# Drinking Water Audit Report

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| **County:** | Wexford | **Date of Audit:** | 15th June 2015 |
| **Plant(s) visited:** | Gorey (Creagh) Water Treatment Plant (3300PUB1512) | **Date of issue of Audit Report:** | 13th July 2015 |
| | | **File Reference:** | DW2015/88 |
| | | **Auditors:** | Ms Michelle Roche<br>Ms Ruth Barrington |
| **Audit Criteria:** | • The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014).*<br>• *The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)*<br>• The recommendations specified in the EPA *Drinking Water Report*.<br>• The recommendations in the previous audit report (DW2009/30 - 04/03/2009) | | |

**MAIN FINDINGS**

i. **Control monitoring on aspects of the treatment process is inadequate. Each slow sand filter should be fitted with individual turbidity monitors and the data used to inform the treatment process.**
ii. **All monitors should be linked to a SCADA system and the existing SCADA system should be evaluated to ensure that it is operating correctly, with robust measures put in place to protect against failure of the system.**
iii. **Disinfection should be optimised to ensure that all measures outlined in the EPA Disinfection Manual and *EPA Drinking Water Advice Note No. 3: E-coli in Drinking Water* are complied with. Chlorine gas dosing at the plant is currently not flow proportional and is manually adjusted by the caretaker based on chlorine residuals leaving the reservoir.**

## 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 Creagh Water Treatment Plant (WTP) on the Gorey Regional Public Water Supply (PWS).

The Gorey Regional PWS is supplied from two surface water sources treated at the Creagh WTP, and eight boreholes located across four separate sites. This audit report focuses solely on the surface water sources and treatment at the Creagh WTP. The Creagh WTP treats approximately one quarter (2,500m-3/day) of the Gorey Regional PWS total supply sourced from the Kilmichael and Pallis abstraction points on the River Bann. Approximately 4,500 people are supplied from the Creagh WTP. The following treatment is currently in place at the plant:

- pH correction with Caustic Soda

- Coagulation with Polyaluminium Chloride
- Dissolved Air Filtration
- Slow Sand Filtration
- Chlorination with Chlorine gas
- Fluoridation

*Cryptosporidium* of the order of 3 oocysts (0.002/10L) was detected in a sample of final filtered water 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 15.20 p.m. at Creagh 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 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. Tony Quirke – Area Engineer, Wexford County Council*
Mr. Terry Moore – Supervisor, Wexford County Council*
Mr. Eugene Doyle - 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.*

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| **1.** | **Source Protection**<br>a. The Pallis abstraction point is located approximately 13 miles upstream of the WTP and the raw water is fed through three settlement tanks before being piped to the treatment plant. The abstraction point is fenced off for 200m up and downstream.<br>b. The Pallis catchment is predominately forestry and no potential sources of agricultural or septic tanks contamination are known.<br>c. The Kilmichael abstraction point is located approximately 2 miles downstream of the Pallis intake and is also fenced around the abstraction point. |

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| | d. The Kilmichael catchment includes a number of private septic tanks and animal grazing activities are present.<br>e. Both abstraction intakes are fitted with turbidity, ammonia and pH monitors with links to SCADA. On-line raw water data could not be viewed during the audit as the SCADA system was not operating correctly at the time. It has also been notified since the audit that problems are being experienced with the raw water turbidity monitor.<br>f. Turbidity readings taken with a handheld turbidity monitor on the morning of the audit measured 0 NTU at Pallis and 2 NTU at Kilmichael. The handheld monitor is not capable of reading to decimal places.<br>g. No source protection work, other than fencing, has been carried out in respect of either surface water abstraction, such as; farm inspections, septic tank inspections or 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).<br>h. Cryptosporidium risk assessments have been carried out for both abstraction points. A risk assessment score of 66 (moderate risk) was derived for the Pallis intake and a risk assessment score of 88 (high risk) was derived for the Kilmichael intake. |
| **2.** | **Coagulation, Flocculation and Clarification**<br>a. All raw water abstracted from the Kilmichael source and 20% of the raw water abstracted from the Pallis source is treated in a Dissolved Air Flotation (DAF) unit. A turbidity monitor is located on the combined raw water inlet chamber which feeds the DAF; however the monitor was not reading correctly at the time of the audit.<br>b. Polyaluminium chloride is dosed on the DAF inlet using a duty and standby dosing pump arrangement with automatic switchover every 12 hours. |
| **3.** | **Filtration**<br>a. There are 9 slow sand filters (SSFs) at the Creagh WTP and each filter is cleaned approximately every 30 days.<br>b. The DAF unit is connected to 5 SSFs with 4 out of 5 filters in operation at any one time. Treated water from the DAF is evenly distributed to the 4 operational SSFs.<br>c. 80% of the raw water abstracted from the Pallis source is fed directly to the remaining 4 SSFs with 2 out of the 4 filters in operation at any one time and 1 additional filter brought in to operation in times of heavy rainfall.<br>d. No turbidity monitors are installed on the outlet of any of the SSFs. A combined final water turbidity monitor is located on the clear water tank. Final water turbidity trends could not be viewed during the audit as the SCADA system was not operating correctly.<br>e. Final water turbidity data was submitted after the audit; however readings were incorrect until 9th June as the probe was out of calibration. A calibration was performed on 9th June and final water turbidity readings from 9th to 19th June were below 0.1 NTU. |
| **4.** | **Chlorination and Disinfection**<br>a. Chlorine gas is dosed at the Creagh WTP after the SSFs and before the clear water tank. A duty and standby dosing system with automatic switchover is in place.<br>b. Chlorine gas dose is manually adjusted by the caretaker to receive a chlorine residual of 0.5 mg/l leaving the clear water tank.<br>c. The outlet on the clear water tank is fitted with a chlorine monitor that is set with a low level alarm of 0.3 mg/l and a high level alarm of 0.7 mg/l. Once the low level alarm is triggered the plant will also shut down.<br>d. Alarms are responded to using a cascade system that has been established throughout County Wexford in accordance with the *EPA Handbook on the Implementation of the Regulations for Water Service Authorities for Public Water Supplies*.<br>e. Chlorine residuals in the network are tested every 2 days. A chlorine residual of 0.24 mg/l was recorded at the end of the network, on the day of the audit.<br>f. It is planned to decommission the chlorine gas dosing system and install a sodium hypochlorite dosing system. A timeframe given for completion of this work is August 2015. |

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| **5.** | **Monitoring and Sampling Programme for treated water**<br>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 *Crytosporidium* on 3rd June 2015 was the first detection since monitoring began.<br>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.<br>c. No *Cryptosporidium* has been detected in the treated water at the Creagh WTP since 11th June 2015 or the raw water entering the Creagh WTP since 23rd June 2015.<br>d. It had not been possible to type any detected oocysts at the time of the audit and no genotyping results have been provided to the EPA since the audit. |
| **6.** | **Management and Control**<br>a. The SCADA telemetry system was unable to be viewed during the audit. However it was unclear if the issue was with the SCADA or the PC. |

## 3. AUDITORS' COMMENTS

Irish Water should improve control monitoring on aspects of the treatment process at the Creagh WTP. A number of failures of on-line monitors were noted during the audit, including raw water and final water turbidity monitors, and no control monitoring is in place on any of the individual slow sand filters. It was also noted that the SCADA system was not available to view during the audit. This should be investigated to ensure that the caretaker has constant access to on-line monitor recordings in order to run the plant effectively. The disinfection process should be optimised to ensure that flow proportional dosing and automatic feedback from residual chlorine levels are incorporated as per the guidance set out in the EPA's Disinfection Manual and *EPA Drinking Water Advice Note No. 3: E-coli in Drinking Water*.

*Cryptosporidium* was initially detected in the treated water at the Gorey Water Treatment Plant on 3rd June 2015. Subsequent treated water samples have also detected *Cryptosporidium* oocysts and while *Cryptosporidium* has not been detected in the raw water since 23rd June 2015 genotyping of the oocysts should still be carried out in order to inform the investigation should any incidence of Cryptosporidiosis occur in the community. No boil water notice is currently in place on the Gorey PWS.

## 4. RECOMMENDATIONS

### Source Protection

1. 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 point; and
    ii. Farmyard manure held in a field prior to landspreading is not placed within 250 m of the abstraction point.

2. 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. Irish Water should identify all potentially polluting discharges into the catchment of the water source and implement mitigation

measures, where appropriate, to reduce the potential impact of these discharges.

### Filtration (General)

3. Irish Water should install continuous turbidity monitors on each filter and the final treated water at the water treatment plant. These monitors should be linked to the SCADA system and generate an alarm to enable an appropriate response by the operators in the event of a deviation from the acceptable operating range of the filters.

### Disinfection

4. Irish Water should ensure that dosing of chlorine is flow proportional or is linked to the residual chlorine monitor. In the event that the chlorine dosing is changed from chlorine gas to sodium hypochlorite Irish Water should ensure that all measures outlined in the *EPA Drinking Water Advice Note No. 3: E-coli in Drinking Water* are complied with.

### Monitoring and Sampling Programmes for Treated Water

5. Irish Water should ensure that genotyping of the *Cryptosporidium* oocysts detected is carried out if possible and is communicated to the HSE in order to inform the investigation should any incidences of Cryptosporidiosis occur in the community.

### Management and Control

6. Irish Water should undertake an assessment of the adequacy of the current treatment system to remove or inactivate *Cryptosporidium* should it be present in the raw water. Where assessment of the treatment system finds inadequacies Irish Water should prepare an action plan to address these inadequacies.

7. Irish Water should ensure that the raw water turbidity monitor and the turbidity monitor on the intake to the DAF are working correctly and a regular check system is in place for these and all on-line monitors.

8. Irish Water should ensure that the SCADA system is operating correctly and that all data is recorded and viewable at the water treatment plant. Irish Water should ensure that the system is robust and measures are in place to protect against failure.

## 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:** 13th July 2015

Inspector