



Drinking Water Audit Report

County:	Kilkenny	Date of Audit:	25/06/19
Plant visited:	Kilkenny (Troyswood) Scheme Code1500PUB1011	Date of issue of Audit Report:	26/07/19
		File References:	DW2019/87 and DW2014/322
		Auditor:	Regina Campbell
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>, as amended. • <i>The 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

- *Cryptosporidium* was detected in the final water leaving the Kilkenny (Troyswood) Water Treatment Plant on 30/04/19. Follow up sampling has been clear of further detections. In the days prior to the detection, the river was in flood and this led to slightly elevated turbidities of > 0.2 NTU in the filtered water on 28/04/19 and 29/04/19 which may have resulted in the *Cryptosporidium* breakthrough at the treatment plant.
- On the day of the audit, it was found that the online turbidity monitors on the individual filters and on the final water were not alarmed. Irish Water subsequently advised the EPA on 17/07/19 that turbidity alarms were now in place.

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. The focus of this audit was to assess the performance of Irish Water in providing clean and wholesome drinking water following the detection of *Cryptosporidium* in the Kilkenny (Troyswood) Public Water Supply (PWS) on the 30/04/19.

The supply is on the EPA's Remedial Action List since October 2017 for persistent exceedances of the pesticides parametric value (MCPA). A Direction was issued by the EPA on 14/11/2017 requiring Irish Water to take measures to comply with the pesticides parametric value of 0.1 µg/l as soon as possible and no later than 31/12/2019. These pesticide exceedances were not the subject of this audit.

The raw water for the supply is sourced from the River Nore. The volume of water produced is 5,797 m³/day which serves a population of approximately 13,822. The supply serves the eastern environs of Kilkenny City. Treatment at the plant includes coagulation, flocculation, clarification, filtration, disinfection and fluoridation.

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

The opening meeting commenced at 10.00am at the Kilkenny Troyswood 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.

<p>Representing Irish Water:</p> <p>Patrick Duggan - Compliance Specialist Catherine Rice – Compliance Analyst Colin Cunningham – Water Engineer</p> <p>Representing Kilkenny County Council:</p> <p>Damien Knox - Caretaker John Cleere - Supervisor Andrew Flood - E.E. Ken Boland - Operations S.E.E. Kevin Hogan - Technician</p> <p>Representing the Environmental Protection Agency:</p> <p>Regina Campbell - Inspector</p>
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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>Source Protection</p> <ul style="list-style-type: none"> a. The source of the supply is the River Nore. b. Kilkenny County Council outlined that relevant farmers have been notified of their responsibilities under the European Union (Good Agricultural Practice for Protection of Waters) Regulations 2017. c. Raw water is monitored continuously for the following parameters: UVT, turbidity, pH, colour and ammonia. There are alarms on colour and turbidity. On the day of the audit raw water pH was 8.24 and turbidity was 2.18 NTU. d. The <i>Cryptosporidium</i> Risk Assessment Score is 149 (Very High).
2.	<p>Coagulation, Flocculation and Clarification</p> <ul style="list-style-type: none"> a. pH correction using 30% sulphuric acid and coagulant dosing using 10% polyaluminium chloride (PAC) takes place on the rising main to the treatment plant. b. There are duty/standby pH and coagulant dosing pumps but no automatic switchover in the event of failure of the duty pump. Both sets of pumps are alarmed. Pumps are switched over manually every few weeks. c. The coagulant dose rate is adjusted manually based on colour and inflow. The dose on the day was 73 mg/l PAC. Jar testing is undertaken once every two weeks. d. Polyelectrolyte is used as a coagulant aid. Irish Water subsequently confirmed on 17/07/2019 that the the dose rate for polyelectrolyte is 0.2 mg/l. e. The sides of the coagulant mixing chamber were observed to have a large amount of algal build up on the walls. The caretaker said that the chamber is cleaned once per week. f. The water is then split into two streams and enters four flat-bottomed clarifiers (operating in pairs). g. Sludge bleeds take place on a timed basis (every 45 minutes for 5 minutes and every 38

	<p>minutes for 5 minutes).</p> <ul style="list-style-type: none"> h. The clarifiers were observed to have a build-up of algal growth on the walls and clumps of flocs/algae were collecting in the decanting channels (see Photo 1). The caretaker said that the decanting channels on the clarifiers are washed once per week and the clarifiers are cleaned once per year. i. There is no online turbidity monitoring of the settled water. j. Daily aluminium testing of the final water is undertaken at the plant and results are recorded in the daily logbook. Results viewed for April, May and June were satisfactory.
3.	<p>Filtration</p> <ul style="list-style-type: none"> a. Three rapid gravity filters are in operation at the plant. b. Large clumps of flocs/algae were observed floating on all three filters (see Photo 2). The caretaker said that the filters are power-washed every 2-3 weeks to clean them. c. There is no media depth gauge on any of the filters. Kilkenny County Council staff said that the media depth was 800 mm but this could not be verified during the audit. d. Each filter is backwashed every 72 hours on rotation. There is no backwashing based on turbidity or headloss. The backwash is run to waste. A backwash of Filter no. 2 was observed and no issues were noted. e. On the day of the audit, it was found that the online turbidity monitors on the individual filters and on the final water were not alarmed. Irish Water subsequently advised the EPA on 17/07/19 that turbidity alarms on each filter and on the final filter are now in place. f. Online turbidity readings noted at the audit were as follows: Filter 1, 0.09 NTU; Filter 2, 0.08 NTU; Filter 3, 0.09 NTU and final water 0.1 NTU. g. While it was possible to observe turbidity trends on the HMI panel, there was an IT issue on the day of the audit which meant that trends over a longer time period could not be viewed on the SCADA. Daily final turbidity readings are recorded in the daily log-book.
4.	<p>Disinfection</p> <ul style="list-style-type: none"> a. Water is disinfected using chlorine gas. There are duty and standby chlorine injectors with automatic switchover in place. b. Dosing is based on residual chlorine levels and the target level is 1.1mg/l leaving the reservoir. High and low chlorine level alarms are in place. c. On the day of the audit, residual chlorine levels at the reservoir and leaving the plant were satisfactory.
5.	<p>Fluoridation</p> <ul style="list-style-type: none"> a. Fluorosilic acid (10.9 %) is stored in a bulk storage tank and made up as required in the fluoridation room. b. Duty and standby dosing pumps are provided but there is no automatic switchover.
6.	<p>Treated Water Storage and Distribution Network</p> <ul style="list-style-type: none"> a. The main reservoir for the site is Thornbrack reservoir (6,800 m³ storage). It is double-celled and was cleaned and refurbished in October 2018. It was not visited as part of this audit.
7.	<p>Monitoring and Sampling Programme for treated water</p> <ul style="list-style-type: none"> a. Residual chlorine monitoring is undertaken in the network several times a week. Results reviewed were satisfactory.
8.	<p>Exceedances of the Parametric Values</p> <ul style="list-style-type: none"> a. The EPA was notified of a detection of <i>Cryptosporidium</i> in the treated water in a sample taken on the 30/04/19 at the plant. The river was in flood on the 27-28/04/19. The final water turbidity was reported to be 0.3 NTU on 28/04/19 and 0.22 NTU on 29/04/19. Individual turbidities on each filter ranged between 0.24 and 0.37 NTU on 28/04/19. Final water turbidity dropped to <0.2 NTU on 30/04/19. Residual chlorine levels were satisfactory over the time period in question. Daily turbidity results recorded in the daily log book for the months of

	<p>April, May and to date in June were reviewed at the audit. On a few occasions final water turbidity was noted as > 0.2 NTU (0.24 NTU on 5th June, 0.23 NTU on 7th June, 0.22 NTU on 8th June and 0.21 NTU on 9th June). Trend graphs of continuous turbidity readings could not be viewed as the SCADA was not operational on the day of the audit.</p> <p>b. This supply is on the EPA's Remedial Action List since October 2017 for persistent exceedances of the pesticides parametric value. A Direction under Regulation 16(1) was issued on 14/11/2017 which requires Irish Water to comply with the pesticides parametric value of 0.1 µg/l as soon as possible and not later than 31/12/2019. There have been no pesticide exceedances reported in the supply since 23/08/2017.</p>
<p>9.</p>	<p>Management and Control</p> <p>a. The plant is in operation for 22 hours/day and is manned for 8 hours/day. There are two people on the cascade system for responding to alarms; the caretaker and the supervisor.</p> <p>b. All monitors inspected were labelled with calibration/service dates.</p> <p>c. The treatment plant is due to be upgraded, subject to the granting of planning permission, and this will allow further infrastructural and operational improvements to be made.</p>

3. AUDITORS COMMENTS

Cryptosporidium was detected in the Kilkenny (Troyswood) Public Water Supply on 30/04/19. Resampling to date has been clear. The detection may have been caused by heavy rain impacting raw water quality which in turn impacted filter performance and may have resulted in *Cryptosporidium* breakthrough at the plant. Turbidities returned to normal following the heavy rain.

It was found that Irish Water could improve the control of the treatment process by the installation of alarms on the online turbidity monitors on the individual filters and combined final water.

4. RECOMMENDATIONS

General

1. Irish Water should submit details of the upgrades, with timeframes, proposed for the water treatment plant.

Coagulation, Flocculation and Clarification

2. Irish Water should investigate the feasibility of installation of automatic control of coagulant dosing processes in response to variations in raw water quality.
3. Irish Water should investigate the feasibility of installing online continuous turbidity monitors on the settled water in order to allow better operational control of the clarification processes.

Filtration

4. Irish Water should provide details of the alarms (including time delays) on the continuous turbidity monitors on each filter and the final treated water at the water treatment plant. The alarms should be triggered in the event of a deviation from the acceptable operating range of the filters. Irish Water should ensure that there is a procedure in place for responding to the turbidity alarms.
5. Irish Water should provide the SCADA trend for the turbidity monitoring of each individual filter and combined filtered water for the period 27/04/2019 to 01/05/2019. Any gaps, dips and spikes in the trends should be explained.
6. Irish Water should ensure that a filter media depth gauge is installed, or a procedure be put in place for regular measurement and recording of the depth of the filter media present.

Management and Control

7. Irish Water should confirm that the SCADA system is operational at the plant and that trends

are available for the plant operators to review to ensure adequate control and assessment of treatment processes.

8. Irish Water should install automatic changeover of the pH, coagulant and fluoride dosing pumps in the event of the failure of the duty pump.
9. Irish Water should investigate adding additional staff to the cascade system for responding to alarms and ensuring a timely response.
10. Irish Water should ensure that the CFC tanks (including settled water outlet channels) and filtration tanks are cleaned on a regular basis to prevent the build-up of algae and any subsequent impacts on treatment processes.

Monitoring and Sampling Programmes for Treated Water

11. Monitoring for *Cryptosporidium* should continue in line with Irish Water's Rationale in Determining Cryptosporidium Monitoring in Public Water Supplies.

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 Dr. Michelle Minihan, Senior Inspector.

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:

Regina Campbell

Date:

26/07/2019

Regina Campbell

Inspector

Photo 1: Flocs/algae collecting in decanting channel of clarifier



Photo 2: Algae floating on a filter

