analyst Michael Cunniffe - Water Infrastructure Lead Representing RPS/ Murphy Process Engineering (Upgrade Works): Gerry Bracken - Project Resident Engineer (RPS) Danny Byrne – M&E Resident Engineer (RPS) Sean Devoy – Lab Manager (MPE) Andrew McCourt – O&M Plant Manager (MPE) Representing the Environmental Protection Agency: Ruth Barrington – Inspector Michelle Minihan – Senior Inspector

2. AUDIT OBSERVATIONS

The audit process is a random sample on a particular day of a facility's operation. Where an observation or recommendation against a particular issue has not been reported, this should not be construed to mean that this issue is fully addressed.

1.	**Incident Response** a. There was a temporary power outage at Staleen Water Treatment Plant at 01.15 a.m. on 30/01/2019. These power "blips" were described as occurring from time to time on-site but are normally accommodated within the plant operating procedures. However on this occasion, the Uninterruptable Power Supply (UPS) failed in conjunction with the power outage. This resulted in a failure of the SCADA dial out alarm for low chlorine levels, which should have been generated on the basis of the lack of power to the chlorine dose pumps. b. The UPS was reported as having been well within the expected lifespan for this equipment and the reason for its failure has not been established. c. The plant operators arrived on-site at 08.10 a.m. and having noted the SCADA was not online, restarted it. The treatment plant was still operating without chlorination at this time, as the ChlorGuard system, which is designed to alert and protect site personnel against gas leaks, also alarmed. The effect of a ChlorGuard alarm is to immediately shut down the chlorine cylinders as a health and safety protection measure. d. At the time of the incident, the plant inhibits did not include a shut down of raw water intake pumps in the event of chlorine gas cylinder shut down, with the effect that the treatment plant continued to put water into supply in the absence of any chlorination at the plant. e. The chlorine gas dosing was restored at Staleen WTP at 09.00 a.m. on 30/01/2019. f. It was known at the time dosing was restored that undisinfected water had entered the network. Attempts were made to minimise the impact of this by target dosing the Clear Water Tank 2 and the Donore reservoir with sodium hypochlorite, to maintain the level of residual chlorine above 0.1 mg/l. The other reservoirs on the supply located in both Louth and Meath have continuous booster chlorination in operation. g. The investigation of the impact of the incident, carried out by Irish Water and Louth and

	Meath County Councils, indicated that network chlorine residuals did not fall below 0.1 mg/l. The lowest levels (0.16 mg/l) detected were in the Duleek area which is served directly from Staleen WTP. These levels were established by means of the trends available from online chlorine monitors located in the network and by results of individual spot checks using hand held chlorine monitors. h. The auditors considered that primary disinfection was not demonstrated during the incident. A level of 0.1 mg/l within the network is recommended by the EPA as the minimum level to provide secondary disinfection and assist in preventing regrowth of microbiological species within the network. However, for this secondary protection to be effective, primary disinfection must be achieved first, with a minimum chlorine contact time (C_t) of 15 mg.min/litre. Under normal dosing conditions, C_t of 17 mg.min/litre was said to be available in the clearwater tanks. This could not have been achieved if a period of nearly 8 hours elapsed without any chlorine dosing at the WTP. i. One round of microbiological sampling in the network was carried out on 30/01/2019, with all results being clear. No further microbiological sampling was carried out as part of the assessment of the incident's impact, since the network chlorine residuals had returned to normal. The auditors considered that further microbiological sampling should have been carried out, in case the targeted dosing and secondary boosting of chlorine in some areas was masking the impact of inadequate primary disinfection.
2.	**Management and Control** a. Since the incident and previous to the audit, a new UPS was installed, the ChlorGuard batteries were replaced and three new WTP inhibits (shutdown scenarios) have been programmed, to safeguard the treatment capacity at the plant and mitigate against future power outages. b. The new WTP inhibits, which will result in a shutdown of raw water intake are set on (i) a ChlorGuard alarm activation, (ii) a high/high chlorine residual and (iii) a low/low chlorine residual in the clearwater tank. c. The planned upgrade works under the RAL action programme include the provision of a robust looped electrical mains supply and an emergency generator.

3. AUDITORS' COMMENTS

The audit team found that Staleen WTP operated for approximately 8 hours after the disinfection system failed on 30/01/2019, putting inadequately disinfected water into supply. While the response time to restore disinfection was unacceptably long, steps have been taken since the incident to minimise the risk of such failure recurring. It was also noted that the power supply to the WTP will be strengthened as part of the planned upgrade works under the RAL action programme. Irish Water should undertake a further review of the residual chlorine monitor alarm settings and the chlorine contact time for the highest risk area supplied directly from Staleen WTP.

4. RECOMMENDATIONS

Incident Response

1. Irish Water should review the alarm settings which activate the newly programmed shutdown of the raw water pumps based on low/low and high/high residual chlorine set-points. Appendix 2.1 of the EPA Disinfection Manual contains recommendations in relation to appropriate chlorine residual alarm settings. The chlorine concentrations for alarm settings should be selected having regard to the required concentration for achieving primary disinfection to the first connections in the Duleek network which are fed directly from Staleen WTP.

2. Irish Water should ensure that suitable checks are in place when the WTP is returned to service after an incident or planned shutdown, to ensure that critical treatment processes such as disinfection are operating as required.

3. Irish Water should define the minimum investigative monitoring to be carried out in the event of an incident at Staleen WTP. Such monitoring should in general be incident specific, but in the event of a failure of disinfection, a minimum of three rounds of microbiological sampling is recommended.

Management and Control

4. Irish Water should ensure that the power supply to the plant is strengthened as part of the upgrade works under the RAL action programme, with the installation of the planned looped power supply and emergency generator. In the interim, the continued operation of the new UPS should be a priority and any necessary maintenance on this to be carried out.

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 date 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 timeframe 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 File Reference Number in any future correspondence in relation to this Report.

Report prepared by:  **Date:** 15/02/2019

Ruth Barrington

Inspector