Drinking Water Audit Report

County:	Wexford	**Date of Audit:**	15th June 2015
Plant(s) visited:	Bunclody Water Treatment Plant (3300PUB1425)	**Date of issue of Audit Report:**	26th June 2015
		File Reference:	DW2015/89
		Auditors:	Ms Michelle Roche
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014).* • *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 specified in the EPA *Drinking Water Report*. • The recommendations outlined in the previous audit report issued on 5th November 2013.		

MAIN FINDINGS

i. **Genotyping of *Cryptosporidium* detected in the treated water from the Bunclody Water Treatment Plant should be completed as an immediate priority in order for the risks to the community to be fully evaluated.**
ii. **Source protection through catchment management should be implemented as a priority. The catchments relevant to both the surface water and groundwater sources are largely agricultural based however no farm inspections or letters of notification to landowners regarding their responsibilities under the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014* have been carried out.**
iii. **The management of plant processes should be optimised to reduce the amount of manual adjustment required. Automated dosing systems feeding back to relevant online monitors should be installed where possible to provide an instantaneous and consistent response to parametric changes at the plant.**

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 8th June 2015 of the detection of *Cryptosporidium* in the final water leaving the Bunclody WTP.

The Bunclody Public Water Supply supplies a population of 1,800 people in Bunclody, Co. Wexford, and an additional 490 people across the border in Carrigduff, Co. Carlow. The supply is sourced from two surface water sources, the Craan River and the Deerpark Stream and is supplemented by four boreholes located in a nearby golf course. The surface water sources supply 60% of the total supply and the remaining 40% that is supplied from the boreholes is mixed with treated surface water post filtration. The following water treatment processes are currently in place at the plant:

- Coagulation with Polyaluminium Chloride
- Clarification and Filtration (Trident Package Plant)

- Chlorination
- Fluoridation

Cryptosporidium of the order of 8 oocysts (0.1/10L) was detected in the final filtered water from a sample collected on 3rd June 2015 as part of a scheduled compliance monitoring event. Genotyping of the *Cryptosporidium* oocysts has been requested; however no results were available at the time of issuing the audit report. No incidents of Cryptosporidiosis in the community were notified at the time of issuing the audit report.

The opening meeting commenced at 11.00am at Bunclody 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: (* indicates that person was also present for the closing meeting)
Ms. Deirdre O'Loughlin – Water Compliance Analyst, Irish Water*
Ms. Catherine Rice – Water Compliance Analyst, Irish Water*
Mr. Jim Fitzgerald – Regional SLA Lead*
Mr. Paul Delahunty – Quality Engineer, Wexford County Council*
Mr. Tadhg O'Corcora – Senior Executive Engineer, Enniscorthy Municipal District*
Mr. Michael Murphy – Caretaker*
Representing the Environmental Protection Agency:
Ms. Ruth Barrington – Inspector*
Ms. Michelle Roche – 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.	**Source Protection** a. The surface water abstraction points on the River Crann and Deerpark Stream were fenced off and made secure in 2013 in response to the previous EPA audit. b. No other source protection work related to the either of the surface water sources has been carried out, such as; farm inspections, septic tank inspections, fencing work upstream of the abstraction points, writing to landowners to make them aware of their obligations under the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014),* etc. c. A Source Protection Zone Delineation report was completed for the four groundwater boreholes in 2009 and provided to the Agency following the audit. None of the recommendations of the 2009 report appear to have been implemented. d. Raw water colour, turbidity and pH monitors with links to SCADA are fitted at both surface water sources. No alarms or automatic shutdowns are currently set on any of the raw water monitors. e. Two surface water delivery lines from the River Craan and one line from the Deerpark Stream deliver water from the abstractions points to a sump at the WTP where both

	surface water sources are mixed before being treated.
2.	**Coagulation, Flocculation and Clarification** a. Mixed surface water is treated with a 10% solution of Polyaluminium Chloride (PAC) prior to entering the Trident package plant for clarification and filtration. A static mixer is in place after the addition of PAC and before the clarification point. b. The coagulant dose is manually adjusted by the caretaker based on raw water colour and turbidity and final water aluminium readings. The coagulant dose requires adjustment in response to heavy rainfall. c. A plastic media is used in the clarification process to assist with the removal of colour.
3.	**Filtration** a. Filtration occurs in the Trident Package Plant, which is located indoors. b. Filter media consists of silica sand and minimum levels of anthracite, which the manufacturer states is required for optimal running of the filter. The filter media was last topped up in 2013. c. A backwash of the filter occurs every 8 hours or can be manually triggered. A filter backwash was observed during the audit. The backwash was observed to have an even air scour and cleared satisfactorily. d. The filter is run to waste for 15 minutes following backwash. e. A turbidity monitor with links to SCADA is located after the filter and was reading 0.046 NTU at the time of the audit. This reading was recorded following the filter backwash. f. The turbidity monitor on the final filtered water is set with a high alarm of 0.9 NTU and a high high alarm of 1.25 NTU, which triggers a plant shut-down.
4.	**Chlorination and Disinfection** a. Three separate chlorine dosing systems are in operation at the Bunclody WTP. The first system doses the groundwater component, the second system provides chlorine boosting on a 5 inch cast iron main leaving the reservoir and the third system provides chlorine boosting on an 8 inch HDPE main leaving the reservoir. Automatic changeover for chlorine dosing is only provided for the groundwater component and not for the two distribution lines. b. Contact time calculations for each distribution pipeline before the first connection were submitted following the audit and ranged from 35.7mg.min/l to 21mg.min/l. c. Chlorine residuals at the end of the network are taken by the caretaker on a weekly basis. Chlorine residual records were viewed during the audit and all recordings were above 0.1mg/l. d. Both distribution lines leaving the reservoir are fitted with chlorine monitors with links to SCADA. The chlorine monitors are set with a low alarm of 0.2mg/l and a high alarm of 1.1 mg/l.
5.	**Treated Water Storage and Distribution Network** a. Treated water is stored in an overland reservoir before being delivered via two separate distribution networks to the Bunclody area in Co. Wexford and Carrigduff in Co. Carlow.
6.	**Monitoring and Sampling Programme for treated water** a. An annual monitoring programme of five *Cryptosporidium* samples over the course of each spring/summer period has been in place since 2013. The detection of *Cryptosporidium* on 3rd June 2015 was the first detection since monitoring began. b. Following the initial detection on 3rd June 2015, Irish Water initiated a Sampling Action Plan to include *Cryptosporidium* sampling three days a week on raw and treated water for a minimum of three weeks. At the time of the audit, the route for *Cryptosporidium*

	contamination had been narrowed down to one of the surface water sources but it was not known whether it was Craan River, Deerpark Stream or both. c. Treated water sample results submitted to the Agency by Irish Water from samples lifted on dates between the 9th to 17th June range from 1 to 9 oocysts. A sample of blended raw water of 17th June had a result of 70 oocysts. d. According to Irish Water it had not been possible to type the oocysts at the time of the audit. Further detections since the day of the audit had not been typed either, while the reason for this does not appear to have been established.
7.	**Management and Control** a. The operation of the Bunclody Water Treatment Plant is triggered by water levels at the reservoir between the hours of 7am to 7pm. Outside of these hours the plant does not operate. b. A cascade system consisting of 5 people is in place to respond to all plant alarms. A call out sheet (for out of hours calls) or plant service sheet is filled in and maintained on site and in the Wexford County Council offices following every alarm response. c. The SCADA data recording system at the Bunclody WTP was shut-down from 30th May to 2nd June 2015 due to a power surge at the central information centre at Mayglass. Several water treatment plants in the Wexford region were affected, including Bunclody. The SCADA link was unreliable (flatlining) until 4th June. d. An Uninterruptable Power Supply (UPS) system has been installed at Mayglass since the breakdown, to protect against future power surges and the SCADA system itself at the Bunclody WTP is now alarmed in the event of failure. e. As a result of the loss of SCADA at the time of the *Cryptosporidium* detection no plant alarms were activated to notify the caretaker of any issues with final water turbidity readings.

3. AUDITORS' COMMENTS

Cryptosporidium was initially detected in the treated water at the Bunclody Water Treatment Plant on 3rd June 2015. Subsequent treated water samples have also detected *Cryptosporidium* oocysts. Genotyping of these oocysts has not yet been completed and this action should be finalised as an immediate priority. Catchment management activities should be initiated as a priority to improve the protection of both the surface water and groundwater sources to the Bunclody Water Supply and reduce the risk of *Cryptosporidium* entering the supply. A Source Protection Zone Delineation report was produced in 2009 for the four groundwater wells, however this does not appear to have been utilised and none of the recommendations of the report appear to have been implemented. No investigations or inspections have been carried out in relation to the surface water sources since the detection of *Cryptosporidium*. Plant processes should be optimised with the aim of reducing the amount of manual adjustment required to effectively operate the plant.

4. RECOMMENDATIONS

Source Protection

1. Irish Water should take steps to ensure that the potential source(s) of *Cryptosporidium* are investigated in the surface water catchment, and that appropriately authorised staff resources are made available to carry out this work as a matter of urgency. Recommendation No. 2 below should inform the focus of the investigations.

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 liaise with the relevant local authority in relation to the requirements of the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI*

No.31 of 2014) to ensure, unless an alternative setback distance has been set as per Article 17 that:

i. Organic fertiliser or soiled water is not applied to land within 200 m of the abstraction points; and
ii. Farmyard manure held in a field prior to landspreading is not placed within 250 m of the abstraction points.

4. Irish Water should liaise with the River Basin District team responsible for implementing the Water Framework Directive and establish links with the Environment Sections in relevant local authorities in the catchment to ensure that they are aware of the issues potentially impacting on the raw water abstraction point.

5. Irish Water should review the alarm settings on the turbidity and ammonia meters to alert plant operators of any changes in raw water quality.

Coagulation, Flocculation and Clarification

6. Irish Water should optimise the coagulation / flocculation processes at the water treatment plant having regard to the findings of the recent compliance review inspection carried out by Irish Water process optimisation personnel. This process should also refer to EPA Advice Note 15: Optimisation of Chemical Coagulation Dosing at Water Treatment Works available online at http://www.epa.ie/pubs/advice/drinkingwater/dwadvicenote15.html.

Disinfection

7. Irish Water should ensure that automatic changeover of chlorine dosing pumps is installed at all chlorine dosing locations as outlined in EPA Advice Note 3: E-coli in Drinking Water.

Monitoring and Sampling Programmes for Treated Water

8. Irish Water should ensure that sampling for *Cryptosporidium* in the raw and treated water, in addition to the other parameters outlined in the Sampling Action Plan, continues until such time as the Health Service Executive (HSE) agree that the risk of a *Cryptosporidiosis* outbreak in the community has diminished. This sampling should be designed to narrow down the source of the contamination.

9. Irish Water should ensure that genotyping of the *Cryptosporidium* oocysts detected occurs as soon as possible, and is communicated to the HSE, in order for Irish Water and the HSE to better evaluate the risks.

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 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.

Report prepared by: _____ **Date:** 26th June 2015

Inspector