Drinking Water Audit Report

County:	Dublin City Council	**Date of Audit:**	30/01/2018
Plant(s) visited:	Varty Water Treatment Plant, Roundwood, Co. Wicklow Scheme Code 0700PUB1003	**Date of issue of Audit Report:**	31/01/2018
		File Reference:	DW2009/397
		Auditors:	Ms Aoife Loughnane Ms Ruth Barrington
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 EPA's Water Treatment Disinfection Manual and Drinking Water Advice Note No. 3.		

MAIN FINDINGS

i. **Unchlorinated water entered the Vartry Reservoir supply between 19.45 p.m. on 28/01/2018 and 08.30 a.m. on 29/01/2018 following the failure of the automatic chlorine switchover panel. The alarm response procedure was not followed correctly, leading to the chlorine alarm arising from the failure being dismissed as a false alarm.**

ii. **At the time of the audit, chlorine residual levels as measured by the online monitors were restored to normal concentrations. Sampling in the network was ongoing at the time of the audit to assess the impact of the disinfection failure. This sampling will determine when adequate disinfection is reinstated to all areas served by the Vartry Reservoir supply.**

iii. **The automatic chlorine switchover function was not operational at the time of the audit and should be reinstated without delay to ensure robust disinfection is provided at Vartry water treatment plant.**

iv. **The audit team found that under normal operations, the required equipment and procedures are in place to adequately monitor and verify the disinfection system at Vartry water treatment plant, and to provide alarms in the event of a disinfection incident. Irish Water should ensure these procedures are followed.**

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 of a failure in the disinfection system at Vartry Water Treatment Plant between 19.45 p.m. on 28/01/2018 and 08.30 a.m. on 29/01/2018, and the subsequent issuing of a precautionary Boil Water Notice to 65,000 consumers.

Treated water from Vartry Water Treatment Plant (WTP) is supplied to public water supplies serving approximately 200,000 people across North Wicklow and Dun Laoghaire Rathdown. In some of these

areas, reservoirs with additional disinfection are in place which were sufficient to maintain safe levels of disinfection of the drinking water even in this case of failure of the primary disinfection.

The Boil Water Notice covers areas served by Vartry WTP where a risk to public health was identified by Irish Water in consultation with the HSE due to inadequate disinfection affecting approx. 65,000 people within these areas. It was imposed initially on 29/01/2018 as a precautionary measure due to the failure of the disinfection system at the water treatment plant, and was confirmed on 30/01/2018 following failures of microbiological parameters (E. coli and coliform bacteria) in samples taken in the network on 29/01/2018.

Vartry Water Treatment Plant and its linked public water supplies are on the EPA's Remedial Action List. Planning permission has recently been granted for the construction of a new treatment plant due to be complete in 2020, and work has begun on a new pipeline to replace the existing Callow Hill Tunnel by early 2019.

The opening meeting commenced at 14.30 p.m. at Vartry 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 audit observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

Representing Irish Water:

Mr Andrew Boylan – Drinking Water Compliance Specialist
Mr Trevor Hennessy – A/SLA Lead (Water) Asset Operations

Representing Dublin City Council:
Mr Ned Fleming – Plant Engineer Dublin City Council
Mr Martin Hession – Water Services Dublin City Council
Mr Tom Kinirons – Water Services Dublin City Council

Representing the Environmental Protection Agency:

Ms Aoife Loughnane – Inspector
Ms Ruth Barrington – Inspector

Observer:
Mr Declan Murphy – HSE Environmental Health

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.	**Chlorine Disinfection Failure** a. Filtered water at Vartry WTP is disinfected with chlorine gas before entering supply. b. Two banks of chlorine drums provide duty and standby dosing capability at the plant. c. Switchover between the two banks can be achieved manually. As per EPA guidance, an automatic switchover panel is also in place to switch from one bank to the other in the event of the drums being emptied. d. The audit team was informed that on 28/01/2018 as the drums in Bank 2 became exhausted, the automatic switchover failed due to a fault on the auto switchover panel. This meant that no chlorine was being dosed into the water supply. e. A sequence of chlorine monitors are in place at the plant and in the network. These detect

	chlorine levels continuously and in the event of the chlorine residual concentration dropping, an alarm is generated. The first in the sequence of alarms, corresponding to the monitor at the plant, sounded as designed following the automatic switchover failure, and activated the out of hours alarm dial out facility. f. A documented alarm response procedure is in place at Vartry WTP which sets out the sequence of actions to be taken in the event of a chlorine alarm. The response in the case of this incident failed to take account of each of the required steps within this procedure, particularly the visual check that the chlorinator was operating satisfactorily. g. The first chlorine alarm on the inlet to the on-site reservoir was discounted as false, as was the second alarm on the chlorine monitor at the plant outlet. In reality the alarms indicated that the chorine levels were dropping below the minimum chlorine required to disinfect the water supply. h. On the morning of 29/01/2018 personnel arriving at the plant discovered that the chlorinators were not in operation and the switchover to Bank 1 of chlorine drums was completed manually, restoring chlorine dosing. The dose rate was increased to double the normal level until approximately 14.00 p.m. on 29/01/18. i. The audit team confirmed that chlorine dosing at the plant was fully restored and operating normally at the time of the audit. The online chlorine monitors were reading 1.169 mg/l at the inlet to the on-site reservoir, 0.7 mg/l at the plant outlet (chamber 7), and 0.6 mg/l at Callow Hill. j. The automatic switchover panel had not yet been brought back into service. It requires a replacement part not held in stock in Ireland to complete this, and the audit team was informed that this replacement part has been ordered. k. Each bank of chlorine drums generally lasts for 20 days, and as Bank 1 was brought into service on 29/01/2018, a switchover should not be immediately required. It is also noted that this switchover may be achieved manually within a precautionary time period and within normal working hours. l. The EPA's criteria for disinfection, as specified in Drinking Water Advice Note 3, will not be satisfied until the automatic switchover is reinstated.
2.	**Monitoring and Sampling Programme for treated water** a. A sampling programme has been established by Irish Water in consultation with the HSE, across the areas affected by the Boil Water Notice. The results of the sampling programme will inform the decision on when to lift the Boil Water Notice and will consider microbiological results as well as the presence of a required minimum chlorine residual throughout the network to establish a return to adequate disinfection. b. Results of the sampling programme are assessed by Irish Water and the HSE on a daily basis, with exceedances in parametric values being notified to the EPA, as required.
3.	**Management and Control** a. The daily water treatment plant check sheets were examined by the audit team. Other than the alarm response procedure, there is no specific template for plant operators to complete for out of hours response to prompt the procedure requirements in the event of an incident. b. The alarm procedure was not displayed prominently at the plant for easy access during an incident. c. The trends in chlorine residual levels are available on the SCADA system at the plant and were examined as part of the audit. The response centre which handles the alarm calls is Dublin City Council's 24-hour traffic centre, and does not have access to these trends or the reason for the alarms, and Irish Water cannot access the trends remotely either.

3. AUDITORS' COMMENTS

The audit team found that the equipment and procedures are in place at Vartry water treatment plant during normal operations to adequately monitor and verify the disinfection system, and to provide alarms in the event of an incident.

The EPA is concerned that a failure to follow the alarm response procedure during this incident resulted in a mechanical breakdown escalating to a Boil Water Notice being imposed on the drinking water supply to 65,000 people. Irish Water should act to restore the function of the automatic chlorine switchover, and ensure that procedures are followed. Irish Water is advised to set up remote access to the trends and alarms on the disinfection system at the plant, particularly given the size of the population served by the Vartry Reservoir supply.

4. RECOMMENDATIONS

Incident Response

1. Irish Water should ensure that the alarm response procedure is reviewed and acted on to provide:
   (i) refresher training including emergency drills;
   (ii) signage at the plant in suitable locations to highlight the key checks in the event of a chlorine alarm; and
   (iii) A framework for decision making and escalation of an incident before an alarm is discounted as false.

2. Irish Water should ensure that the key checks from the alarm response procedure are incorporated into the daily check sheet/ out of hours response form.

3. Irish Water should establish 24-hour remote access to trends and alarms from the Vartry WTP. The feasibility of remote access through the Irish Water Control Centre should also be examined.

Disinfection

4. Irish Water should reinstate the automatic switchover facility between the duty and standby chlorine drums at the plant without delay. Consideration should be given to the availability of key disinfection and control equipment to avoid delays caused by the need to order in parts in the event of a breakdown of key equipment.

Monitoring and Sampling Programme

5. Irish Water should continue to keep the EPA informed of the progress of the sampling programme being undertaken under the Boil Water Notice, including the notification of any exccedances of the parametric values on ODWNS, and any decisions taken, in consultation with the HSE, on the duration or scope of the Boil Water Notice.

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 EPA within one week 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:** 31/01/2018

Ruth Barrington

Inspector