Drinking Water Audit Report

County:	Westmeath	**Date of Audit:**	17th February 2015
Plant visited:	Ballany WTP, Scheme codes 3200PUB1003 Ballany Low Level Reservoir, and 3200PUB1004 Ballany High Level Reservoir	**Date of issue of Audit Report:**	25th February 2015
		File Reference:	DW2015/12
		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. Ballany water treatment plant abstracts water from Lough Lene. There is a concern regarding the robustness of the current treatment processes when the raw water quality deteriorates.

ii. The chlorine injection points become blocked on a regular basis, and the UV disinfection system operates outside its validated range on occasion, creating a risk of water entering supply which has not been adequately disinfected.

iii. Some alarm settings at the plant appear to be set at inappropriately low levels. Irish Water should review the critical alarm settings to ensure that the alarms provide the necessary forewarning to the plant 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.

Ballany water treatment plant supplies an average volume of 4,700 m^3/day to two water supply zones; Ballany Low Level Reservoir (population 4,280), and Ballany High Level Reservoir (population 1,200). The treatment plant capacity is 7,200 m^3/day. The plant abstracts water from Lough Lene and provides treatment by micro-filtration, disinfection and fluoridation prior to entering the public supply.

Photographs taken by Darragh Page during the audit are attached to this report and are referred to in the text where relevant.

The opening meeting commenced at 10.00 am at Ballany 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 Mr. Mkhululi Ndebele, Executive Engineer, Westmeath County Council Mr. Niall Gaffney, Westmeath County Council Mr. Adrian Giles, 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. Lough Lene is a spring fed lake which is the source of water supply to Ballany water treatment plant. The land use surrounding the lake is mainly agricultural. b. There is a disc screen at the lake abstraction point. Two pumps operate in duty/standby arrangement, pumping on average 200 m^3/hr water to treatment. The maximum production volume is 300 m^3/hr. c. Raw water turbidity is normally < 1 NTU but the water quality can deteriorate during poor weather conditions. The raw water turbidity alarm is set at 5 NTU and the plant is shut-down if this level is reached. d. Westmeath County Council's representatives stated that *Cryptosporidium* monitoring was carried out previously on the raw water, with no oocysts detected.
2.	**Filtration** a. The raw water is filtered in one of 3 membrane filters (2 μm filter size). The maximum filtration capacity is 300 m^3/hr when all 3 filters are operating. During normal conditions, filters 1 and 2 operate simultaneously. b. Backwashing of the filters is triggered by time or differential pressure. Backwashing is usually carried out 5 to 6 times per day for each filter. c. The filters are serviced every 6 months, during which the membrane cartridges and cassettes are checked and replaced as necessary.
3.	**Chlorination and Disinfection** a. The filtered water is disinfected by UV treatment and chlorination. b. UV treatment is provided by an ATG ECF 430-12 UV disinfection system consisting of 2 duty units (one on each reservoir line). The system is validated to the US UVDGM criteria and the target UV dose is 40 mJ/cm^2. c. The UV units are linked to the SCADA system and an alarm is activated in the event of failure of the UV units, however not in the event that the system deviates outside its validated operating range. d. The operators confirmed an average UV dose rate of 80 – 90 mJ/cm^2 which is significantly above the target dose. They also confirmed that the UV dose falls below the 40 mJ/cm^2 target on occasion. When this occurs, the operators arrange for the units to be serviced by an external agent.

	e. 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). f. Sodium hypochlorite is dosed post UV treatment. 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 low chlorine alarm is set at 0.2 mg/l. g. There is a recurring problem with the chlorine injection points becoming blocked approximately every 6 weeks due to the crystallisation of sodium hypochlorite in the injection nozzle. When this occurs, no sodium hypochlorite is dosed into the filtered water. h. There are chlorine boosting stations on the low level distribution network at Brownstown reservoir and at Burkes Bridge/Delvin. These stations were not visited during the audit.
4.	**Treated Water Storage** a. Treated water is stored in a clear water tank on-site prior to being pumped to two reservoirs; Ballany Low Level Reservoir and Ballany High Level Reservoir. Both reservoirs were built in the 1970s and are fully covered, but the roof vents don't have mesh covering on the openings. Reservoir cleaning is carried out every 5 years. **b.** There are two service reservoirs on the low level distribution network at Ballinlough and Brownstown. These reservoirs were not visited during the audit.
5.	**Exceedances of the Parametric Values** a. An exceedance of the fluoride drinking water standard occurred on 31st October 2012 when 2.86 mg/l fluoride was recorded at Ballany water treatment plant. The subsequent investigation found that the sample point was located too close to the dosing point. 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 (supplied by Brenntag) and hydrofluosilic acid are stored outdoors in double-skinned bulk storage tanks.
7.	**Hygiene and Housekeeping** a. The water treatment plant appeared to be well maintained. Spent filter membranes (which were replaced in October 2014) were stored outdoors awaiting removal from the site.
8.	**Management and Control** a. The SCADA system showed a decreasing chlorine trend in the days prior to the audit, resulting in the low chlorine alarm (0.2 mg/l) being activated on 16th February 2015 (see photo 1). The cause was identified as a blocked chlorine injection nozzle and the plant operator responded by clearing the blockage. However, they identified that it would take approximately 34 hours for the chlorine levels to rise back up to the target residual chlorine level of (0.6 – 0.7 mg/l) at the reservoir outlets. This incident led to low levels of chlorine (<0.1 mg/l) in parts of the distribution network on 17th February 2015. b. The SCADA system showed a deterioration in the raw water quality on 14/11/2014 (see photo 2). The auditors raised concerns that the plant's *Cryptosporidium* barrier may have been compromised during that time because the treated water turbidity was >1 NTU and the UV system was not operating due to a planned service. The operators confirmed that the plant was shut down during that time (pumps turned off). c. The online fluoride monitor has not been operational for the past year. Weekly colorimetric testing is carried out and daily records are kept of the predicted fluoride dose based on weight measurements. d. The water supply to the sink in the plant bathroom is taken off the treated water line at the point immediately downstream of the fluoride injection point. This presents a health and safety risk as the hydrofluosilic acid might not be properly mixed at that location and could result in very high fluoride levels at the bathroom tap.

3. AUDITORS COMMENTS

The audit team identified concerns regarding the robustness of Ballany water treatment plant when the raw water quality deteriorates. The blockage of the chlorine injection points, and the operation of the UV system outside its validated range, creates a risk of water entering supply which has not been adequately disinfected. Some alarm settings appear to be set at inappropriate levels and therefore don't provide sufficient warning to allow plant operators to take immediate action. The operation and management of this plant is in need of improvement to ensure the disinfection system is safe and secure.

4. RECOMMENDATIONS

Source Protection

1. Irish Water should carry out regular monitoring on all raw water sources 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 ensure that the UV disinfection system operates within its validated range at all times.

3. 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.

4. 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.

5. Irish Water should investigate if the UV system is operating efficiently, given that the dose rates shown on the SCADA system are significantly higher than the 40 mJ/cm^2 target dose.

6. Irish Water should review the use of disinfectants at the Ballany 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).

7. Irish Water should ensure that there is at least 0.1 mg/l free residual chlorine in the network at all times. Irish Water should submit a report to the EPA outlining what steps are to be taken to ensure that this is the case.

Treated Water Storage

8. Irish Water should ensure that all vents on the reservoirs are secured against ingress of animals or deliberate introduction of any contaminant or acts of vandalism.

Management and Control

9. Irish Water should investigate the robustness of the current treatment processes to deal with variations in raw water quality, and take appropriate measures to ensure that treatment is not compromised during periods of raw water quality deterioration. The investigation should include an assessment of the frequency of treated water turbidity > 1 NTU entering the distribution network.

10. Irish Water should review the critical alarm settings to ensure that the alarms provide the necessary forewarning to the plant operators.

11. Irish Water should update the documented alarm response procedure to define the actions to be taken in response to the different levels of alarm settings.

12. Irish Water should ensure that the online fluoride monitor is operational and linked to an appropriate alarm.

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.

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: Aoife Loughnane

Aoife Loughnane

Inspector

Date: 25th February 2015

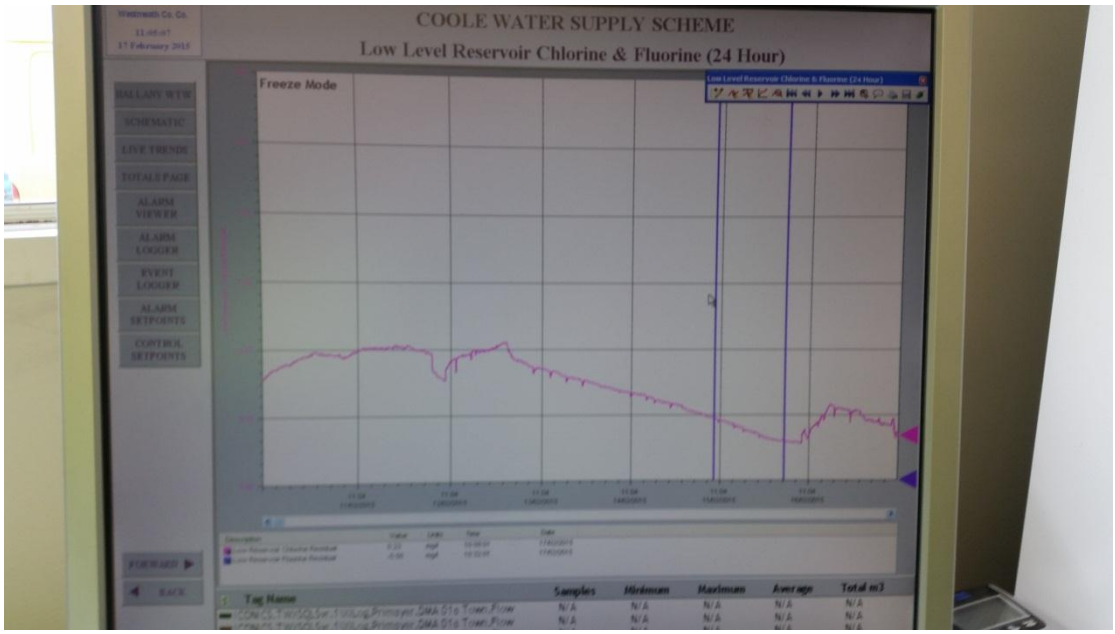

Photo 1: SCADA screenshot showing decreasing residual chlorine trend

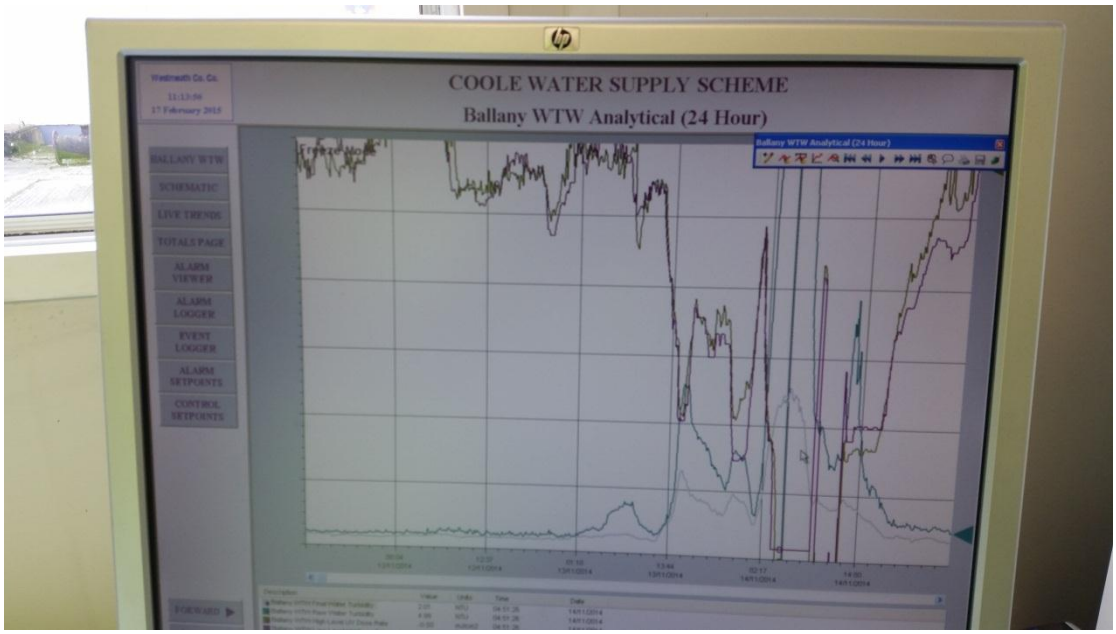

Photo 2: SCADA screenshot showing raw and final water turbidity and UVI trends during a period of raw water quality deterioration (14/11/2014)