



Drinking Water Audit Report

County:	Kildare	Date of Audit:	06/07/2017
Plant visited:	Ardcarraig Clogherinkoe Water Treatment Plant (WTP) Scheme Code: 1400PUB1051	Date of issue of Audit Report:	14/07/2017
		File Reference:	DW2017/65
		Auditors:	Ms Pauline Gillard Ms Aoife Loughnane
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>. • The <i>EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)</i> • The recommendations specified in the <i>EPA Drinking Water Report</i>. • EPA Drinking Water Advice Notes No.s 1 to 15. 		

MAIN FINDINGS

- i. **The Ardcarraig Clogherinkoe public water supply became contaminated with *E.coli* on 15th June 2017 because the disinfection system at the water treatment plant is inadequate on the basis that it fails to meet the chlorination criteria set out in *EPA Drinking Water Advice Note 3: E coli in Drinking Water*. There is no chlorine alarm, no recording device on the chlorine monitor, no automatic switchover between the chlorine dosing pumps, and there is no network monitoring programme to check the residual chlorine levels in the distribution network.**
- ii. **The borehole source is poorly protected and the wellhead does not meet the design principles set out in *EPA Drinking Water Advice Note No. 14: Borehole Construction and Wellhead Protection*.**

1. INTRODUCTION

Under the *European Union (Drinking Water) Regulations 2014* 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 dated 16/06/17 of the failure to meet the *E.coli* parametric value (as specified on Table A of Part 1 of the Schedule of the Regulations) and the subsequent imposition of a boil water notice on the Ardcarraig Clogherinkoe public water supply.

The raw water is sourced from a borehole beside the water treatment plant. Treatment comprises of disinfection by chlorination. The treatment plant produces approximately 14 m³/day and serves a total population of 80 people the Ardcarraig Clogherinkoe supply area.

Photographs taken by Aoife Loughnane during the audit are attached to this report and are referred to in the text where relevant.

The opening meeting commenced at 10.30am at Ardcarraig Clogherinkoe WTP. 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:

Aoife Lambe - Drinking Water Compliance Analyst
 Aodhnait Ni Chathasaigh - Drinking Water Compliance Analyst
 Tselophile Tlou - Water Engineer

Representing Kildare County Council

Mark Flanagan - Area Engineer
 John Keena - Overseer

Representing HSE

Mary Gorby - Senior Environmental Health Officer

Representing the Environmental Protection Agency:

Pauline Gillard – Inspector
 Aoife Loughnane -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.	<p>Exceedances of the Parametric Values</p> <ol style="list-style-type: none"> a. On 16th June 2017 the EPA was notified of the detection of <i>E.coli</i> (1/100ml) and Coliform Bacteria (1414/100ml) in a check sample taken on 15th June at Clogherinkoe National School. Upon the advice of the HSE, a boil water notice was issued to the 80 consumers on this supply. b. The HSE has confirmed that three young children tested positive for campylobacter, possibly due to the contamination of the water supply. c. Investigations by Irish Water and Kildare County Council identified the cause of the <i>E.coli</i> and coliform exceedances as a failure of the disinfection system at the treatment plant due to a blockage of the chlorine injection lines, caused by limescale build-up. d. Neither Irish Water or Kildare County Council could confirm when the chlorine injection lines became blocked and how long undisinfected water had been entering into supply before the <i>E.coli</i> detection on 15th June. e. There is no chlorine alarm to alert the caretaker to low chlorine levels at the plant. f. The chlorine monitor is not linked to a recording device so it was not possible to detect a gradual decline in the chlorine levels as the injection pipes became blocked. g. Chlorine levels at the treatment plant are recorded daily in the plant logbook by the caretaker. However, the records around the time of the incident showed no drop in chlorine levels at the plant, which could not be explained by those present at the audit. h. Follow up sampling detected low chlorine levels and further coliform bacteria exceedances at other locations in the network. i. Since the contamination incident, Irish Water has replaced one of the chlorine injection pipes with a larger diameter pipeline, and installed a new hydrant towards the end of the network to allow flushing. Flushing of the distribution network has been carried out twice with a third round of flushing scheduled. j. Further microbiological sampling is due to be carried out in the network with a view to lifting the boil water notice, subject to HSE agreement.
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	<p>k. Irish Water has committed to upgrade the disinfection system at Ardcarraig Clogherinkoe by late July / early August, to ensure it meets the criteria in <i>EPA Drinking Water Advice Note 3: E. coli in Drinking Water</i>.</p>
<p>2.</p>	<p>Source Protection</p> <p>a. The source of the raw water is a borehole beside Ardcarraig Clogherinkoe WTP. The borehole is located below ground level in a concrete chamber with a lockable manhole lid (see photograph no. 1). The audit team observed that the borehole chamber was partly filled with water. There was water spraying from a hole in the elbow pipe which Kildare County Council stated will be replaced.</p> <p>b. The wellhead is poorly protected and does not meet the design principles set out in <i>EPA Drinking Water Advice Note No. 14: Borehole Construction and Wellhead Protection</i> (see photograph no. 2). The borehole has outer steel casing and inner plastic liner but there is no grouting in between. There is no drillers log or data available on the borehole construction but Kildare County Council estimated it is around 15-17 years old.</p> <p>c. The immediate catchment around the plant comprises of grassland and a housing estate. The area is not fenced around the borehole or the treatment plant. (See photograph no. 3.)</p> <p>d. The zone of contribution to the borehole has not been delineated. There are no septic tanks located in the immediate vicinity of the borehole, as all houses are connected to the public sewer. Kildare County Council confirmed that there is a Waste Water Treatment Plant (WWTP) serving the Clogherinkoe agglomeration located 200m down gradient of the borehole. The WWTP discharges to ground via a Puraflo system and Kildare County Council do not consider it a risk to the drinking water source. The land use around the borehole is predominantly grassland. Kildare County Council did not report any land spreading activities in the area</p> <p>e. Kildare County Council confirmed that landowners were written to three years ago by the Environment section to inform them of their obligations in relation to the requirements of the <i>European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014)</i>.</p> <p>f. The <i>Cryptosporidium</i> risk assessment score has not been completed for the Ardcarraig Clogherinkoe water supply.</p> <p>g. A Drinking Water Safety Plan is not yet in place for Ardcarraig Clogherinkoe public water supply.</p>
<p>3.</p>	<p>Disinfection</p> <p>a. The raw water is disinfected by chlorination using sodium hypochlorite 5% with softener. The chlorine dose is a fixed rate of 2L per hour and may be manually changed by the operator. There are three storage tanks which are used to achieve adequate chlorine contact time.</p> <p>b. The chlorine monitor was reading 0.49 mg/l during the audit.</p> <p>c. There is no chlorine alarm at the treatment plant.</p> <p>d. Duty and standby chlorine dosing pumps are installed at the plant but there is no automatic switchover between the pumps in the event of pump failure.</p> <p>e. The chlorine monitor is not linked to a recording device so that either a sudden increase in chlorine demand or a failure of the chlorine dosing system can be immediately detected. There is no online system to alert an appropriate person to allow an immediate response.</p> <p>f. Free residual chlorine levels are not checked in the distribution network by the caretaker.</p>
<p>4.</p>	<p>Management and Control</p> <p>a. Chlorine levels at the treatment plant are recorded daily in the plant logbook by the caretaker. The records around the time of the disinfection system failure on 15/06/17 showed no drop in chlorine levels at the plant. The caretaker was not present at the audit and Kildare County Council representatives could not explain why the records did not reflect a reduction in chlorine levels at the plant when the chlorine injection lines blocked.</p>

	<ul style="list-style-type: none"> b. There was no alarm response procedure at the plant. c. The Drinking Water returns data for the Ardcarraig Clogherinkoe PWS reported to the EPA via EDEN is incorrect, as it states that a chlorine alarm is in place and that chlorine dosing is flow proportional/residual based. d. There is another public water supply in Clogherinkoe (scheme code 1400PUB1012, groundwater borehole producing 8 m³/day and serving 40 people) which supplies a nearby housing estate. Irish Water stated that the disinfection system at that supply is also inadequate and they intend to decommission that supply and connect to Ardcarraig Clogherinkoe PWS once the disinfection upgrade has been completed.
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3. AUDITORS COMMENTS

The Ardcarraig Clogherinkoe public water supply became contaminated with *E.coli* on 15th June 2017 because the disinfection system at the water treatment plant is inadequate. There is no chlorine alarm to alert the caretaker to low chlorine levels in treated water. A blockage of the chlorine injection lines resulted in undisinfecting water being supplied to consumers. Neither Irish Water or Kildare County Council could confirm when the chlorine injection lines became blocked and how long undisinfecting water had been entering into supply before the *E.coli* detection on 15th June. The disinfection system needs to be upgraded as a priority to ensure it meets the chlorination criteria set out in *EPA Drinking Water Advice Note 3: E coli in Drinking Water*.

4. RECOMMENDATIONS

Source Protection

1. Irish Water should take action to ensure that the borehole source is made secure and fenced off to prevent livestock access.
2. Irish Water should ensure that the source protection and catchment risk assessment score for the *Cryptosporidium* risk assessment is reviewed in detail and appropriate measures implemented to reduce the risk.
3. Irish Water should ensure that hazard mitigation plans, with timeframes, are in place for all hazards identified as high risk in accordance with the Drinking Water Safety Plan approach to managing water supplies. Irish Water should provide information to the EPA on the projects that are highlighted through the statement of needs process for Ardcarraig Clogherinkoe PWS, and how these correspond with identified risks.
4. Irish Water should ensure that the wellhead is properly designed and completed and all borehole linings and seals are maintained in accordance with *EPA Advice Note No. 14: Borehole Construction and Wellhead Protection*.

Disinfection

5. Irish Water should ensure that the continuous chlorine residual monitor on the final water is alarmed and linked to a recording device to ensure that either a sudden increase in chlorine demand or a failure of the chlorine dosing system is immediately detected.
6. Irish Water should install a duty and standby chlorine dosing pump with automatic switch over in the event of the failure of one of the pumps.

Monitoring and Sampling Programmes for Treated Water

7. Irish Water should implement a monitoring programme in the distribution network in order to demonstrate adequate levels of residual chlorine in the distribution network at all times.

Management and Control

8. Irish Water should update the drinking water returns data in EDEN to ensure it is accurate.
9. Irish Water should put in place a documented procedure setting out the actions to be taken in response to plant alarms.

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.

A direction has issued by the Agency under a separate cover legally requiring specific recommendations to be implemented by Irish Water.

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:

14/07/2017

Pauline Gillard

14/07/2017

Inspector



Photograph No. 1: Borehole chamber located below ground level



Photograph No. 2: Poor wellhead protection and standing water in the borehole chamber



Photograph No. 3: No fencing around borehole or Water Treatment Plant.