



Drinking Water Audit Report

County:	Longford	Date of Audit:	16 th April 2019
Plant(s) visited:	Ballymahon PWS (Abbeyshrule WTP)	Date of issue of Audit Report:	18 th April 2019
		File Reference:	DW2011/35
		Auditors:	Ms Derval Devaney Mr Daryl Gunning
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014), as amended.</i> • <i>The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)</i> • The recommendations specified in the <i>EPA Drinking Water Report.</i> • EPA Drinking Water Advice Notes No.s 1 to 15. • The recommendations in previous audit reports for audits conducted on 20/08/14 and 02/06/17. 		

MAIN FINDINGS

- i. An incident occurred at Abbeyshrule Water Treatment Plant at 2 am on 10/04/19 which resulted in operational difficulties with the clarification and filtration processes. Due to alarm failure, plant automatic shutdown did not occur, resulting in inadequately treated water entering the Richmond Reservoir and the distribution network.
- ii. Once the caretaker became aware of the incident at 11.20 am on 10/04/19, the plant was manually shutdown until 9.30 pm. However, from 2am – 11.20am on 10/04/19 turbidity levels rose to 7.3 NTU in the final water. This resulted in a loss of the *Cryptosporidium* barrier at the plant and it compromised the effectiveness of the disinfection process.
- iii. Longford Co. Co. did not notify Irish Water of the incident until 16.24 pm Thursday 11/04/19. The EPA was notified by Irish Water at 12.32pm on 15/04/19. The HSE was not consulted by Longford Co. Co. or Irish Water regarding the risk to public health associated with the incident.
- iv. Irish Water failed to ensure that reactive sampling of the final treated water for microbiological parameters and *Cryptosporidium* was undertaken in the critical period following the incident. Six days post the incident, such sampling had yet to be arranged.
- v. The audit also assessed progress with the upgrade of Ballymahon Public Water Supply for removal from the EPA's Remedial Action List (RAL). Ballymahon PWS is on the EPA's RAL since 2015 due persistent THM failures. Works are to be complete by the end of Q2 2019 to enable the supply's removal from the RAL in Q3 2019.

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 in response to the notification by Irish Water on 15/04/19 of an incident involving sludge carryover from the clarifiers on 10/04/19 and the subsequent failure to meet the turbidity parametric value in the final treated water leaving the plant.

In addition, as the Ballymahon PWS was added to the EPA's Remedial Action List (RAL) in Q3 2015 due to persistent failures of THMs in the supply, the audit also assessed progress with the remedial works underway to bring about THM compliance.

Abbeyshrule water treatment plant abstracts water from the River Inny and serves Ballymahon public water supply (PWS) with approximately 3,500 m³/day to approx. 8, 247 consumers. Treatment at the plant consists of coagulation, flocculation, clarification, rapid gravity filtration and chlorination.

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

The opening meeting commenced at 12.00pm at Abbeyshrule 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 (those with an asterisk * after their name attended the audit at 2 pm to discuss the incident which occurred on 10/04/19).

Representing Irish Water:

Andrew Boylan – Compliance Specialist
Aodhnait Ní Chathasaigh – Compliance Analyst
Ian Walsh – Capital Programmes
Barry Leonard – Asset Operations
Michael Cunniffe – Water Infrastructure Lead*

Representing Longford County Council:

Des Reynolds, Technician
John Byrne, Waterworks Caretaker
Karina O'Grady – Technician
Angela Brady – Scientific Officer
Barry Lennon, Senior Executive Engineer*

Representing EPS:

Colm Moran, Project Engineer

Representing the Health Service Executive:

Siobhan Callaghan – Environmental Health Officer*
Deirdre O'Shea, Principal E. H. O. *

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.	Sludge Carryover to Filters Incident <ol style="list-style-type: none">a. On 15/04/19 Irish Water notified the EPA by telephone at 12.32 pm of an incident involving the carryover of sludge from the clarifiers at 2 am on 10/04/19 and the failure of the plant alarms and automatic shutdown process. The plant was manually shutdown at 11.20 am on 10/04/19.b. An EPA audit had been arranged for 16/04/19 to assess progress with RAL works at the site. Irish Water were informed that the audit would also now cover the incident investigations. On the afternoon of 15/04/19, the EPA notified the HSE of its intention to conduct an audit as a result of the incident and invited the HSE to attend.c. The incident occurred when the sludge bleeds in the clarifiers failed to activate, resulting in the sludge blanket rising in the clarifiers from 2 am on 10/04/19. The turbidity monitors on the settled water are alarmed to text the caretaker if the level reaches 0.4 NTU and shutdown the plant if the level reaches 0.6 NTU. While a turbidity of > 10 NTU was recorded on the turbidity monitors just before 2am on 10/04/19, the alarms did not activate. As a result, the sludge blanket rose in the clarifiers and sludge carried over to the rapid gravity filters. The turbidity monitors on each of the three filters are alarmed to initiate a backwash at 1 NTU. This alarm did not activate. There is a turbidity monitor on the combined final water which shuts down the plant at 0.5 NTU, this alarm failed also. Therefore, inadequately treated water continued to flow from the treatment plant to the Richmond Reservoir and into supply.d. The caretaker arrived onsite on 10/04/19 at approx. 11.20 am and discovered the elevated turbidity readings (7 NTU) in the final water. He stated the last time he received an alarm by text from the plant was on 09/04/19 at 10.05 am. He manually shut down the plant and started to backwash the filters. He also drained down the water in the rising main leading up to Richmond Reservoir. He alerted staff within Longford Co Co of the incident. He took samples of water leaving the Richmond Reservoir at 2.15 pm and 6 pm on 10/04/19 and at 9 am on 11/04/19 for parameters including turbidity, chlorine, aluminium, UVT, Colour. The results of these tests were satisfactory. He turned the plant back on at approx. 9.30 pm on 10/04/19. The caretaker stated he started receiving text alarms at 2.20 pm on 10/04/19.e. Prior to, and on the day of the incident, EPS staff were working onsite as part of the RAL upgrade works. The auditors understand that they were uploading a new programme to the programmable logic controller (PLC) for the new sulphuric acid dosing system, for greater control of the coagulation process.f. Longford Co Co notified Irish Water of the incident by email at 4:24 pm on Thursday 11/04/19. The HSE was not consulted by Irish Water or Longford Co Co at any stage prior to the audit regarding the incident and the potential risk to public health it had posed. The HSE became aware of the detail and seriousness of the incident while on-site during the audit.g. An examination of the SCADA system during the audit showed that the clarified water turbidity rose to > 10 NTU just before 2am and the final water turbidity was above 0.2 NTU from 02.26 am until the plant was shutdown at 11.20 am. This meant the plant's <i>Crypto.</i> barrier was compromised during that 9-hour period. The final water turbidity also rose to > 1 NTU from 3.11 am and steadily increased to 7.3 NTU until such time as the plant was shutdown at 11.20 am. This meant the 1 NTU parametric value for turbidity in the final water leaving the plant was breached for 8 hours and the effectiveness of the disinfection at the plant was compromised during this period (See photo 1). By the day of
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	<p>the audit, 6 days after the incident, there were no microbiological or <i>Crypto.</i> sampling undertaken.</p> <p>h. The audit showed the logger which uploads the Richmond reservoir level was not updating and there was no such data available for the time of the incident. Also, the HMI screen was reading incorrect turbidity for Filter No 3 and there was no turbidity spike observed prior to the final water levels rising at 2 am on 10/04/19.</p> <p>i. During the audit, 6 days post the incident, it was evident there was:</p> <ul style="list-style-type: none"> (i) lack of clarity as to what was the root cause of the incident (what caused the sludge bleeds and alarms to fail?). (ii) the communication of the incident to relevant parties (Irish Water, HSE, EPA) was not conducted in a timely manner to enable an informed response to the incident and the protection of public health. (iii) a failure to take microbiological and <i>Crypto.</i> sampling in the critical period following the incident.
<p>2.</p>	<p>Source Protection</p> <ul style="list-style-type: none"> a. Ballymahon PWS abstracts water from the River Inny. The river level can rise rapidly after heavy rainfall with accompanying deterioration in water quality. b. The neighbouring land use is mainly agricultural, although the privately owned Abbeyshrule Aerodrome is directly across the river from the abstraction point. The Legan waste water treatment plant (P.E. of < 500) discharges approx. 10km upstream of the plant. Despite these apparent risks and it being raised in two previous EPA audits, there is no communications plan between these catchment users in the event of an emergency/pollution incident.
<p>3.</p>	<p>Management and Control</p> <ul style="list-style-type: none"> a. Using the protozoal compliance log credit approach, there is currently a 2-log deficit at Abbeyshrule WTP because the River Inny is a S3 source which has a 5-log credit requirement, and the current CFC and filtration processes provide 3-log credits (when operating effectively). Once the filter upgrade works are complete, Irish Water stated this may provide an additional log credit for enhanced individual filtration. However, there will still be a 1-log deficit. During the audit, Irish Water stated that there no monitoring programme in place for <i>Crypto.</i> in the final treated water, and they have yet to apply the <i>Crypto.</i> rationale to this plant. Irish Water stated it would discuss the monitoring requirement further with the HSE.
<p>4.</p>	<p>Remedial Action Works</p> <p>Irish Water have acquired EPS to undertake the following works, of which progress was provided during the audit:</p> <ul style="list-style-type: none"> a) The infrastructure to enable raw water pH correction (injection points, pipework, dosing pumps, sulphuric acid bulk tanks) is in place and commissioning commenced Monday 15th April 2019. The set up includes a pH analyser to automatically control the pH dose using a feedback system to ensure a target pH for optimum coagulation is met. Plant inhibits will be built into the system in the event of a low or high pH or if no sample is fed to the pH analyser. b) A static mixer has been installed to improve coagulant mixing. Currently Chemifloc 101 (at 340 mg/l to meet a target pH of 6.4) is being dosed which is a blend of alum and ferric sulphate. Irish Water is to carry out jar testing and investigate if aluminium sulphate can be used as a coagulant instead now that sulphuric acid will be used to control pH. c) The down pipes on the clarifiers were replaced, decanting channels levelled and access to the clarifiers improved to aid their cleaning. However pin floc was observed in the clarified water (see Photo 2) and algae in and around the decanting channels and the walls of the clarifiers (see Photo 3). d) pH and turbidity monitors were installed on the clarified water in 2017 and have been adjusted to now provide a plant shutdown facility in the event of a turbidity set-point being breached.

	<p>The calibration stickers on the pH and turbidity monitors showed their calibration was overdue, despite Longford Co Co stating that they had been recalibrated by Veolia on 11th November 2018 (See Photo 4). Longford Co Co stated they have increased the calibration frequency of these monitors from 6 to every 3 months.</p> <ul style="list-style-type: none"> e) The filters were upgraded to include new pipework to facilitate a run to waste facility during backwash. The run to waste facility has not yet been activated, as the control philosophy is still in the commissioning phase. f) The filters were inspected but a backwash was not observed. The media in Filter No. 2 appeared to show areas where boiling could be evident during backwash (See Photo 5). This matter was raised in previous EPA audits. g) The Richmond Reservoir was cleaned and leaks repaired. h) Irish Water stated that RAL works are on track to be completed by the end of Q2 2019 and verification of works for removal from the RAL in Q3 2019. <p>Further planned improvement works include the installation of a UVT monitor at the raw water intake. Currently a UVT monitor is in place on the final water only. It is proposed that this raw water monitor will be linked to the coagulant dose to provide automation of the process once a bank of UVT data for raw water is obtained.</p> <p>Hydrocarbon and ammonia online monitors are also due to be commissioned on the raw water intake within the next few weeks to bring greater security to the water supply.</p> <p>In addition, Veolia have been contracted to move the chlorine injection point from the inlet to the outlet of the clearwater tank. The flow meter monitors at the outlet of the tank and rather than the dose being based on a flow at the raw water intake, it will be based where the chlorine dose is being injected post the clear water tank. Irish Water stated contact time is achieved in the rising main entering the Richmond Reservoir and there are no consumers served prior to that reservoir.</p>
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3. AUDITORS COMMENTS

The audit found that Abbeyshrule water treatment plant upgrade is progressing well and the plant is generally well run and operated, however the incident which occurred on 10/04/19 presented a significant risk to the safety of the water supply. It was evident that the caretaker reacted quickly once he became aware of the incident by shutting down the plant, however the cause of the sludge bleed and alarm failures remains unconfirmed, and the incident was not communicated by Longford Co Co in a timely manner to Irish Water and the HSE. This incident resulted in inadequately treated water being delivered into supply for 9 hours on 10/04/19 which presented a significant risk to those being served by the Ballymahon PWS.

Irish Water must ensure that the lessons learned from this incident are acted upon to prevent a reoccurrence and to ensure the ongoing safety and security of the Ballymahon public water supply in the protection of public health for the population served by the plant.

4. RECOMMENDATIONS

1. Irish Water should determine the root cause of the incident and put measures in place to ensure a similar incident does not reoccur. Irish Water should verify that all alarms, including those that inhibit the plant, are operating satisfactorily, to prevent inadequately treated water being supplied to consumers.
2. Irish Water should ensure there is a documented communications protocol in place for the reporting of incidents which could potentially impact the water quality at the water treatment plant so the relevant parties involved (e.g. Irish Water, HSE, EPA) are alerted in a timely manner.

The protocol should also cater for the communication of risk to the raw water quality from nearby activities in the catchment (e.g. waste water treatment plants, the Aerodrome, etc.) so that the water treatment plant operator is alerted in the event of an incident which could potentially impact on the raw water quality at Abbeyshrule water treatment plant. Irish Water should ensure that relevant Longford Co Co staff are trained in the protocol and relevant catchment stakeholders are informed of the protocol and understand the instances in which the protocol is to be used.

3. 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.
4. Irish Water should immediately commence a monitoring programme for *Cryptosporidium* and microbiological parameters in the final treated water at Abbeyshrule water treatment plant and its network. Irish Water should also ensure that reactive sampling can be undertaken in a timely manner in response to an incident at the plant.
5. Irish Water should identify how the protozoal compliance log deficit is to be addressed at Abbeyshrule water treatment plant.
6. Irish Water should confirm that pH and turbidity monitors have been calibrated and their calibration stickers are up-to-date.
7. Irish Water should ensure the RAL upgrade works at Abbeyshrule water treatment plant are completed by Q2 2019. Such works should address issues found during the audit - pin floc carryover, algae presence in the clarifiers and potential issues during filter backwash (e.g. media boiling).
8. Irish Water should ensure the data logger which uploads reservoir levels and the HMI screen which displays turbidity readings is scaled appropriately and displays data accurately and in a timely manner. The cause for the delayed turbidity spike on the filters on 10/04/19 should be investigated.

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 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:

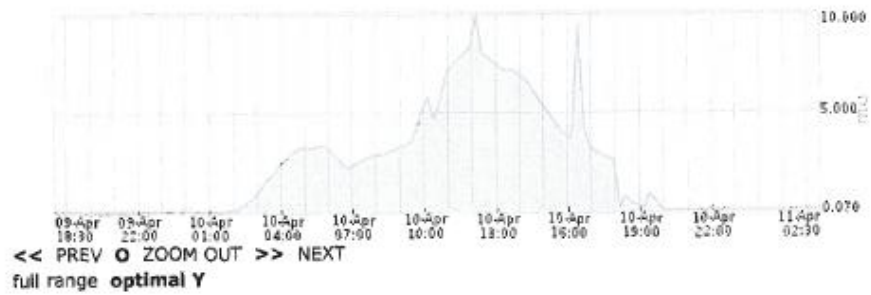
18/04/19

Inspector

Sensor Details

Reference  Abbeyshrule Final Water Turb
Type 420m
Comment Ballymahon

ALL THIS YEAR LAST 4 WEEKS LAST 7 DAYS LAST 24 HOURS



REQUEST DATA UPDATE NOW

Download logger data for displayed period


Logger Data CSV 

Photo 1 Final Water turbidity print out from SCADA during the audit shows turbidity leaving the plant going into supply from 2am – 11.20 am 10/04/19 reaches 7.3 NTU



Photo 2 Pin floc evident in clarifer



Photo 3 Algae on decanting channels and walls of clarifier

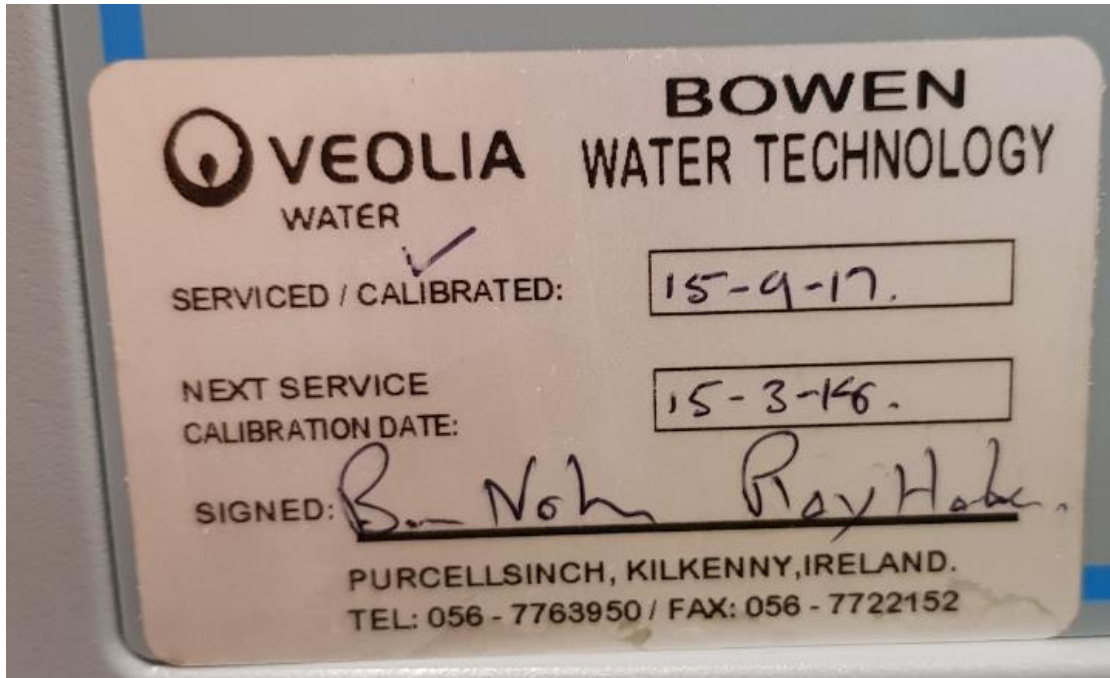


Photo 4 Service sticker on clarified water turbidity monitor shows calibration is overdue



Photo 5 Traces of boils on Filter Media