



Drinking Water Audit Report

County:	Carlow	Date of Audit:	19 th October 2018
Plant(s) visited:	Borris Water Treatment Plant	Date of issue of Audit Report:	15 th November 2018
		File Reference:	DW2018/184
		Auditors:	Michelle Roche Ruth Barrington
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 EPA <i>Drinking Water Report</i>. 		

MAIN FINDINGS

- i. **Irish Water should review the coagulation and clarification process following the recent installation of the static mixer. The review should ensure that the process is working as best it can and include an action plan for any changes necessary.**
- ii. **Irish Water should take a water quality sample from the Mountain River, downstream of the water treatment sludge discharge point. The sample should ensure that the recent run to waste of treated water has not had a negative impact on the river water quality.**
- iii. **Irish Water should progress the Disinfection Programme on this scheme.**

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 dated 15th October 2018 of a Do Not Drink Notice being placed on the Borris public water supply. The Do Not Drink Notice was subsequently changed to a Boil Water Notice on 16th October 2018 and this Boil Water Notice was lifted on 20th October 2018.

The Borris public water supply serves 629 people within the village of Borris, Co. Carlow. The treatment plant is located beside the abstraction point on the Mountain River and operates approximately 10 hours per day. Water treatment at the plant consists of:

- Raw water pH dosing with caustic soda
- Coagulation using ferric aluminium sulphate
- Clarification in a covered Multiflow clarifier
- Filtration in two indoor rapid gravity sand filters
- UV disinfection with secondary sodium hypochlorite disinfection

- Final pH correction

The opening meeting commenced at 10:45 at Borris Water Treatment Plant. The scope and purpose of the audit were outlined at the opening meeting. The water treatment plant was not operational at the time of the audit as the raw water pH dosing pump was being fixed. As a result, the scope of the audit was confined to investigating the details of the incident that resulted in the Do Not Drink Notice and auditing Irish Water’s response to the incident. Water treatment process controls were also discussed and examined where possible.

The audit process consisted of interviews with staff, review of records and observations made during an inspection of the treatment plant. The audit observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

<p>Representing Irish Water:</p> <p>Patrick Duggan – Compliance Specialist Tommy Roche – Compliance Analyst Michael Tuohy – Irish Water Operations</p> <p>Representing Carlow County Council:</p> <p>Gerard O’Brien – Senior Executive Engineer Kieran Cullinane – Senior Engineer Adrian Cotes – Water Caretaker</p> <p>Representing the Environmental Protection Agency:</p> <p>Michelle Roche – Inspector Ruth Barrington - Inspector</p>

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.

<p>1. Details of Incident</p>	<ol style="list-style-type: none"> a. The Borris water treatment plant initially went into automatic shut-down on Sunday 14th October. The reason for the shut-down was there was no water flowing to the CL17 (chlorine) monitor. The caretaker immediately responded to the shut-down alarm and visited the site. b. The caretaker cleared the sample line to the CL17 monitor and the plant was set-up to go back online once the low-level sensor in the reservoir called out to the plant to switch on. The caretaker left the site at approximately 6:30pm on Sunday evening. c. When the caretaker arrived to the water treatment plant on the morning of Monday 15th October he realised that the treatment plant had shut-down again. The plant had shut-down at 10:30pm on Sunday 14th and the level of treated water in the reservoir was approximately 0.5m. d. Given the low level of treated water in the reservoir, Carlow County Council and Irish Water’s initial response was to bring treated water to the Borris reservoir, from the neighbouring Leighlinbridge water supply. This water was tankered to the Borris reservoir from approximately midday on Monday 15th October. Tankering water from the neighbouring supply would ensure that customers on the Borris supply could still be supplied with drinking water, while investigations continued at the treatment plant into the
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	<p>reason for the second automatic plant shut-down.</p> <ul style="list-style-type: none"> e. Irish Water received two complaints about coloured water during the day on Monday 15th and then one complaint about black water at 6pm on Monday 15th. f. Carlow County Council investigated the complaints and found that adding water to the Borris reservoir from the takers had stirred up a lot of silt that had been sitting at the bottom of the reservoir. This silt had then entered the water distribution network and was causing the coloured water that was coming through customers taps. g. Carlow County Council immediately contacted the HSE as they were concerned about a possible health impact. A Do Not Drink Notice was put on the Borris supply on Monday evening. h. Carlow County Council took several chlorine residual and microbiological samples in the network following the complaints. Chlorine levels at the end of the network at Clonagoose Road were lower than normal at 0.09-0.1 mg/l. i. Carlow County Council began flushing the water distribution network on Monday evening and by midday on Tuesday 16th October the water was running clear and chlorine residuals had recovered to 0.5 – 0.6 mg/l. j. The Do Not Drink Notice was lifted on Tuesday 16th, however a Boil Water Notice remained in place until the HSE were satisfied that the plant was operating correctly and water was being properly disinfected.
<p>2.</p>	<p>Investigation of the Incident</p> <ul style="list-style-type: none"> a. During the investigation, the treatment plant was operational and sending treated water to the reservoir, however pH readings in the treatment process kept increasing and causing the plant to shut-down. This was particularly a problem when the plant was initially switched on after a long period of being shut-down. The high pH readings were detected at a pH meter located after the dosing of caustic soda (for pH correction of raw water) and ferric aluminium sulphate (coagulant) and before the water entered the clarifier. The optimum coagulation pH at the plant is 6.2, however pH readings were increasing to 9 or 10. b. When the pH readings were rising and it was not possible to form a proper sludge blanket at the plant, the affected water was being run to waste through the sludge settlement tanks and discharged to the Mountain River, downstream of the water treatment plant. c. Irish Water's investigations of the high pH readings included raw water monitoring, servicing of the streaming current meter and servicing of the caustic soda and coagulant dosing pumps. The caretaker also began manually dosing the coagulant at the treatment plant and carrying out jar tests in an effort to better control the pH and the coagulation process. d. On the morning of Friday 19th October, the contractor servicing the caustic soda dosing pump (Veolia) noticed that the ball valve in the caustic soda dosing pump had come loose and a trickle of caustic soda was being released into the dosing line even when the treatment plant was not operational. This was resulting in the pH of the water rising rapidly just after the plant was switched back on after a period of being shut-down. At the time of the audit, Irish Water believed this was the root cause of the high pH readings and why the plant was continually shutting down. e. A new ball valve was being installed on Friday 19th and it was hoped that this would solve the problem.
<p>3.</p>	<p>Water Treatment Management and Control</p> <ul style="list-style-type: none"> a. A walk through of each step in the treatment process was undertaken during the audit and the caretaker provided information on what controls and alarms were in place on each treatment system. b. A new static mixer was installed the week before the audit, after the coagulant dosing point. There was some concern that floc was beginning to form in the pipework between the static mixer and the clarifier. This would disrupt the formation of a stable flocculation blanket in the clarifier and therefore the effectiveness of the clarification process. c. The contact time calculation for the supply is 49.78mg.min/l. This is based on a low chlorine residual at the treatment plant of 0.5mg/l and the distance and dimensions of the

	<p>pipework from the treatment plant to the reservoir. The low chlorine alarm set point at the treatment plant however is 0.3mg/l.</p> <p>d. Additional contact time is provided within the Borris reservoir but this has not been included in the contact time calculation.</p>
5.	<p>Treated Water Storage and Distribution Network</p> <p>a. The Borris reservoir is a single celled reservoir and has not been cleaned in approximately 30 years. Prior to the incident Irish Water had contacted a contractor to assess the best method of cleaning the reservoir but no timeframe had been worked out.</p>

3. AUDITORS COMMENTS

The Borris water treatment plant is a well-run plant with good controls in place and the caretaker has very good oversight and knowledge of the treatment processes. The incident that led to silt entering customers taps and the subsequent Do Not Drink Notice and Boil Water Notice was swiftly addressed and thoroughly investigated by Carlow County Council and Irish Water. Both water restriction notices were lifted by Saturday 20th October and the cause of the repeated plant shut-downs was rectified (high pH readings during the treatment process).

4. RECOMMENDATIONS

Coagulation, Flocculation and Clarification

1. Irish Water should review the coagulation and clarification process following the recent installation of the static mixer to ensure that the process is optimised. The review should outline any changes necessary.

Management and Control

2. Irish Water should take a water quality sample from the Mountain River, downstream of the run to waste discharge point from the treatment plant. The sample is necessary to ensure that treatment water discharges to the river during the incident did not have a negative impact on river water quality.
3. Irish Water should review the contact time calculation for chlorine disinfection. Irish Water should ensure that the minimum chlorine residual figure applied in the contact time calculation reflects the minimum chlorine residual set-point used at the treatment plant, and that alarms are set at levels which reflect this. Irish Water should submit the calculation of the effective contact time to the Agency.

Treated Water Storage

4. Irish Water should ensure that the service reservoir is inspected and cleaned out on a regular basis and any maintenance and repairs completed as soon as possible after the need has been identified.

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 Emer Cooney, 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:** 15th November 2018

Inspector