Drinking Water Audit Report

County:	Galway	**Date of Audit:**	9th May 2019
Plant(s) visited:	Oughterard WTP	**Date of issue of Audit Report:**	17th May 2019
		File Reference:	DW2019/51
		Auditors:	Ms Derval Devaney Mr Daryl Gunning
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014) as amended*. • *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*. • EPA Drinking Water Advice Notes No.s 1 to 15.		

MAIN FINDINGS

i. **An incident occurred at Oughterard Water Treatment Plant on Saturday 02/02/19 which resulted in operational difficulties with the clarification and filtration processes. An automatic shutdown of the treatment plant did not occur, and inadequately treated water entered the distribution network from approx. 4am - 6am & 10am - 2pm on 02/02/19. During this 6-hour period the effectiveness of the treatment plant's *Cryptosporidium* barrier and disinfection process was compromised.**

ii. **The communication of the incident to relevant persons and parties (Galway Co. Co., Irish Water, HSE, EPA) was not conducted appropriately or in a timely manner to enable an informed response to the incident and the protection of public health.**

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. This audit was carried out to assess the performance of Irish Water in providing clean and wholesome drinking water in Oughterard public water supply. Oughterard water treatment plant abstracts water from Lough Buffy and serves Oughterard public water supply (PWS) with approximately 2,429 m^3/day to approx. 5,564 consumers. Treatment at the plant consists of aeration, coagulation, flocculation, clarification, rapid gravity filtration, chlorination and fluoridation.

The opening meeting commenced at 10:30 am at Oughterard 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.

Representing Irish Water:

Pat O'Sullivan, Compliance Specialist

Thomas Gibbons, Compliance Analyst

Pat Collins, Compliance Analyst

Tim O'Connor Water Operations Lead

Representing Galway County Council:

Michael Timmons, Senior Engineer

Tony Kelly, Senior Executive Engineer

Jim O'Connell, Environmental Technician

Vincent McDonagh, Caretaker

Representing the Health Service Executive:

Séamus Mitchell – Environmental Health Officer, HSE West

Representing the Environmental Protection Agency:

Derval Devaney, Inspector

Daryl Gunning, 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.	**Poly Dose Incident** a. On 19/02/19 Irish Water notified the EPA of an aluminium failure in a compliance sample taken in the network on 06/02/19 (210 ug/l vs 200 ug/l parametric value). Galway Co. Co., operating on behalf of Irish Water, consulted with the HSE on 19/02/19 to request health advice relating to this aluminium failure. b. In response to the EPA's request for further information on the failure, on 27/02/19 Irish Water informed the EPA that the aluminium failure was a result of an incident that occurred at the plant on 02/02/19. The poly pumps operate on a toggle control, switching over automatically every 24 hours. The switchover occurred and the pump was running but was failing to dose. During the audit, it was stated that this caused the sludge blanket to rise and sludge to carry over from the clarifiers to the filters. At the time of the incident there was no final water turbidity alarm or shutdown nor was there a plant shutdown on a low chlorine concentration in the final water. The caretaker received a low chorine alarm by text on the morning of 02/02/19 and upon arriving on site that morning discovered a crack in the poly dose line resulting in a failure of the poly dose. The poly dose was rectified that morning and the chlorine dose was increased leaving the plant. c. SCADA data provided to the EPA by Irish Water on 11/03/19, showed that the plant continued to operate throughout the incident and delivered inadequately treated water to the network. Water with turbidity levels > 1 NTU entered the supply from approx. 4am – 6am & 10am- 2pm on 02/02/19. This meant the 1 NTU parametric value for turbidity in the final water was breached for 6 hours and the effectiveness of the disinfection at the plant was compromised during this period. d. The caretaker informed the Environmental Technician, Galway Co. Co. of the incident two

	days later, on Monday 04/02/19. It was stated during the audit that the delay in the caretaker notifying personnel in Galway Co. Co. was because there were no designated personnel to contact outside of normal business hours. There appeared to be no formal out of hours arrangements in place between Irish Water and Galway Co. Co. e. Irish Water only became aware of the incident when Galway Co. Co. responded to the EPA's request for further information on the aluminium failure that occurred on 06/02/19. f. Correspondence sent from the EPA to Irish Water on 04/03/19 and 11/03/19 referred to the need for the HSE to be informed of the incident in order for the HSE to make an informed decision regarding the risk to public health. On 09/04/19 Irish Water stated that "*the HSE were made aware of the issues at Oughterard at the Q1 Galway Compliance meeting held on the 28th March 2019 and no further advice was provided."* During the audit, the HSE representative stated that they were not made aware of the incident during that compliance meeting and only became aware that an incident had occurred during the EPA's telephone call to the HSE on 29/04/19 inviting the HSE to attend the EPA audit. g. Operational sampling was undertaken at the clear water tank on 04/02/19 but only THMFP and UVT was analysed. A routine compliance monitoring sample was taken in the network on 06/02/19 which had an aluminium failure of 210 ug/l. This failure was notified to the EPA on 19/02/19. It was this failure that eventually alerted the EPA and Irish Water to the incident at the plant on 02/02/19. Turbidity at tap was also elevated above normal network levels in the sample taken on 06/02/19 at 0.9 NTU. Coliform and *E coli* results, also taken as part of the sample, were provided during the audit and were compliant. h. A follow up aluminium sample taken at the previously failed location in the network on 25/02/19 was compliant. A routine monthly *Cryptosporidium* sample was taken at the plant on 28/02/19 and was compliant.
2.	**Clarification** a. During the audit pin floc was observed on the clarified water in both clarifiers. b. Irish Water stated that new pipework and the underdrains were refurbished recently and lamellae plates are to be installed in the 2 No. clarifiers which should address this issue. c. FLOPAM™ AN 909 SEP poly is being dosed at 0.12 mg/l and while technical data sheets were available on-site for the product, calculations for acrylamide concentrations in final water were not available during the audit.
3.	**Filtration** a. There are three rapid gravity filters at the plant. The filter sand media was last replaced in 2011. There was no sand depth indicator in the filters. b. A backwash was observed in Filter No. 1. Air scour was not as prominent on the left side of the filter next to the weir. c. Currently backwash is not automated and requires manual initiation. Air scour runs for 10 minutes; water is then passed through the filters for 8 minutes after which the filter is allowed to rest for 30 minutes.
4.	**Management and Control** a) Upgrade Works: Oughterard WTP is undergoing upgrade works and the following alarms and shutdowns are now in place since the incident: - Final water turbidity – alarms at 0.9 NTU and shutdowns that plant at 0.99 NTU; - Individual filter turbidity – alarms at 0.25 NTU and plant shutdown at high turbidity of 0.3 NTU; - Chlorine residual – low alarm at 0.6 mg/l (and plant shutdown at 0.5mg/l) and high alarm and plant shutdown at 1.9 mg/l; - Treated Water pH low alarm at 6.5 and plant shutdown at 5 pH and high alarm at 8.5 and plant shutdown at 9.

	Further alarms and plant shutdowns are proposed to be installed to allow for greater control of the treatment process, e.g. at the inlet pH monitoring point (following soda ash and aluminium sulphate dosing) to ensure pH remains within the set point range (pH 5.7 to 6.05), and a turbidity monitor with alarms and plant shutdown on the clarified water quality. Currently there is a 30-minute slow start on the filters following a backwash, as there is no run to waste facility. It was stated during the audit that run to waste pipework has been installed but has not been introduced as there is a restriction on the capacity of the backwash water tank. It was also stated Irish Water received complaints regarding the supernatant from the sludge press discharging to a nearby stream and that Inland Fisheries Ireland have highlighted their concerns on the impact of the discharge on the receiving waters. To address these issues, Irish Water propose to install a pilot clarifier to treat the backwash water with the intention, if successful, of returning the clarified water to the inlet of the water treatment works. Information on this pilot study only came to light during the audit. Irish water propose further upgrade works (as was outlined in Items 1 – 8 of the correspondence submitted to the EPA on 11/03/19) by the end of May 2019. These were discussed during the audit and it was stated that items 2, 5, 6, 7 and 8 have yet to be completed. Item 8 includes an upgrade to the disinfection process to conform with Irish Water Disinfection Specification. It was stated during the audit that the contractor is in the process of completing the works. The contractor was not on-site during the EPA's audit and specific detail on what the works entailed and progress with meeting the proposed timelines could not be provided. b) Contractual Works: Upon review of the daily log book, the auditors observed that on Bank Holiday Monday, 06/05/19 the clarified water pH rose to 8.1, and the clarified and final water turbidity increased above average to 0.54 NTU and 0.33 NTU respectively. The caretaker stated that contractors were working on the plant control panel settings on Friday 03/05/19 and failed to reinstate the pH set point controls on the inlet pH. This resulted in the soda ash being dosed above the pH set point of 6.05. The caretaker stated that the plant had shut down due to the 0.3 NTU turbidity shutdown on the filters. The HMI panel was adjusted on 06/05/19 by the caretaker to re-introduce the inlet pH set point range.
5.	**Protozoal Compliance** a. Monthly *Cryptosporidium* monitoring is being carried out at Oughterard WTP until such time as Irish Water can verify that sufficient protozoal compliance log credits are in place. *Cryptosporidium* results for 2018 and 2019 were provided during the audit and were compliant. b. Once the filter upgrade works are complete, Irish Water stated this should provide 3 log credits and it may provide an additional log credit for enhanced individual filtration if the filters can meet the 0.1 NTU criteria. However, if clarified water is to be recycled to the inlet of the works, this would have to be assessed in terms of meeting the log credits required.

3. AUDITORS COMMENTS

During the audit, it was evident that:

(i) Inadequately treated water continued to be delivered to the distribution network throughout the incident which occurred at the plant on 02/02/19, during which time the treatment plant's *Cryptosporidium* barrier and disinfection process were compromised;

(ii) The communication of the incident to relevant persons and parties (Galway Co. Co., Irish Water, HSE, EPA) was not conducted appropriately or in a timely manner to enable an informed response to the incident and the protection of public health;

(iii) There was a failure to take reactive sampling to include for aluminium, turbidity, chlorine residual, microbiological and *Cryptosporidium* in the network in the critical period following the incident.

(iv) Systems to ensure that the water treatment plant is returned to normal operations post upgrade works by external contractors are not in place, which represents a vulnerability in the safety and security of the water supply.

The audit found serious deficiencies in the operation and management of Oughterard water treatment plant. The recent upgrade works have addressed some of these issues (e.g. installation of plant alarms and shutdowns) and further works are proposed to improve the treatment process and control.

However, the lack of an out-of-hours incident response protocol, the failure to communicate and escalate the incident in a timely manner, and the lack of oversight of contractors during works on-site needs to be addressed as a matter of urgency to ensure the ongoing safety and security of the Oughterard public water supply.

4. RECOMMENDATIONS

1. Irish Water should ensure there is a documented communications protocol in place for the reporting of incidents which could potentially impact the quality of water produced at Oughterard water treatment plant, so the relevant persons and parties involved (e.g. Galway Co. Co., Irish Water, HSE, EPA) are alerted in a timely manner.

   Irish Water should ensure that relevant Water Services staff are trained in the protocol and relevant stakeholders are informed of the protocol and understand the instances in which the protocol is to be used.

2. During consultation with the HSE following an incident or exceedance of a parametric value, Irish Water should ensure that all relevant information is provided in a timely manner to allow the HSE to determine if the water supply presents a risk to public health, and if consumers need to be informed promptly thereof and given the necessary advice.

3. Irish Water should ensure that reactive sampling is undertaken in a timely manner in response to an incident which could affect the quality of water going into supply.

4. Irish Water should put in place a procedure to ensure treatment plant shutdowns and fail-safes are verified after any works have been carried out at Oughterard WTP.

5. Irish Water should:
   a) revise the treated water pH plant shutdown (currently set at 5 pH units) to ensure final water meets the parametric value of ≥ 6.5 and ≤ 9.5 pH units;
   b) carry out an investigation to identify the cause and prevent pin floc formation and floc carryover from the clarifier into the filters;
   c) assess the performance and depth of the filter media to establish if the sand media needs to be replaced and inspect the filter air and water nozzles and underdrainage to ensure effective and even scour during backwash as part of the upgrade works;
   d) ensure that acrylamide meets the drinking water parametric value of 0.1 ug/l by ensuring that the dose of polyelectrolytes is such that the average dose does not exceed 0.25 mg/l and no individual short-term dose of polyelectrolytes exceeds 0.5 mg/l. (cf Drinking Water Inspectorates List of Approved Products and Processes).

6. Irish Water should provide the following information in relation to upgrade works at Oughterard water treatment plant:

   a) details of the scope and timeframe for the planned upgrade works at the plant, including details on the installation of the run to waste facility following a filter backwash;
   b) details of the pilot project on the treatment of backwash water by clarification.

7. Irish Water should submit details of the Lough Buffy source water classification and log credit requirement and how the protozoal compliance log deficit is to be addressed at Oughterard water treatment plant.

   Please also include details of the effect the return of clarified backwash water to the inlet works may have on meeting protozoal compliance requirements for the water supply.

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.

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:** 17 May 2019

Derval Devaney

Inspector