Drinking Water Audit Report

County:	Galway	**Date of Audit:**	8th February 2016
Plants visited:	Loughrea PWS, scheme code 1200PUB1037 Lake Road & Knockanima treatment plants	**Date of issue of Audit Report:**	12th February 2016
		File Reference:	DW2016/29
		Auditors:	Aoife Loughnane
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 2014*.		

MAIN FINDINGS

i. **Loughrea public water supply provides treatment by pressure filtration and disinfection using chlorination, however this does not provide an adequate barrier to *Cryptosporidium* entering the water supply.**

ii. **A Boil Water Notice was issued on 01/02/2016 following the detection of *Cryptosporidium* in the treated water at both the Lake Road and Knockanima water treatment plants. Investigations are underway into the source of contamination, which may be linked to surcharging of the combined sewer along Lake Road during recent heavy rainfall.**

iii. **Irish Water has committed to the immediate upgrade of both treatment plants by installing UV disinfection systems which will provide a barrier to *Cryptosporidium* entering the water supply. These works are expected to be completed within 4 to 5 weeks.**

iv. **There is poor management and control of the filtration process at both treatment plants.**

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 on 02/02/2016 of the detection of *Cryptosporidium* in the treated water and the issuing of a boil water notice on Loughrea public water supply.

The source of Loughrea public water supply is Lough Rea, a spring fed lake. There are two abstraction points and two treatment plants; the Lake Road plant produces 65 m^3/hr and the Knockanima plant produces 115 m^3/hr. Both plants provide pressure filtration and disinfection using chlorination. The population served by the supply is 8,500, which includes a number of group water schemes.

The opening meeting commenced at 10:30 am at the Lake Road 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. Photographs taken by Aoife Loughnane during the audit are attached to this report and are referred to in the text where relevant. 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:

Anne Bonner, Drinking Water Compliance Specialist, Irish Water
Ger Greally, Operations & Maintenance, SLA Lead - North West Region, Irish Water
Diarmuid Croghan, Senior Engineer, Galway County Council
Adrian Raftery, Executive Engineer, Galway County Council
Tara Meehan, Technician, Galway County Council
Fintan Donnelly, Technician, Galway County Council
John Neilan, Caretaker, Galway County Council
Kevin Larkin, Caretaker, Galway County Council
Gerry Manning, Caretaker, Galway County Council

Representing the HSE:

Maurice Mulcahy, Regional Chief Environmental Health Officer
Shane Keane, Principal Environmental Health Officer
Paul Hickey, Senior Environmental Health Officer
Seamus Mitchell, Senior Environmental Health Officer

Representing the EPA:

Aoife Loughnane, 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.	***Cryptosporidium* - Investigations and actions** a. *Cryptosporidium* was detected in the treated water at both the Lake Road and Knockanima water treatment plants on 28/01/16. The level of detection was 18 oocysts in 1,228 litres (0.15 per 10L) at Knockanima and 5 oocysts in 1,341 litres (0.03 per 10L) at Lake Road. b. Following consultation with the HSE, Irish Water issued a Boil Water Notice on the Loughrea PWS on 01/02/2016. c. The source of the *Cryptosporidium* contamination has not been determined. Irish Water and Galway County Council (GCC) are carrying out investigations and provided the following update during the audit: • The results of genotyping of the sample taken on 28/01/16 are awaited. • Surcharging (as a result of recent heavy rainfall) of the combined sewer along Lake Road has been identified as a possible cause. GCC confirmed there are no direct sewer overflows/discharges from the waste water network into the lake. • Inspections of farms and septic tanks on lands surrounding the lake are due to be carried out but have been delayed by resource constraints within GCC and recent bad weather. • A toilet block at the lake bathing area has been examined and ruled out as the possible cause. d. The HSE has confirmed no recent spike in illness in the community. While two cases of *Cryptosporidium*/*Giardia* related illness have been identified in the locality, the HSE stated that they cannot be definitively linked to the public water supply. The HSE is monitoring the situation regarding public health. e. Irish Water is carrying out *Cryptosporidium* sampling of the final water at both plants twice a week (Mondays & Wednesdays) for the next 2 weeks, as agreed with the HSE. The samples taken on 03/02/16 were clear of any oocysts. f. Irish Water has committed to immediately installing UV disinfection systems at both treatment plants to provide a barrier to *Cryptosporidium* entering the water supply. The proposed timeframe for installation and commissioning of the UV systems is 4 to 5 weeks.

	g. UVT monitors were installed at both treatment plants in April 2015 and the results show that raw water UVT is in the range 70-80%. Irish Water stated that UVT improves by approximately 10% after pressure filtration. They confirmed that the proposed UV systems will be validated to 70% UVT and will ensure adequate disinfection of the water supply. h. Irish Water will carry out reservoir cleaning and flushing of the network once UV disinfection is in place, as agreed with the HSE. i. Irish Water identified that the long term plan is to decommission the current source and treatment plants at Loughrea and connect to Luimnagh Regional Water Supply in a timeframe of approximately 2 years.
2.	**Pressure Filtration** **<u>Lake Road Treatment Plant:</u>** a. There are 5 ODIS pressure filters, installed in 2013. There is no coagulation stage before these filters. During the audit the turbidity monitors showed an average 59% reduction in turbidity post-filtration: Raw water: 0.583 NTU Filter No. 1: 0.250 NTU Filter No. 2: 0.259 NTU Filter No. 3: 0.235 NTU Filter No. 4: 0.186 NTU Filter No. 5: 0.238 NTU b. There was evidence of loss of filter media, with sand visible on the floor of the filter room and outside on the ground beside the backwash pipework/manholes (see photos 1 & 2). The operators stated that the sand loss from the filters was caused by the backwash pressure being too high (12 months ago) and a recent problem with a filter valve (1 month ago). A contractor has carried out remedial works and checked the sand levels in the filters, however no evidence to this effect was provided during the audit. c. The filters are backwashed based on time (every 72 hours) or pressure differential, but not based on turbidity levels. The operators could not confirm if the filters are run to waste for an appropriate period of time or if there is a slow start when the filters are brought back into use. **<u>Knockanima Treatment Plant:</u>** d. There are 2 Culligan filters at the 'new' plant, installed in 2007, and 2 pressure filters at the 'old' plant, installed circa 1992. There is no coagulation stage before these filters. e. The filters are backwashed based on time (Culligan filters every 72 hours and other filters twice a week), but not based on turbidity levels or pressure differential. f. There are no turbidity monitors before or after these filters and the condition of the filter media is not known. g. The outlet pressure gauge on Culligan Filter No. 2 at the 'new' plant was not working (see photo 3) and there are no pressure control gauges on the filters at the 'old' plant. h. The operators could not confirm if the filters are run to waste for an appropriate period of time or if there is a slow start when the filters are brought back into use. i. The documented filter backwashing procedure for Knockanima plant identifies the need to open and close the 'E.E.P' valve very slowly. The operators did not know the meaning of the 'E.E.P' valve and displayed poor knowledge of filter management and control.
3.	**Disinfection: Chlorination** a. The chlorination systems at both Lake Road and Knockanima plants were upgraded in April 2015 as part of Irish Water's Disinfection Programme, to provide duty and standby sodium hypochlorite dosing pumps with automatic switchover and flow proportional dosing. b. The chlorine monitor on the treated water from the Lake Road plant is located on the rising main to Mount Pleasant reservoir, i.e., before adequate contact time has been achieved. There are no connections off the rising main. c. GCC confirmed that chlorine monitors are due to be installed at the two reservoirs in the near future.

4.	**Management and Control** a. During the audit, there was a lack of awareness among GCC Water Services personnel of plant performance and key treatment components. The operators displayed poor knowledge of filter management and control, as identified above under the 'Pressure Filtration' observations. b. The actions of Irish Water and GCC in response to the Boil Water Notice have been inadequate for the following reasons: • There has been insufficient investigation into the cause of the contamination and the *Cryptosporidium* source has not been determined. • No remedial works have been identified to protect the lake source from contamination. • The condition of the filters had not been investigated by the day of the audit, a week after the BWN was issued. c. Irish Water has identified that the population served by Loughrea PWS is actually 8,500 and not 6,104 as reported to the EPA in the 2014 drinking water monitoring returns data.

3. AUDITORS COMMENTS

Irish Water has committed to the immediate upgrade of both the Lake Road and Knockanima water treatment plants by installing UV disinfection systems which will provide a barrier to *Cryptosporidium* entering the water supply. These works are expected to be completed within 4 to 5 weeks from the date of the audit. The Boil Water Notice will remain in place until Irish Water demonstrates to the satisfaction of the EPA and the HSE that the proposed UV disinfection systems have been installed and are operating within their validated ranges at all times.

The audit found that there is poor management and control of the filtration process at both treatment plants and there was a lack of awareness concerning key treatment components of the plants. Irish Water needs to ensure that personnel operating water treatment plants are adequately trained and aware of the key plant performance indicators that are critical to the supply of safe and secure drinking water.

4. RECOMMENDATIONS

Source Protection

1. Irish Water, in conjunction with Galway County Council, should undertake the following source protection measures at Loughrea PWS without delay:

   (i) Investigate any problematic storm water overflows and incidences of surcharging from the sewer network into Lough Rea, and take appropriate remedial actions to reduce the risk of contamination of the lake source.

   (ii) Ensure that a programme of farm and septic tank inspections is undertaken in the zone of contribution, and follow up any failures with appropriate enforcement actions.

Disinfection

2. Irish Water should install a *Cryptosporidium* barrier on the Loughrea PWS as soon as possible in order to ensure the water supply is adequately disinfected at all times.

3. Irish Water should ensure that the proposed UV disinfection systems at Lake Road and Knockanima treatment plants are:

   (i) validated in accordance with an appropriate internationally accepted validation system;

   (ii) operated within their validated range at all times;

   (iii) installed in duty and standby arrangement with automatic changeover in the event of failure of one of the UV disinfection units;

   (iv) equipped with a continuous UVI or UVT monitor at the point of disinfection and this monitor should be alarmed and linked to a recording device to ensure that any deviation of the quality of water outside the validated range for the UV treatment system or a failure of the UV disinfection system is immediately detected.

4. Irish Water should submit the contact time calculations for chlorine disinfection to demonstrate that the effective contact time achieved is 15mg.min/l and that the first connections are receiving appropriately disinfected drinking water.

5. Irish Water should install continuous chlorine residual monitors at the two reservoirs and these monitors should be alarmed and linked to a recording device.

Filtration

6. Irish Water should ensure that all control gauges on the filters are maintained in working order.

7. Irish Water should install continuous turbidity monitors on each filter and the final treated water at both water treatment plants. These monitors should be linked to a recording device and generate an alarm in the event of a deviation from the acceptable operating range of the filters.

8. Irish Water should review the operation and condition (including sand depth) of the pressure filters in order to optimise the filtration process and ensure that the levels of turbidity in the filtered water are as low as possible. Following backwashing, the filters should be run to waste for an appropriate period of time, or there should be a slow start when the filters are brought back into use.

9. Irish Water should examine and report on the effectiveness of the filters in removing turbidity, using SCADA trended data in graph format.

Management and Control

10. Irish Water should ensure that personnel operating water treatment plants are adequately trained and aware of the key plant performance indicators that are critical to the supply of safe and secure drinking water.

11. Unless otherwise agreed by the HSE, Irish Water should continue to monitor for *Cryptosporidium* in the water supply twice weekly until the UV disinfection systems have been satisfactorily commissioned. If any *Cryptosporidium* oocysts are detected during the monitoring programme then Irish Water should immediately contact the HSE.

12. Irish Water should ensure that the reservoirs are inspected and cleaned out, and the distribution network is completely flushed as soon as possible after the UV disinfection systems have been satisfactorily commissioned.

13. Irish Water should ensure that the correct figures for population size and volume of water produced (m^3/day) are reported in EDEN for the 2015 drinking water monitoring returns data. Irish Water should examine the implications for sampling frequency, having regard to Table B of Part 2 of the *European Union (Drinking Water) Regulations 2014*.

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 Darragh Page, Senior Inspector, Drinking Water Team.

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 DW2016/29 in any future correspondence in relation to this Report.

Report prepared by: Aoife Loughnane **Date:** 12th February 2016

Aoife Loughnane
Inspector

Photo 1: Sand on the floor in the pressure filter room at Lake Road WTP

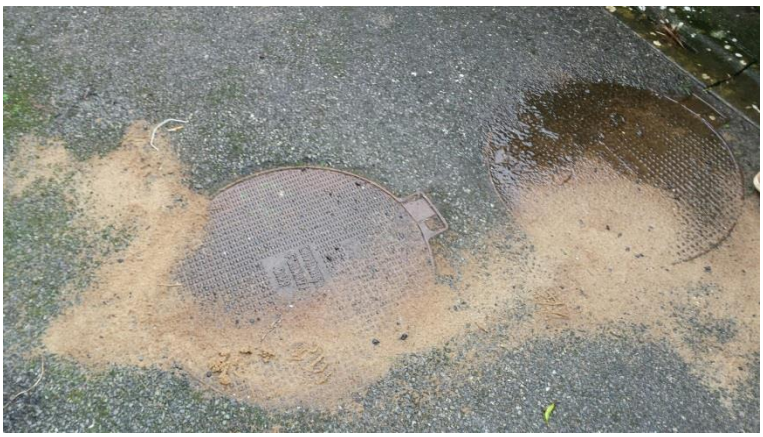

Photo 2: Sand on the ground beside the filter backwash pipework/manholes at Lake Road WTP

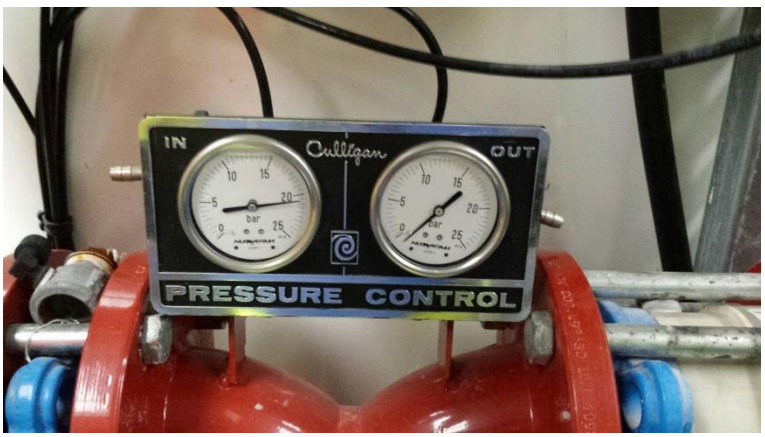

Photo 3: Broken outlet pressure gauge on Culligan Filter No. 2 at Knockanima WTP.