Drinking Water Audit Report

County:	Westmeath	**Date of Audit:**	17th February 2015
Plant(s) visited:	Ballinderry WTP Scheme code 3200PUB1008 Ardnapondra Reservoir	**Date of issue of Audit Report:**	25th February 2015
		File Reference:	DW2014/379
		Auditors:	Mr Darragh Page Ms 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*. • The recommendations in any previous audit reports.		

MAIN FINDINGS

i. Ballinderry water treatment plant abstracts water from a groundwater spring/infiltration gallery which is influenced by surface water fed from Ballinderry Lough. There was evidence of the UV unit being bypassed and therefore compromising the *Cryptosporidium* barrier.

ii. The chlorine monitors are not reliable and the online fluoride monitor has not been operational for the past number of years. The HMI system doesn't display any monitoring data and the plant operators don't have access to the SCADA system on-site. Irish Water needs to ensure there is proper management and control of the treatment processes, including access to trended monitoring data at the plant by the operators.

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 to assess the performance of Irish Water in providing clean and wholesome drinking water.

Ballinderry water treatment plant supplies a volume of 1,200 m^3/day to Ardnapondra Reservoir water supply zone (scheme code 3200PUB1008) which is the public water supply serving Moate, Co. Westmeath. The source of the supply is a groundwater spring/infiltration gallery which is influenced by surface water fed from Ballinderry Lough. The plant provides treatment by filtration, UV treatment, chlorination and fluoridation prior to entering the public supply.

The opening meeting commenced at 2.00 pm at Ballinderry 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.

Representing Irish Water: Mr. John Leamy, Compliance Specialist, Irish Water Mr. Tselophile Tlou, Water Engineer, Irish Water Mr. John Gavin, SLA Lead, Operations & Maintenance, Irish Water Ms. Blathnaid Cox, Executive Engineer, Water Services, Westmeath County Council Mr. Eamonn Morris, Technician, Water Services, Westmeath County Council Mr. Michael Murphy, Caretaker, Water Services, Westmeath County Council Mr. Ciaran McCabe, Caretaker, Water Services, Westmeath County Council Representing the Environmental Protection Agency: Mr. Darragh Page, Inspector Ms. Aoife Loughnane, Inspector Mr. Daniel Kennedy, CER (Observer)

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 source, located at the rear of the treatment plant, is a groundwater spring/infiltration gallery which is influenced by surface water fed from Ballinderry Lough. b. Raw water monitoring was carried out routinely until 2012, but has not been carried out since. Westmeath County Council's representatives stated that *E.coli* has never been detected in the raw water, though the results were not available to verify on the day of the audit. c. Raw water turbidity is normally approximately 0.07 NTU but can rise to 3 NTU during heavy rain. d. The plant's production volume is maintained at 50 m^3/hr. During dry weather conditions there are problems with the quantity of water available from this source, resulting in the supply being supplemented by the Mullingar supply.
2.	**Filtration** a. Raw water is filtered in two pressure filters which contain sand and quartz media. No chemicals are added to the water prior to filtration. b. Backwashing of the filters is triggered by time and differential pressure. The filters are usually backwashed every Monday and Thursday, and serviced every 6 months. c. Westmeath County Council's representatives identified that there has been a significant reduction in the number of consumer complaints regarding colour of the water supply since the filters were installed 18 months ago.
3.	**Chlorination and Disinfection** a. The filtered water is disinfected using UV treatment and chlorination. b. UV treatment is provided by an ATG SP25-4S UV disinfection system consisting of 2 duty units. The system is validated to the US UVDGM criteria and the target UV dose is 40 mJ/cm^2. The plant operators confirmed that dose is maintained at a fixed rate of 40 mJ/cm^2. c. The UV units are linked to the county SCADA system and an alarm is activated when the dose drops below 40 mJ/cm^2 and in the event of failure of the UV units. d. There is no automatic plant shut-off in the event of failure of the UV system (i.e. there is a risk of inadequately disinfected water entering the distribution network).

	e. During the audit, the plant operators confirmed that the UV system shuts down regularly for unknown reasons. This occurred in the week prior to the audit when the UV system was offline for approximately 10 days until it was repaired on 16th February 2015. The UV system is serviced by an external agent and the service response times are slow, necessitating the bypassing of the UV units. f. Sodium hypochlorite is dosed post UV disinfection. The chlorination system has duty and standby chlorine dosing pumps, with automatic changeover in the event of pump failure, a chlorine monitor and alarm system. The normal chlorine dose setting is 1 mg/l. The low chlorine alarm on the rising main to the reservoir is set at 0.7 mg/l. g. The residual chlorine monitor was reading 1.08 mg/l during the audit. The monitor is located on the rising main to the reservoir but is close to the dosing point and it is likely that the chlorinated water is not fully mixed at that location. h. There is a residual chlorine monitor at Ardnapondra Reservoir but the plant operators stated that they deemed it to be unreliable. i. The residual chlorine concentrations in the distribution network generally range from 0.5 to 0.8 mg/l. The operators stated that they maintain high chlorine residuals in the network to ensure adequate disinfection because of the vulnerability of the supply during periods of bad weather and the presence of cast iron mains in the distribution network.
4.	**Treated Water Storage** a. Treated water is pumped to Ardnapondra Reservoir which provides 400 m^3 storage capacity, equivalent to 8 hours retention time. b. The reservoir was visited during the audit and was covered, with all roof vents secured. An inspection of the reservoir had recently been carried out and was found to be clean. **c.** One of the reservoir cells has been decommissioned. The return water from the chlorine monitor appeared to drain into the decommissioned cell. Irish Water could not confirm where the water went after entering this reservoir.
5.	**Exceedances of the Parametric Values** a. An exceedance of the fluoride drinking water standard occurred on 25th September 2013 when 1.92 mg/l fluoride was recorded at Ardnapondra Reservoir. The EPA was not notified of this exceedance at that time, and only became aware of the result when it was submitted as part of the annual drinking water monitoring returns. Following an investigation, Westmeath County Council could not identify any specific details regarding the cause of the exceedance. Records of dose rates and sampling in the network confirmed that fluoride levels were satisfactory and the sample in question was not representative of water being supplied to consumers.
6.	**Chemical storage and bunds** a. Sodium hypochlorite is supplied in drums by Brenntag, and stored in an unbunded area in the chlorination room. The chlorine day tank is bunded. b. The bulk fluoride storage tank is located indoors in a bunded area. The fill point for the bulk storage tank is located outdoors in an unbunded area. A small plastic basin is used to contain any drips/spills during deliveries of hydrofluosilic acid. This arrangement is not satisfactory because the basin is not acid resistant and is likely to be too small to contain spillages.
7.	**Management and Control** a. The auditors noted that the HMI system at the plant does not display any monitoring data. b. The plant operators don't have access to the SCADA system on-site. Instead, they access the SCADA at Athlone WTP. c. The auditors requested SCADA screenshots of the raw and final water turbidity trends during a period of heavy rainfall in order to assess the performance of the plant. Irish Water provided this follow up information for August 2014 when extremely high rainfall was recorded in the Mullingar area (23.5mm on 01/08/2014 and 54.4mm on 02/08/2014). The SCADA system showed the raw water turbidity maxed out for a period on 02/08/2014 but the final water turbidity did not exceed 0.3 NTU. This demonstrates that the plant

	performance was not compromised during the heavy rainfall. d. The fluoride dosing records at the plant are based on weight calculations only. The online fluoride monitor at Ardnapondra Reservoir has not been operational for the past number of years and colorimetric testing is not carried out at the plant in order to verify the weight based calculations of predicted fluoride dose.

3. AUDITORS COMMENTS

While the quality of drinking water from Ballinderry water treatment plant meets the quality standards required, some issues identified during the audit present a risk to the safety and security of the supply.

The *Cryptosporidium* barrier is not robust because the pressure filters operate without coagulant dosing and the UV system deviates outside its validated operating range on occasion, and is bypassed on other occasions. This presents a risk of inadequately disinfected water entering the distribution network. Irish Water needs to take appropriate action in order to ensure that the disinfection system is safe and secure.

The management and control of the treatment plant processes needs to be improved. The chlorine monitors are not reliable and the online fluoride monitor has not been operational for the past number of years. The HMI system doesn't display any monitoring data and the plant operators don't have access to the SCADA system on-site. Irish Water needs to ensure there is proper management and control of the treatment processes, including access to trended monitoring data at the plant by the operators.

4. RECOMMENDATIONS

Source Protection

1. Irish Water should carry out regular monitoring of the raw water source and should include monitoring for microbiological parameters as an indicator of trends in assessing water quality and to determine the degree of treatment and controls required in the supply.

Disinfection

2. Irish Water should relocate the chlorine monitor at the treatment plant to ensure a reliable reading following complete mixing of the chlorinated water. Irish Water should ensure that the chlorine monitor at Ardnapondra Reservoir is maintained and calibrated in accordance with the manufacturer's instructions.

3. Irish Water should ensure that the UV disinfection system operates within its validated range at all times.

4. Irish Water should ensure that there are duty and standby UV disinfection arrangements with automatic changeover in the event of failure of one of the UV disinfection units.

5. Irish Water should ensure that the continuous UVI monitor is alarmed so 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.

6. Irish Water should review the use of disinfectants at the Ballinderry WTP and all other public water supplies to ensure that all disinfectants are authorised in accordance with the EU Biocides Products Regulation (528/2012) and associated Irish regulations (European Union (Biocidal Products) Regulations, 2013).

Treated Water Storage

7. Irish Water should ensure there is no interconnection between the active and decommissioned reservoir cells.

Chemical Storage and Bunds

8. Irish Water should review chemical storage arrangements at the treatment plant. Chemicals must be stored in bunded areas capable of containing at least 110% of the volume of chemicals stored therein. Fill points for storage tanks inside the bunds should be within the bunded area. Irish Water should take measures to ensure that any spillages during chemical deliveries are contained.

Management and Control

9. Irish Water should ensure there is proper management and control of the treatment processes, including access to trended monitoring data at the plant by the operators. The plant's HMI system should be set up properly to display the monitoring data for critical parameters.

10. Irish Water should ensure that the online fluoride monitor at Ardnapondra Reservoir is operational and linked to an appropriate alarm. While the fluoride monitor is offline, Irish Water should commence regular colorimetric testing at the plant in order to verify the weight based calculations of predicted fluoride dose.

FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

During the audit the Water Services Authority representatives were advised of the audit findings and that action must be taken as a priority by the Water Services Authority to address the issues raised. This report has been reviewed and approved by Mr Darragh Page, Drinking Water Team Leader.

The Water Services Authority 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: Aoife Loughnane **Date:** 25th February 2015

Aoife Loughnane

Inspector