Drinking Water Audit Report

County:	County Cork	**Date of Audit:**	25/03/2015
Plant(s) visited:	Midleton (0500PUB2406)	**Date of issue of Audit Report:**	30/03/2015
		File Reference:	DW2014/404
		Auditors:	Ms. Cliona Ní Eidhin Ms. Michelle Roche
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)*. • *The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)* • The recommendations specified in the EPA Report on *The Provision and Quality of Drinking Water in Ireland*. • The recommendations in any previous audit reports.		

MAIN FINDINGS

i. The Midleton drinking water treatment plant is undergoing systems and process upgrade works at present which were instigated in response to the December 2015 aluminium exceedance. These works should be completed and an assessment of compliance with the aluminium parametric value undertaken and submitted to the EPA.

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 of the failure on 16/12/2014 to meet the aluminium parametric value specified in the Regulations.

Where the text makes reference to 'the Water Service Authority' (WSA) this refers to Irish Water in accordance with Section 7 of the Water Services (No. 2) Act 2013.

Supply Information

The Midleton Public Water Supply (PWS), constructed in 1968, is located in East Cork some 23 km east of Cork City and 1.5 km north of Midleton town. The supply has one raw water source; the Owenacurra River. The abstraction point is located approximately 1.5 km upstream of Midleton town centre. Design treatment capacity is 200 m^3/hr and the plant is currently operating at a throughput of 135 m^3/hr. The Midleton PWS serves a population of 8851.

Treatment at the Midleton plant comprises the following processes:

- Flocculation and coagulation using Poly Aluminium Chloride (PAC) (primary coagulant) and Polyelectrolyle (coagulant aid)
- Clarification
- Rapid gravity sand filtration
- Fluoridation

- Disinfection with sodium hypochlorite

Final water is stored in a single 2-celled reservoir located at the treatment plant prior to distribution. There are no other reservoirs in the network and no chlorine boosting takes place. The Midleton distribution network is short with the population served concentrated within the Midleton urban area. The distribution network has interconnectors to the adjacent Tibbotstown (to the west) and Whitegate (to the south) public water supply zones.

The Midleton treatment plant operates 24 hours per day and has an assigned Water Curator who attends the plant 40 hours per week including weekends as required. The site is locked when not attended.

Irish Water advised that a Process Optimisation audit of this plant has not yet taken place and is not scheduled, however it may be examined at some stage.

The opening meeting commenced at 10.00am at the Midleton treatment plant. The scope and purpose of the audit were outlined at the opening meeting. The audit process consisted of interviews with staff, reviews of records and observations made during an inspection of the source, treatment plant and reservoir. The audit observations and recommendations are listed in Section 2 and 4 of this report. Photographs taken by Cliona Ní Eidhin during the audit are attached to this report and are referred to in the text where relevant.

The following were in attendance during the audit and closing meeting:

Representing Irish Water:
Paddy Crowley – Water Services Engineer, Cork County Council Dave Sheehan – Executive Scientist, Cork County Council Kevin Murphy – Water Engineer, Irish Water Liam Lynch – Senior Executive Engineer, Cork County Council Billy Horgan – Water Curator, Cork County Council
Representing the Environmental Protection Agency:
Cliona Ní Eidhin – Inspector 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 intake point from the Owenacurra River was visited during the audit. Some items of construction-type debris were noted to be scattered in the river bed and bank areas in the immediate vicinity of the intake. They were noted to pose no apparent risk to water quality. b. The ownership and status of forestry sites upstream of the intake was unknown. The WSA advised that tree felling had taken place in recent years and the Owenacurra River had become flashier in its flow characteristics. It was not known by the WSA if replanting and associated pesticide use had taken place or was scheduled to take place.
2.	**Monitoring and Sampling Programme for raw water** a. The WSA informed the auditor that an application for a new 'surface scanner' turbidity monitor at the intake had been submitted to Irish Water for consideration and was hoped to be in place within 2 months.

3.	**Coagulation, Flocculation and Clarification** a. The coagulation, flocculation and clarification stages of the treatment process were examined as part of the audit. b. The WSA informed the auditors that a static mixer would be installed shortly after the coagulant injection points. This measure was proposed towards optimising the coagulation process and is one of the measures being enacted to address elevated aluminium. The WSA also advised that an application had been made to replace the current lamella plates with tube settlers. No timeframe for this has been identified as yet. c. Coagulant aid (Polyelectrolyte) is currently dosed via a temporary hose arrangement. The WSA confirmed that the design and installation of permanent polyelectrolyte apparatus was intended to take place in the near future. d. Clarifiers were examined during the audit and no issues of concern were observed. There was no floc carryover into the decanting channels.
4.	**Filtration** a. Three rapid gravity sand filters are in place at the Midleton drinking water treatment plant and were examined during the audit. b. Refurbishment and media replacement had recently been undertaken in filters 1 and 2. On the day of the audit, this work was in progress at filter 3. c. The filtration rate was not known at the time of the audit. d. Turbidity monitors were confirmed to be in place on each filter (reading 0.033, 0.030) and on combined filtered water (reading 0.116) at the time of the audit. e. The backwashing of one of the filters was observed as part of the audit. The backwash cycle was noted to be manually controlled and subject to run for as long or as short as the duty curator decides is necessary based on visual inspection. The water cycle of the backwash is continued until the water appears to be running clear on visual inspection by the curator. No target turbidity is set to govern the duration of the backwash programme. The turbidity monitor on the filter being backwashed is generally switched off by the curator at the start of backwashing. f. No target turbidity is set to govern the duration of the run-to-waste phase prior to returning the filter to production. Turbidity monitors generally remain switched off by the curator for this phase. The duration of the 'run to waste' phase is currently determined by visual inspection. The protocol for determining the length of the 'run to waste' phase and returning a filter to use after a backwash is documented in the Plant Operating Manual. g. The filters displayed no apparent media issues during filtration or during the backwash.
5.	**Sludge Management** a. Sludge handling at the plant was reviewed and no concerns were noted by the auditor. Sludge bled from the clarifiers, backwash water from the filters, and filtered water for the 'run to waste' phase after backwashing is discharged to the sludge settling tank located within the treatment plant site. Supernatant from the sludge settling tank is discharged to sewer and conveyed for treatment at Midleton waste water treatment plant. Sludge is collected by a contractor and disposed of at a licensed facility.
6.	**Chlorination and Disinfection** a. A chlorine monitor is in place at the outflow from the reservoir at the plant. A chlorine residual of 0.7 mg/l is aimed for in water at this point. The chlorine monitor was reading 0.84 mg/l when inspected. The chlorine monitor is alarmed with a low level set-point of 0.5 mg/l. Triggering this alarm shuts down the plant automatically via the SCADA.
7.	**Fluoridation** a. Fluoride is dosed by a single dosing pump. The WSA informed the auditors that an application for upgrade of the fluorosilicic acid day-tank storage and dosing room had been submitted to the relevant authority.

8.	**Treated Water Storage** a. The reservoir at the treatment plant site was constructed in 1968 and comprises two cells. One cell was cleaned and tested in November 2014 and the second cell was cleaned and tested in January 2015. Vents were of an old design but were confirmed to be adequately secured with an insect-proof mesh. Inspection hatches were confirmed to be locked and sealed in place. They did not, however, provide ease of access for inspection purposes; the WSA advised that the installation of accessible hatches is proposed but no timeframe for completion has been identified as yet.
9.	**Exceedances of the Parametric Values** a. The WSA notified the EPA on 30/12/2014 of an exceedance (431 µg/l) of the Aluminium parametric value in a sample taken on 16/12/2014. The programme of works ongoing at the plant is aimed at optimising treatment processes and controls towards managing and maintaining compliance with this parameter.
10.	**Chemical storage and bunds** a. The Poly Aluminium Chloride day tank was not bunded. (See **Photograph No. 1**)
11.	**Hygiene and Housekeeping** a. The treatment plant was noted to be maintained in moderate condition, in terms of hygiene and housekeeping. Whilst tiled channels were clean, the tilework on these water channels was aged and damaged in a number of areas. Peeling paintwork on ceilings and light dust/debris on window sills were noted and require attention. (See **Photograph No. 2**) The WSA was aware of these issues and expressed an intention to address them.
12.	**Management and Control** a. A good Treatment Plant Manual has been prepared for the Midleton plant and was reviewed in brief as part of the audit. Good labelling of various points in the treatment process was noted throughout the plant. b. A toilet is located within the plant building. Waste is directed to a septic tank located within the treatment plant site some distance from any final water and did not raise any concerns.

3. AUDITORS COMMENTS

The Midleton drinking water treatment plant was found to be undergoing systems upgrade throughout the coagulation, flocculation, clarification and filtration processes which was instigated following the aluminium exceedance in December 2014. Progress in respect of some of these upgrade measures was noted during the audit and plans with timeframes were noted for others.

Automatic shut-off based alarm set-points for three continuously monitored parameters, ammonia (at 300 ppb), chlorine (at 0.5 mg/l) and turbidity (at 1.5 NTU in settled water), form critical element of the supply's security and ability to respond appropriately to changing raw water conditions. This security will be further enhanced by the installation of online turbidity monitoring of raw water.

The completion of minor improvement work at the Midleton plant on foot of recommendations made at previous EPA audits of other supplies was noted and is commendable.

4. RECOMMENDATIONS

Source Protection

1. **Source Protection:** Irish Water should remove items of construction-type debris from the river bed and bank at the intake from the Owenacurra River. Whilst the items observed were acknowledged to be of apparent inert material (e.g plastics, concrete, cladding materials) and unlikely to pose a threat to water quality, they should be removed.

2. **Source Protection:** Irish Water should identify the owner(s) / manager(s) of forestry areas upstream of the intake and establish communication with them regarding activities which have potential to impact on raw water quality.

Rapid Gravity Sand Filtration

3. **Filtration:** Irish Water should submit the filtration rate for the rapid gravity sand filters and ensure that this is documented in the plant manual. It should be ensured that the filtration rate does not exceed 7.5 m^3/ m^2/hour ;

4. **Filtration:** Irish Water should follow the guidance as specified in the EPA publication "*Water Treatment Manual on Filtration*". In particular, it should be ensured that following backwashing, the filters are run to waste for an appropriate period of time, until a target turbidity is reached or both or that there is a fixed period slow start when the filter is brought back into use. These criteria should be documented in the plant manual and strictly followed each time a filter is backwashed.

Treated Water Storage

5. **Treated Water Storage:** Irish Water should ensure that inspection hatches on the reservoir provide ease of access as required for inspection or operational purposes.

Chemical Storage and Bunds

6. **Chemical Storage and Bunds:** Irish Water should ensure that the poly aluminium chloride day-tank is adequately bunded.

Management and Control

7. **Management and Control:** Irish Water should submit a schedule of all process upgrade works ongoing or planned for the Midleton treatment plant with an update on progress and estimated time for completion. The schedule of works should include the installation of a 'surface scanner' turbidity monitor at the intake, the installation of a static mixer post PAC

dosing, installation of permanent and optimised polyelectrolyte dosing arrangement, installation of baffle plates post polyelectrolyte dosing and filter refurbishment.

8. **Management and Control:** Irish Water should schedule a sampling programme for aluminium to take place on completion of the schedule of improvement works to verify compliance in aluminium levels in final water. The proposed sampling programme should be submitted to the EPA. Results should be submitted to the EPA when available.

Hygiene and Housekeeping

9. **Hygiene and Housekeeping:** Irish Water should attend to general hygiene and housekeeping at the plant and ensure that this is maintained to standard through routine tidying and cleaning of surfaces.

FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

During the audit the Water Services Authority representatives were advised of the audit findings and that action must be taken as a priority by the Water Services Authority to address the issues raised. This report has been reviewed and approved by Ms Yvonne Doris, Drinking Water Team Leader.

The Water Services Authority should submit a report to the Agency within one month of the date of issue of this audit report detailing how it has dealt with the items of concern identified. The report should include details on the actions 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 **DW2014/404** in any future correspondence in relation to this report.

Report prepared by: Cliona Ní Eidhin **Date:** 30/03/2015

Cliona Ní Eidhin, Inspector

Photograph No. 1: PAC day-tank not bunded.

Photograph No. 2: Hygiene and Housekeeping: tilework on water channels in need of repair.