



Drinking Water Audit Report

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| County: | Wicklow | Date of Audit: | 21 March 2014 |
| Plant(s) visited: | Knockananna | Date of issue of Audit Report: | 25 March 2014 |
| | | File Reference: | DW2014/160 |
| | | Auditors: | Mr. Darragh Page |
| 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 EPA Report on <i>The Provision and Quality of Drinking Water in Ireland</i>. • The recommendations in any previous audit reports. | | |

MAIN FINDINGS

- i. **The management of the disinfection system in the Knockananna PWS is inadequate as the levels of chlorine in the water supplied to consumers is regularly <0.1 mg/l. Irish Water should review the operation and management of the disinfection system and ensure that at least 0.1 mg/l free residual chlorine is present in the distribution network.**
- ii. **The documented procedure for response to chlorine alarms was not being implemented as there was no evidence of the required records when low levels alarms were activated. Such alarms appear to have regularly been activated based on the results of the chlorine monitor provided. Irish Water should ensure that the cause of the alarm activation and the actions taken are recorded to prevent future occurrences.**

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 20 March 2014 of the failure to meet the *E. coli* parametric value (as specified in Table A of Part 1 of the Schedule of the Regulations) in the Knockananna PWS.

The Knockananna PWS supplies approximately 28 m³/d to consumers in the village of Knockananna, Co Wicklow. There are two boreholes located in the centre of the village and to the north of the village. The latter is used as a backup supply in summer when water levels in the main borehole are low. Treatment consists of chlorination followed by pH correction for water from borehole 1 (village borehole) and filtration for iron and manganese removal for borehole no. 2 when in use. Water is then stored on site in a reservoir and distributed to consumers

The opening meeting commenced at 2.00 pm at the Knockananna PWS 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: (* indicates that person was also present for the closing meeting)

Tselophile Tlou – Water Engineer*, Irish Water

Larry Wolohan – Senior Executive Engineer*, Wicklow County Council

Tom Griffin – Senior Chemist*, Wicklow County Council

Noel Doody – Water Engineer, Wicklow County Council

Charlie Brennan – EPS*

Eamonn Walsh - EPS

Representing the Environmental Protection Agency:

Darragh Page - 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.

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| 1. | <p>Source Protection</p> <ul style="list-style-type: none"> a. The groundwater vulnerability is classified as extreme in the case of both boreholes. b. Borehole No.1 is surrounded by agricultural land used for sheep grazing. c. Borehole No.2 is located in the centre of the village and there is a very small allotment (3 plots) immediately adjacent to the borehole (<5 m distance). Wicklow County Council stated that there is a sewer for the village but was unable to say whether the property to the north of the borehole across the road was on the sewer or whether any pesticides had been used in or adjacent to the allotments. d. Borehole protection was good and the wellheads were raised and secure from surface water ingress, however the cap on Borehole No.1 was a loose plastic sheet and was not secure. e. No raw water sampling had been carried out. |
| 2. | <p>Chlorination and Disinfection</p> <ul style="list-style-type: none"> a. Disinfection is achieved by dosing sodium hypochlorite (14% solution which is diluted 1:10). b. Duty and standby dosing is in place which it was reported is switched every hour. The auto changeover was tested at the time of the audit by switching off the duty dosing pump. The standby pump immediately kicked in. c. There is a contact tank on site though no CT calculations were available at the time of the audit. However, there is 3 days storage in the reservoir indicating that there is adequate CT prior to supply to consumers. d. There is a chlorine monitor and alarm after the contact tank which is alarmed at 0.2 and 0.5 mg/l which is the range specified in the contract with EPS. A manual chlorine residual test is carried out at least weekly and compared to the chlorine monitor to determine if the monitor needs to be calibrated. e. A documented procedure outlining the actions to be taken when the chlorine alarm is activated was reviewed during the audit. The procedure stated that each alarm is to be recorded along with the cause. The records reviewed indicated that only one alarm was |

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| | <p>recorded since 2009, however EPS stated that there have been other alarm activations that were not recorded as per the procedure.</p> <p>f. The historical results from the chlorine monitor were not available at the time of the audit. However, they were forwarded to the EPA subsequent to the audit. The results for 2014 indicate that the chlorine levels were below the low alarm level of 0.2 mg/l 14% of the time (275 of the 1960 hourly results provided). A summary of alarms recorded in the daily log sheet for 2014 was forwarded to the EPA subsequent to the audit; however, it only contained details of six high level alarms and did not contain details of any low level alarms. Therefore, no records of the low level alarms was being maintained nor was there any explanation or corrective actions recorded in response to each of these alarm activations.</p> |
| <p>3.</p> | <p>Treated Water Storage</p> <p>a. The disinfected water is stored on site in a concrete reservoir which has approximately 3 days storage.</p> <p>b. The chlorine residual of the water leaving the reservoir is recorded on site and a sample of the results was reviewed. The results for 2014 indicate that low levels of chlorine were recorded in water exiting the reservoir on the following dates:</p> <ul style="list-style-type: none"> a. 0.05 mg/l on 24/1/14 b. 0.06 mg/l on 3/3/14 c. 0.02 mg/l on 10/3/14 d. 0.03 mg/l on 20/3/14 <p>c. Wicklow County Council explained that the dosing had previously been higher to ensure adequate residual but that the levels were reduced following complaints. WCC stated that levels had been raised following the failure.</p> |
| <p>4.</p> | <p>Exceedances of the Parametric Values</p> <p>a. A result of 3 <i>E. coli</i> was recorded in the Knockananna PWS on 18 March 2014 and was notified to the EPA on 20 March 2014.</p> <p>b. Wicklow County Council stated that follow up sampling had been undertaken and the results were clear though the actual results were not available at the time of the audit as they had just been reported by the laboratory. However, WCC stated that chlorine levels were still low.</p> |

3. AUDITORS COMMENTS

The management of the disinfection system is inadequate and the chlorine dose is not providing adequate chlorine residual in the network (i.e. at least 0.1 mg/l). This is likely to have been a contributory factor in the microbiological failure recorded. Furthermore, there was evidence that the documented procedure for response to chlorine alarm activations was not being followed as there were no records of any actions taken in response to the low chlorine alarm activations in 2014 to date.

A comprehensive review of the disinfection system and management of it should be undertaken.

4. RECOMMENDATIONS

Source Protection

1. Irish Water should carry out monitoring of the raw water sources and should include monitoring for *E. coli* bacteria, as an indicator of trends in assessing water quality and to determine the degree of treatment and controls required in the supply.
2. Irish Water should ensure that pesticides are not used in the vicinity of the abstraction points.

In particular, Irish Water should ensure that users of the allotment immediately adjacent to borehole no.1 are aware of this fact.

3. Irish Water should ensure that an appropriate cover is placed on the wellhead of borehole no.1 to prevent ingress.

Disinfection

4. Irish Water should carry out a review of the disinfection system and implement corrective action to ensure that there is at least 0.1 mg/l free residual chlorine at the extremities of the distribution network.
5. Irish Water should investigate the cause of the low level chlorine alarms in 2014 and ensure that corrective action is taken to prevent a reoccurrence.
6. Irish Water should ensure that any activations of the chlorine alarm are recorded and the cause of the activation and the associated corrective action is recorded in accordance with the documented procedures for the Knockananna water treatment plant.

Treated Water Storage

7. Irish Water should review the levels of chlorine in the reservoir to ensure that sufficient chlorine is present in the reservoir leaving that plant to ensure that there is at least 0.1 mg/l free residual chlorine at the extremities of the distribution network.

Exceedences of the Parametric Values

8. Irish Water should submit the results of resampling in the Knockananna PWS and notify the EPA as soon as the boil water notice is lifted.

Management and Control

9. Irish Water should review documented procedures at the plant and ensure that they are being followed.

FOLLOW-UP ACTIONS REQUIRED BY THE IRISH WATER

During the audit the Water Services Authority representatives were advised of the audit findings and that action must be taken as a priority by the Water Services Authority to address the issues raised. This report has been reviewed and approved by Ms Yvonne Doris, 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.

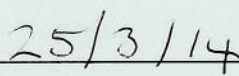
Please quote the File Reference Number in any future correspondence in relation to this Report.

**Report prepared
by:**


Darragh Page

Inspector

Date:


25 March 2014