



# Drinking Water Audit Report

<b>County:</b>	Cork	<b>Date of Audit:</b>	02/04/19
<b>Plant(s) visited:</b>	Crookhaven Drinking Water Treatment Plant  (Scheme Code 0500PUB4501)	<b>Date of issue of Audit Report:</b>	30/04/19
		<b>File Reference:</b>	DW2016/184
		<b>Auditors:</b>	Ms Criona Doyle
<b>Audit Criteria:</b>	<ul style="list-style-type: none"> <li>• The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014) as amended.</i></li> <li>• <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></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> <li>• The recommendations in any previous audit reports.</li> </ul>		

## MAIN FINDINGS

- i. **The purpose of the audit was to assess the suitability of the Crookhaven Public Water Supply for removal from the EPA's Remedial Action List (RAL). The Crookhaven PWS is on the EPA's RAL since January 2017 for elevated levels of trihalomethanes (THMs) above the standard in the Drinking Water Regulations.**
- ii. **A granular activated carbon filtration system has been installed to reduce the levels of trihalomethanes in the final water. Irish Water have provided verification data to demonstrate the effectiveness of the works. Crookhaven PWS will be recommended for removal from the RAL to be published at the end of April 2019.**
- iii. **Irish Water should install continuous online turbidity monitors on the filtered water from each of the slow sand filters and on the combined filtered water to inform the management of the treatment process. These monitors should be linked to a recording device and generate an alarm in the event of a deviation from the acceptable operating range of the filters.**

## 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. The Crookhaven public water supply (PWS) has been on the EPA's Remedial Action List (RAL) since January 2017 due to elevated levels of trihalomethanes. This audit was carried out to assess the remedial works undertaken to reduce the levels of trihalomethanes in the final water and to determine if the supply can be removed from the RAL.

The raw water for the supply is obtained from an impoundment located adjacent to the treatment plant. According to the EPA's EDEN system the Crookhaven PWS supplies a population of 136 with an average volume of approximately 93m<sup>3</sup>/d. There is a high summer demand associated with the tourist season when the demand can increase up to 200m<sup>3</sup>/d. Treatment consists of slow sand filtration, granular activated carbon (GAC) filtration and chlorination. The GAC filtration system was commissioned in February 2019 to reduce the levels of THMs.

The opening meeting commenced at 1pm at the Crookhaven 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 audit observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

**Representing Irish Water:**

Tommy Roche, Drinking Water Compliance Analyst  
 Oliver Harney, Water Engineer

**Representing Cork County Council:**

Michael Russell, Acting Senior Executive Engineer  
 Seamus Sutton, Executive Engineer  
 Ritchie Delaney, Caretaker  
 Barry O’Meara, Relief Caretaker

**Representing the Environmental Protection Agency:**

Criona Doyle, 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.	<p><b>Remedial Works</b></p> <ul style="list-style-type: none"> <li>a. A plug and play granular activated carbon (GAC) filtration system has been installed for the removal of trihalomethanes (THM). The GAC filtration system consists of 2 no. Jacobi Aqua Flow AF2000 Carbon Filters with Aquasorb 5000 media. The 2 no. units operate in series with the filtered water from the slow sand filters being passed through both GAC units.</li> <li>b. The units are rated for a maximum flow rate of 20m<sup>3</sup>/hr and are typically operated at 12m<sup>3</sup>/hr.</li> <li>c. No backwashing of the filters or run to waste is required. The GAC units can operate to a lower limit of 85% UVT. Irish Water said that the units will be replaced when the UVT goes below 90%.</li> <li>d. There is currently no continuous online monitoring of UVT taking place on site but units from two different manufacturer’s were in the process of being procured.</li> <li>e. UVT is currently being measured on a hand held unit 3 to 4 times a week by the caretaker and recorded in the plant log book.</li> <li>f. The most recent data recorded in the plant log, was a UVT of 99.4% on the final water on 29/03/19.</li> <li>g. The GAC filtration system has been operational since 19/02/2019. The GAC filters have not required replacement to date.</li> <li>h. The replacement GAC filters will be matured off site by the supplier and delivered to site and connected by the supplier as required. Both GAC filters will be replaced at the same time. It is estimated that changeover of the units will take 2 to 3 hours to complete on site. The filters will then be flushed to waste for a period of 1 to 2 hours before being brought back into supply.</li> </ul>
2.	<p><b>Source Protection</b></p> <ul style="list-style-type: none"> <li>a. The source is an impounded lake and the surrounding land includes a large area of outcropping bedrock. It was reported at the audit that there is no grazing of sheep, deer or cattle in the vicinity of the impoundment and none were observed on the day of the</li> </ul>

	<p>audit.</p> <p>b. The <i>Cryptosporidium</i> risk assessment was updated in 2016 with an overall <i>Cryptosporidium</i> risk score of 55.7 (moderate risk).</p> <p>c. Monitoring for <i>Cryptosporidium</i> and <i>Giardia</i> is undertaken once per year. There have been no detections to date.</p> <p>d. There is no turbidity monitor on the raw water intake.</p>
<b>3.</b>	<p><b>Slow Sand Filtration</b></p> <p>a. There are 3 no. slow sand filters on site.</p> <p>b. The media in each slow sand filter includes from the top: 700mm of silica sand; 150mm of 3mm to 6mm gravel layer; 100mm of 6mm to 12mm gravel layer; 100mm of 12mm to 25mm and 200mm of 25mm to 38mm gravel layer at base.</p> <p>c. The sand in the filters was last topped up in December 2018 and February 2019. The filters were last refurbished in 2012.</p> <p>d. A slow sand filter log book is kept on site to record details of the operations undertaken and the depth of the filter media removed / replenished.</p> <p>e. The plant records indicate that skimming takes place typically 3 times per year.</p> <p>f. The criteria for filter ripening following skimming are recorded in the filter log book and include the % reduction in bacteria and turbidity.</p> <p>g. There are no continuous online turbidity monitors installed on the raw monitor intake, individual slow sand filters or on the combined filtered water from the slow sand filters to assess the filter performance or to indicate when the filters require cleaning or are suitable to bring back into service. It was outlined that turbidity monitors would be installed by the end of May 2019.</p>
<b>4.</b>	<p><b>Disinfection</b></p> <p>a. The water is disinfected using 10-11% low bromate sodium hypochlorite. The contact time calculation indicated a contact time of 28.94 mg.min/l.</p> <p>b. There is no duty and standby pumping arrangement with automatic pump changeover. There are two pumps which operate on a duty and assist basis. The assist pump can provide 100% of the dose if required.</p> <p>c. Chlorine dosing is linked to the residual chlorine monitor located in the reservoir. The target residual chlorine level is 0.57 mg/l. On the day of the audit the monitor indicated a level of 0.58 mg/l.</p> <p>d. The date of manufacture (12/01/2019) was provided on the sodium hypochlorite drums but an expiry date was not provided on the drums.</p> <p>e. The low level chlorine alarm is set at 0.40 mg/l (15 minutes delay) which triggers automatic shutdown of the supply. The high level alarm is set at 1.50 mg/l. A cascade alert system is in place for alarms.</p>
<b>5.</b>	<p><b>Treated Water Storage and Distribution Network</b></p> <p>a. The twin celled reservoir was cleaned in March 2019.</p> <p>b. Monitoring of the residual chlorine levels is undertaken 3 times a week at the end of the network.</p> <p>c. The water main flushing log indicated regular flushing and scouring of the mains takes place typically 4 times per annum.</p>
<b>6.</b>	<p><b>Management and Control</b></p> <p>a. A detailed and up to date plant manual was available. Good record keeping was observed to be taking place on site.</p> <p>b. The details on treatment provided on EDEN do not include the recent upgrades to the treatment process.</p>

### 3. AUDITORS COMMENTS

The purpose of the audit was to assess the suitability of the Crookhaven PWS for removal from the RAL. The audit confirmed that the installation of the GAC filtration units has been completed. The supply has been in compliance with the THM parametric value since the granular activated carbon filters were commissioned on the 19/02/19. The audit confirmed that the works associated with the GAC filters have

been satisfactorily completed. The Crookhaven PWS will be recommended for removal from the RAL to be published at the end of April 2019.

There are no turbidity monitors in place at the plant to confirm that the slow sand filters are correctly operating. It is recommended that Irish Water install continuous online turbidity monitors on the raw water intake, after each slow sand filter and on the final treated water without delay.

#### **4. RECOMMENDATIONS**

##### **Remedial Works**

1. Irish Water should install continuous online UVT monitors on the outlets from the GAC filters. The monitors should be linked to a recording device and generate an alarm in the event of a deviation from the acceptable operating range of the filters. Daily monitoring should be undertaken using the hand held unit until the continuous online monitors have been installed.

##### **Slow Sand Filtration**

2. Irish Water should install continuous online turbidity monitors on each slow sand filter and the final treated water at the treatment plant without delay. The monitors should be linked to a recording device and generate an alarm in the event of a deviation from the acceptable operating range of the filters.

##### **Disinfection**

3. Irish Water should ensure that there are duty and standby chlorine dosing pumps with automatic switchover in the event of the failure of one of the pumps.
4. Irish Water should review the location of the chlorine monitor to ensure it is at a suitable location to verify adequate disinfection. Irish Water should confirm the estimated completion date for the disinfection upgrades proposed under the Cork County Disinfection Programme and provide details of the proposed works.

##### **Management and Control**

5. Irish Water should update the data on the EPA's EDEN portal in terms of the treatment provided and the *Cryptosporidium* Risk Score.

#### **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 Regina Campbell, 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:**

*Críona Doyle*

**Date:**

30/04/19