



Drinking Water Audit Report

County:	Wicklow	Date of Audit:	6 th November 2014
Plant(s) visited:	Cronroe Water Treatment Plant and Broomhall, Greenhills, Mariners Point, Ballyguile, Seacrest and Ballyneerin Reservoirs	Date of issue of Audit Report:	10 th November 2014
		File Reference:	DW2014/351
		Auditors:	Mr Darragh Page Ms Aoife Loughnane
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</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 Report on <i>The Provision and Quality of Drinking Water in Ireland</i>. • The recommendations in any previous audit reports. 		

MAIN FINDINGS

- i. While the cause of the *E. coli* failure on 9th October 2014 could not be determined, the length of residence time in the Mariners Point reservoir (up to 8 days) resulted in inadequate free residual chlorine (<0.1 mg/l) in the water supply in the area. Remedial works have been undertaken (cleaning of the reservoir, reduction of storage capacity and new covers ordered) but the effectiveness of these needs to be verified. If these works are unsuccessful in improving the chlorine residual Irish Water will need to expedite temporary measures to ensure that adequate residual chlorine is present.
- ii. There was evidence of insufficient chlorine residual in the Wicklow Regional PWS and in several other supplies in Wicklow in monitoring data reviewed from 2014. Irish Water need to carry out a comprehensive review of the disinfection strategy in the Wicklow Regional PWS and other Wicklow supplies to ensure that there is at least 0.1 mg/l free residual chlorine present at consumer's taps at the extremities of the network.

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 dated 10th October 2014 of the failure to meet the *E. coli* parametric value (as specified in Table A of Part 1 of the Schedule of the Regulations) in the Wicklow Regional PWS. The focus of the audit was on the events that led to the contamination of part of the supply and the distribution network in the area localised around Mariners Point.

The Wicklow Regional PWS is supplied with water from the Vartry Reservoir (two thirds) and Cronroe water treatment plant (one third). The water is supplied to Ashford, Rathnew, Wicklow Town and environs via 7 reservoirs. The Ashford reservoir was not inspected as part of this audit.

Photographs taken by Aoife Loughnane 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 the Mariners Point reservoir. 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.

<p>Representing Irish Water: (* indicates that person was also present for the closing meeting)</p> <p>John Leamy – Irish Water*</p> <p>Grainne Carey – Compliance Analyst, Irish Water*</p> <p>Tselophile Tlou – Water Engineer, Irish Water*</p> <p>Larry Wolohan – Senior Engineer, Wicklow County Council*</p> <p>Tom Griffin – Senior Executive Chemist, Wicklow County Council*</p> <p>Fergal Sheerin – Technician, Wicklow County Council*</p> <p>Pat Dowling – Caretaker, Wicklow County Council*</p> <p>John DeCourcy – Town Foreman, Wicklow County Council</p> <p>Representing the Environmental Protection Agency:</p> <p>Darragh Page – Inspector, Environmental Protection Agency*</p> <p>Aoife Loughnane – Inspector, Environmental Protection Agency*</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.

1.	<p>Source Protection</p> <p>a. Source protection was not examined as part of this audit.</p>
2.	<p>Chlorination and Disinfection</p> <p>a. The water supplied from the Vartry Reservoir water treatment plant is chlorinated at Vartry prior to mixing at the Cronroe water treatment plant.</p> <p>b. Since the previous audit the chlorination point for the final water from Cronroe has been moved from the mixing tank to the channel between the Cronroe plant and the mixing tank.</p> <p>c. Records at the water treatment plant indicated that the chlorine levels from the manual test have been recorded daily but written recording of the results from the chlorine monitor only commenced one week prior to the audit.</p> <p>d. The Caretaker does not have access to the SCADA and therefore cannot access the trends on the chlorine monitor in the event of a low chlorine result or discrepancy in the results between the monitor and the handheld test. A previous discrepancy in these results had been flagged by the EPA to Irish Water which has subsequently been resolved by calibrating the monitor.</p> <p>e. There are currently no rechlorination points within the Wicklow Regional PWS distribution network. However, Irish Water stated that a rechlorination point is planned for water</p>

	<p>coming from the Broomhall reservoir.</p> <ul style="list-style-type: none"> f. Low chlorine residuals were noted in the distribution network with 3 of the 8 compliance monitoring samples in the period January to June 2014 in the Wicklow Regional PWS having low chlorine residuals (<0.1 mg/l). g. At Cronroe WTP, there was an open hole in the floor at the point where the chlorine dosing line entered the filtered water channel (Photo 1). There is a potential risk for any spillage on the ground to enter the final treated water channel.
<p>3.</p>	<p>Treated Water Storage</p> <ul style="list-style-type: none"> a. There is a complex network of treated water storage facilities in the Wicklow Regional PWS that have been developed over time. b. The main distribution line (after Ashford) from the Cronroe plant travels to the Broomhall and Greenhills Reservoirs. c. The Council stated that the Greenhills reservoir has approx. 1 day's storage. From here the water supplies part of Wicklow Town while the remainder travels directly to the Mariners Point reservoir and from there to the Ballyguile reservoir (also called the Houghton Tank) which serves a small number of houses on higher ground. The Mariners Point reservoir had approx. 8 days storage but the volume has been reduced in half since the incident. d. Water from the Broomhill reservoir travels to the Ballyneerin reservoir (also called the Mount Carmel reservoir) and is also pumped via an adjacent sump to the Seacrest reservoir. e. The Greenhills, Mariners Point, Ballyguile, Broomhall, Ballyneerin and Seacrest reservoirs were all inspected during the audit. <p>Greenhills Reservoir Treated water from the Greenhills reservoir contains approx. 0.2 to 0.3 mg/l free residual chlorine. Recent site clearance works have been undertaken to clear briars from the site. A visual examination of the roof was carried out (the reservoir is below ground) and there were no obvious signs of potential ingress.</p> <p>Mariners Point Reservoir Water supplied by the Mariners Point was found to be contaminated with 3 <i>E. coli</i> on 9 October 2014. This was confirmed by subsequent resampling at multiple locations on different dates up to the 16th October 2014. Sampling has not continued past this date as it is assumed to be contaminated until the remedial works are complete. The reservoir has a storage capacity of 500 m³/d but only supplies water to approx. 120 persons. The area supplied contains an unfinished estate and it was originally planned that land adjacent was to be developed but this has not occurred. This means that there is excessive storage in the reservoir and insufficient residual chlorine in the water exiting the reservoir. Recent site works were carried out to clear vegetation on the site and an integrity assessment of the reservoir was carried out as well as cleaning and disinfection of the reservoir. The assessment found no structural issues with the reservoir. The storage capacity of the reservoir has also been reduced and level controls have been ordered to control water levels. There are two metal plates on the roof of the reservoir covering access points. As the reservoir is built into the hill (at ground level on one side) it is possible that surface water from the surrounding area could have entered the access points. Wicklow County Council stated that this was a potential source of contamination but could not prove it was the source of contamination in this case. New covers have been ordered and the storage has been reduced in the reservoir. It is planned to flush out the mains supplied by the Mariners Point reservoir when the new covers are installed.</p> <p>Ballyguile Reservoir There are a small number of houses on higher ground that are supplied by this reservoir. Samples in the area supplied by this reservoir were found to contain high levels of coliforms (>200) and low levels of <i>E. coli</i> (up to 3). This reservoir is fed from the Mariners Point Reservoir. The area had been overgrown (cleared by Wicklow County Council since the incident was detected). The concrete around the vent was damaged and appeared to be open to ingress. The Council stated that they have valves ordered to enable this reservoir to be bypassed and decommissioned.</p> <p>Broomhall Reservoir The Broomhall reservoir is a recently constructed reservoir that supplies water to Rathnew and parts of Wicklow Town. Irish Water stated that a chlorine booster station is planned for the water leaving</p>

	<p>the reservoir to deal with low residuals in the network. This is to be in place in Q1 2015.</p> <p>Ballyneerin Reservoir The Ballyneerin reservoir is located in the middle of a housing estate and supplies housing in the vicinity. There were cracks on the roof of the reservoir (Photo 2) though Wicklow County Council stated that there were no structural issues or ingress into the reservoir.</p> <p>Seacrest Reservoir The Seacrest reservoir is on higher ground and receives water from a sump adjacent to the Ballyneerin reservoir. There was evidence of material being burnt at the base of the reservoir (Photo 3) while there were also cracks in the roof of the reservoir (Photo 4).</p> <p>Wicklow County Council stated that they had originally applied to the Department of Environment, Community and Local Government several years ago to construct a single reservoir on higher ground to supply the entire area of Wicklow town but this had not been approved.</p> <p>Irish Water stated that a chlorine booster station was planned for water exiting the Broomhall Reservoir as this was a recommendation of the THM audit carried out previously and it was thought that this would enable the primary dose of chlorine at Cronroe WTP to be reduced. However, it was pointed out by the auditors that while this might address low residuals in the area supplied by the Broomhall reservoir it would not enable the primary dose to be reduced significantly as levels would need to be maintained for the area supplied by the Greenhills reservoir.</p> <p>Irish Water stated that it would review the effectiveness of the remedial works (reduced storage capacity, elimination of the Ballyguile reservoir) on the quality of the water in the area supplied by the Mariners Point reservoir and if this was not effective Irish Water would review whether a chlorine booster station was required. The auditors stressed the urgency of removing the boil water notice as soon as possible, and identified that temporary measures may be required to be implemented as the installation of a full booster station could take time especially as there was not a suitable electricity source on site.</p>
<p>4.</p>	<p>Management and Control</p> <p>a. The EPA raised the issue of the general adequacy of the disinfection strategy in supplies across County Wicklow, referring to EPA correspondence dated 13th October 2014 which pointed out that insufficient chlorine was present in 47 of the 123 compliance monitoring samples in Wicklow during the period January to June 2014 (based on results posted on the Wicklow County Council website). Irish Water stated that they were reviewing the strategy in line with Irish Water overall disinfection strategy and would revert to the EPA in due course.</p>

3. AUDITORS COMMENTS

The distribution network in the Wicklow Regional PWS is a complex system of multiple reservoirs supplying different parts of the scheme. In some cases water must pass through three distribution network reservoirs before being supplied to consumers resulting in excessive retention times. The current chlorine dose at the Cronroe water treatment plant appears to be insufficient to maintain a residual in the distribution network which is evidenced by insufficient chlorine residuals being detected in 3 of the 8 compliance monitoring samples between January and June 2014. While this was not the cause of the *E. coli* failures (since the primary chlorine dose was adequate there must have been a source of ingress into the system) if sufficient residual was present it could have prevented the incident from occurring.

Irish Water need to carry out a comprehensive review of the disinfection strategy in the Wicklow Regional PWS to ensure that there is at least 0.1 mg/l present at consumers taps at the extremities of the network.

4. RECOMMENDATIONS

1. Irish Water should carry out a review of the disinfection strategy in the Wicklow Regional PWS. This should include a review of the adequacy and appropriateness of the primary dose and whether and where there is need for secondary chlorination in the network capable of ensuring at least 0.1 mg/l free residual chlorine in the distribution network at all times.
2. Irish Water should review the effectiveness of the remedial measures undertaken at the Mariners Point reservoir to determine if they have been successful in increasing the chlorine residual to a sufficient level (at least 0.1 mg/l) and eliminated microbiological contamination in that part of the distribution network.
3. If the remedial works in the Mariners Point reservoir are not successful Irish Water should consider short term contingency measures such as the installation of a temporary chlorination system in order to enable the removal of the boil water notice as soon as possible.
4. Irish Water should replace the covers on the Mariners Point reservoir with secure, lockable covers that prevent ingress.
5. Irish Water should investigate the cracks in the Ballyneerin and Seacrest reservoir roofs to determine if they are enabling ingress into the reservoirs.
6. Irish Water should fix the concrete around the vent at Ballyguile Reservoir to prevent ingress or decommission the reservoir as outlined by Irish Water during the audit.
7. Irish Water should take action to prevent burning or other illegal activity in the vicinity of the Seacrest reservoir. The area in the vicinity of Seacrest Reservoir should be cleaned up.
8. Irish Water should provide for access to the SCADA at the Cronroe water treatment plant.
9. Irish Water should seal the hole in the floor of the water treatment works to reduce the potential for any spillages on the floor of the water treatment works entering the final treated water.
10. Irish Water should carry out an investigation into the disinfection strategy in Wicklow and outline what actions are to be taken to ensure that at least 0.1 mg/l free residual chlorine is present in the schemes listed in the EPA email of 13th October 2014.

FOLLOW-UP ACTIONS REQUIRED BY THE LOCAL AUTHORITY

During the audit the Water Services Authority 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 Mr Brendan Wall, Manager (Environmental Enforcement).

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 (especially in relation to insufficient chlorine residuals in networks) 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:

10th November 2014

Darragh Page

Inspector



Photo 1. Hole observed in the floor of the Cronroe WTP leading to the filtered water channel.



Photo 2. Crack observed in the roof of the Ballyneerin Reservoir.



Photo 3. Evidence of burning at the Seacrest Reservoir.



Photo 4. Crack observed in the roof of the Seacrest Reservoir.