



# Drinking Water Audit Report

<b>County:</b>	Mayo	<b>Date of Audit:</b>	22 February 2016
<b>Plant(s) visited:</b>	Crossmolina Water Treatment Plant	<b>Date of issue of Audit Report:</b>	3 March 2016
		<b>File Reference:</b>	DW2015/141
		<b>Auditors:</b>	Ms Derval Devaney Ms Michelle Roche
<b>Audit Criteria:</b>	<ul style="list-style-type: none"> <li>• The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>.</li> <li>• The <i>EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)</i></li> <li>• The recommendations specified in the <i>EPA Drinking Water Report</i>.</li> <li>• EPA Drinking Water Advice Notes No.s 1 to 15.</li> </ul>		

## MAIN FINDINGS

- i. **It was unclear if the supply was adequately disinfected due to the absence of the chlorine contact time calculation for the supply.**
- ii. **The disinfection treatment was not robust; the chemical used was out of date, there was lack of control on the chlorine dose and the chlorine monitor was displaying a fault.**
- iii. **The raw water source was not being monitored or characterised and therefore it was unclear if the treatment was sufficient to supply safe and secure water at all times.**

## 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.

The Crossmolina Public Water Supply (PWS) is sourced from a Spring at Tobermore and serves a population of 1,785 and a volume of 700 – 900 m<sup>3</sup>/day. The plant operates continuously, 24/7. Disinfection is the only form of treatment on the supply.

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

The opening meeting commenced at 2 pm at the Crossmolina 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:

Enda Judge – Caretaker; Mayo Co. Co.

Mark O'Donnell – A/Executive Engineer, Mayo Co.Co.

Eddie Munnely – Senior Executive Engineer, Mayo Co.Co.

Sean Higgins - Operations & Maintenance Engineer, Irish Water

Patrick O'Sullivan, Water Compliance Analyst – North West, Irish Water

Representing the Environmental Protection Agency:

Ms Derval Devaney, Inspector

Ms Michelle Roche, 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. Source Protection

- a. The spring at Tobermore was supplying 700 m<sup>3</sup>/day of water to the Crossmolina PWS on the day of the audit. This can increase to 900 m<sup>3</sup>/day in response to increased demand in the town.
- b. There are two pipes (5" and 6") which abstract water from the spring by gravity feed to the reservoir 1km away.
- c. There is a tee fitting on the 6" pipe which splits the flow to also serve the Moylaw Group Water Scheme. This scheme has UV treatment only on its supply.
- d. Raw water monitoring is not carried out on the source. A raw water characterisation study was not carried out on the supply to determine any trends in water quality to ensure the current treatment system is sufficient.
- e. The *Cryptosporidium* risk score for the site, using the EPA's excel tool, is 47 (low risk). However Irish Water's Risk Characterisation (based on land use, pressures in the catchment, etc.) deems the supply to be G4, high risk, with a 4-log *Cryptosporidium* removal required in the treatment process. This log removal is currently not in place at the plant.
- f. There is no routine *Cryptosporidium* or turbidity monitoring carried out on the raw water source.
- g. There was no knowledge if source protection measures were carried out by Mayo County Council's Environment Section in the catchment of the source water.
- h. The Water Framework Directive Site Information Report for Crossmolina PWS carried out in August 2011 which delineates a Zone of Contribution (ZOC) for the source was referred to by the auditors during the audit. It was not known if landowners within this zone were written to in relation to their requirements under the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014* (SI No.31 of 2014).
- i. Irish Water stated that this supply falls within the raw water characterisation study and *Cryptosporidium*, turbidity and UVT monitoring will be included in this monitoring programme which is to commence this year. Such a study will determine if current treatment is adequate and if the source is viable for retention into the future.
- j. The spring source contained various items of plastic and its cover was rusted (see Photo 1).

<p><b>2.</b></p>	<p><b>Disinfection</b></p> <ol style="list-style-type: none"> <li>a. Chlorination using sodium hypochlorite 14% (PCS No. 98058) is the only form of treatment on the supply. Dosing occurs next to the source.</li> <li>b. Chlorine is dosed at a fixed rate and it was stated that this rate rarely changes. There is no flow meter on the raw water abstraction.</li> <li>c. There is a duty and standby chlorine dose pump which do not alternate automatically but are manually alternated every 2-3 weeks by the caretaker.</li> <li>d. Chlorine is dosed into the 5" pipe located in the spring (See Photo 1). The raw water from the 6" pipe (which also serves the Group Water Scheme) is not chlorinated and merges with the 5" supply prior to entry to the reservoir located 1km away. Therefore the 6" pipe serving the Swinford PWS does not receive chlorine until it merges with the 5" pipe.</li> <li>e. The disinfection contact time calculation provided during the audit (33 minutes) was calculated on the basis that both abstraction pipes receive chlorination and therefore did not reflect the current situation at the plant. It is therefore doubtful that the supply is being adequately disinfected (25 minutes contact time is required and 33 minutes is provided assuming both pipes are chlorinated).</li> <li>f. The chlorine monitor was calibrated by an external contractor on the morning of the audit which resulted in setting off an alarm on the monitor. There was doubt that the dial out alarm facility was working as a result of these works and it was stated that the contractor was due to return to address the matter without delay.</li> <li>g. In the event of an alarm the General Services Supervisor and caretaker receives a text and there is a cascade system in place to respond to an alarm.</li> <li>h. The chlorine monitor readings are archived at the Machinery Yard in Castlebar, Co. Mayo and overseen by a designated person in Mayo Co. Co.</li> <li>i. It was stated that there were plans to replace the current monitor with a CL17 monitor and that this supply falls under the Disinfection Programme.</li> </ol>
<p><b>3.</b></p>	<p><b>Treated Water Storage and Distribution Network</b></p> <ol style="list-style-type: none"> <li>a. The reservoir stores 250m<sup>3</sup> (1/3 day) water. Water is boosted 300 m post the reservoir to the mains to serve the entire distribution networks.</li> <li>b. There is a ball-cock on the reservoir which shuts-off supply from the spring source when demand reduces in the network. It was stated that this was installed at a time when spring levels were low and to avoid wastage of water due to overflow from the reservoir. If such event was to occur the chlorine dose would continue to be delivered to the supply at source.</li> <li>c. There was no mesh on the vents on the reservoir.</li> <li>d. It was stated baffles will be inserted in the reservoir if investigations show preferential flow exists in the storage tank.</li> <li>e. The chlorine monitor's sampling point is at the outlet of the reservoir. The chlorine target leaving the booster station is 0.5 mg/l and this is the low alarm set-point. The high alarm set-point is 1 mg/l. The chlorine analyser readout was 0.76 mg/l.</li> <li>f. There is a flow meter on the booster station.</li> </ol>
<p><b>4.</b></p>	<p><b>Monitoring and Sampling Programme for treated water</b></p> <ol style="list-style-type: none"> <li>a. Compliance monitoring results were reviewed during the audit and were in compliance with the Drinking Water Regulations, 2014. THMs is monitored 4 times per year and varied from 11 – 18 ug/l. TOC was 1.53 - 1.8 mg/l.</li> <li>b. The caretaker records chlorine residuals monitored in the network in the supply's daily log book. Chlorine is monitored at various points around the town (graveyard, pitch, Mackens) once or twice per week but not always at the end of the network to ensure 0.1 mg/l is being maintained. The chlorine concentrations reviewed during the audit were satisfactory.</li> </ol>
<p><b>5.</b></p>	<p><b>Chemical storage and bunds</b></p> <ol style="list-style-type: none"> <li>a. One drum of sodium hypochlorite is used each week and the drum that was used on the morning of the audit had expired; the use-by date on the drum was 12/01/16 (see Photo 2).</li> </ol>

<b>6.</b>	<p><b>Hygiene and Housekeeping</b></p> <p>a. Network flushing is not routine on the supply and only takes place after a network leak or burst repair.</p>
<b>7.</b>	<p><b>Management and Control</b></p> <p>a. It was stated that the distribution network is prone to bursts where old cast iron or asbestos mains are present and while much work has been done to reduce leakage through repair or replacement of mains, there remains some problematic areas in the network.</p>

### 3. AUDITORS COMMENTS

Compliance in the network is heavily dependent on the spring's raw water quality. The EPA is concerned that there is lack of communication with the Environment Section in Mayo County Council on what source protection measures are in place, if any, in the catchment.

The EPA has concerns over the robustness of the treatment provided, as it is not known if the water is being disinfected in accordance with the WHO Guidelines to provide adequate contact time. In addition, the operation of the plant heavily depends on manual adjustments to the process but without the knowledge of the raw water quality, due to lack of raw water monitoring and online raw water monitors (e.g. flow and turbidity).

The recommendations outlined below should be put in place so as to increase the security of the supply and robustness of the treatment provided.

### 4. RECOMMENDATIONS

#### Source Protection

1. Irish Water should ensure that the source protection and catchment risk assessment score for the *Cryptosporidium* risk assessment is reviewed in detail and appropriate measures implemented to reduce unacceptable risk.
2. Irish Water should take action to ensure that the source is free from contamination by man-made materials (e.g. plastic) and its cover is adequately sealed and is fit for purpose for use in the water treatment process (e.g. free from rust and dirt).
3. Irish Water should (i) carry out monitoring on the raw water source and should include monitoring for *Cryptosporidium*, *E.coli* bacteria, turbidity and UVT as an indicator of trends in assessing water quality and to determine the degree of treatment and controls required in the supply and (ii) install a continuous online turbidity monitor on the raw water source with a digital read-out which alerts the plant operator of any deterioration in water quality.
4. Irish Water should establish links with the Environment Section of Mayo County Council and liaise with the River Basin District team responsible for implementing the Water Framework Directive to ensure that they are aware of the raw water abstraction point and importance of its protection. Irish Water should collaborate with these stakeholders to identify all potentially polluting discharges into the catchment (ZOC) of the water source and implement mitigation measures, where appropriate, to reduce the potential impact of these discharges.
5. Irish Water should liaise with the Environment Section of Mayo County Council in relation to the requirements of the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014* (SI No.31 of 2014) to ensure, unless an alternative setback distance has been set as per Article 17 that:
  - (i) Organic fertiliser or soiled water is not applied to land within 200 m of the abstraction point; and

- (ii) Farmyard manure held in a field prior to landspreading is not placed within 250 m of the abstraction point.

### **Disinfection**

- 6. Irish Water should calculate the current contact time for chlorine disinfection to ensure that the effective contact time achieved is 15mg.min/l and that the first connections post the reservoir are receiving appropriately disinfected drinking water. Irish Water should submit a calculation of the effective contact time to the Agency without delay.
- 7. Irish Water should take immediate action to ensure that the continuous chlorine residual monitor on the final water is fully serviced and operating optimally.
- 8. Irish Water should (i) install automatic switch over of the duty and standby chlorine dosing pump to avoid inadequate chlorination in the event of the failure of one of the pumps, (ii) ensure that dosing of chlorine is flow proportional or is linked to the residual chlorine monitor. Where the dosing pump is fixed Irish Water should replace the pump(s) with flow proportional pumps or pumps capable of dosing based on the residual chlorine monitor.
- 9. Irish Water should ensure that chlorine residual is monitored at the extremities of the network at least twice weekly to ensure concentrations of at least 0.1 mg/l are being maintained in the network.

### **Treated Water Storage**

- 10. 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 and there is a complete mixing (i.e. no preferential flows through the tank) in the reservoir and that no stagnant areas exist.

### **Chemical Storage and Bunds**

- 11. Irish Water should put a system in place so that stocks of reagents and chemicals kept on-site are regularly checked to ensure chemicals used in the treatment process are within the use-by date.

### **Management and Control**

- 12. Irish Water should have a leakage management programme in place to reduce the amount of leaks, bursts and unaccounted for water on the supply.

## **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.

With the exception of Recommendations 7 & 8, 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.

A response to Recommendations 7 & 8 should be submitted to the EPA no later than Wednesday 9<sup>th</sup> March 2016.

**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:**

03/03/2016

---

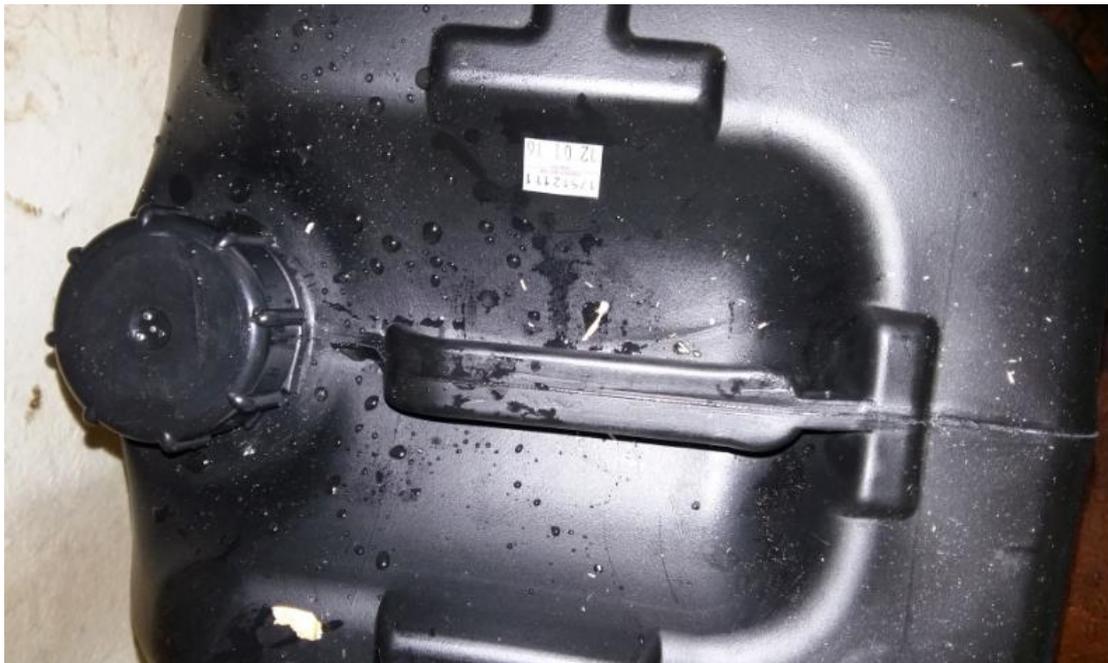
Derval Devaney

Inspector



Chlorine dose lines to 5" pipe

**Photo 1** Intake area - containing waste such as black piping, plastic bag and tags and rusted cover.



**Photo 2** Used Sodium Hypochlorite 25L drum with use-by date of 12/01/16.