



Drinking Water Audit Report

County:	Wexford	Date of Audit:	24 th July 2014
Plant(s) visited:	Wexford Town Public Water Supply (Newtown treatment plant)	Date of issue of Audit Report:	1 st September 2014
		File Reference:	DW2014/229
		Auditors:	Ms Yvonne Doris
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>. • 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> • 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. **The Wexford Town (Newtown) treatment plant is generally a well operated plant. However, there are some opportunities to optimise the treatment processes at the plant, in particular, continuous online monitoring of raw water colour, optimisation of coagulation/flocculation processes and upgrading of filters.**
- ii. **Further work should be carried out on source protection and to ensure prompt and effective response to alarms.**

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 23rd April 2014 of an electrical failure that led to a shutdown of the Newtown treatment plant on the night of 5th-6th April. Where the text refers to the Water Service Authority this refers to Irish Water in accordance with Section 7 of the Water Services (No. 2) Act 2013.

Wexford Town PWS supplies 7,200m³/day to a population of 25,000. The supply expanded to include the Taghmon area of County Wexford about 4 years ago. The main source for the supply is the Sow river, with the intake at Edenvale and during times of peak demand the supply is augmented by the Coolree impoundment reservoir. Treatment at the Newtown plant comprises coagulation, settlement, rapid gravity filtration, chlorination and fluoridation. There is between 35 to 40% leakage from the network.

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

The opening meeting commenced at 09.00am at the Newtown drinking 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: (* indicates that person was also present for the closing meeting)

Name – Job Title

Kieran Cullinane, Irish Water Above Ground Level Lead*

James Whelan, Senior Executive Engineer, Operations, Wexford County Council*

Paul Delahunty, Quality Engineer, Wexford County Council*

Noel Maguire, Permanent Caretaker, Wexford County Council*

Tony Quirke, Area Engineer, Wexford County Council*

Representing the Environmental Protection Agency:

Name – Job Title

Yvonne Doris, 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 <ul style="list-style-type: none">a. There are two sources to the supply – the Sow river and the Coolree Impoundment Reservoir, served by a stream source.b. Wexford County Council has written to all farmers with land within the setback distances for the Sow river under the <i>European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014)</i> to ensure that they were aware of the setback requirements. This has not been done for the river serving the Coolree Impoundment reservoir.c. Continuous raw water monitoring for pH, turbidity and ammonia is in place for the Sow (Edenvale) river but there is no continuous monitoring of the Coolree water. A combined raw water sample is taken at the balancing tank daily.d. The <i>Cryptosporidium</i> risk assessment score is 121 very high risk.
2.	Coagulation, Flocculation and Clarification <ul style="list-style-type: none">a. The Newtown plant is operating at about 10% above its design capacity.b. Aluminium sulphate is injected at a concentration of 20mg/l as the water leaves the balancing tank and the contact time is between 12 and 15 minutes.c. Three hopper-bottomed clarifiers, built in the 1970s, operate in tandem. The clarifiers were last fully cleaned three years ago. The clarifier channels and walls are hosed down weekly. The clarifier walls appeared pitted which provides more opportunity for algal growth on the walls of the clarifier. The channel notches appeared to have a slightly uneven flow.d. The aluminium sulphate dosing point is at risk from damage due to its location behind the door into the storage area under the balancing tank (photograph 1). The storage area contains a lawnmower and various other materials.e. The sludge bleeds are constant and at the time of the audit clear water was observed flowing from the sludge bleeds (see photograph 2).
3.	Filtration <ul style="list-style-type: none">a. Three rapid gravity filters built in the 1970s are in place. There are turbidity meters on each of the filters.b. Filter walls are washed every three weeks. The filter walls appeared pitted which provides more opportunity for algal growth on the walls of the filter and much algal growth was observed on the walls of the filters.c. Filter sand depth was 600mm. The filter design sand depth is between 700 and 800mm. Wexford County Council (WCC) stated that a steel plate needed to be fitted to the filter

	<p>channel wall to increase the depth of the sand. Filter sand was replaced in April 2006.</p> <ul style="list-style-type: none"> d. Backwashing of the filters is done based on time (every 24 hours) or headloss of 1.7m. It is not done based on turbidity readings from the filters. The backwash sequence is a 5 minute air scour (rate unknown) followed by a water wash for 8 minutes ($7.7\text{m}^3/\text{minute}$). e. A backwash of filter 1 was observed during the audit. The air scour appeared uneven in one corner of the filter (photograph 3). WCC stated that the sand and some nozzles in filter 1 needed to be replaced. After the backwash turbidity readings were as follows: <ul style="list-style-type: none"> a. Raw water: 6.8NTU b. Clarified water: 0.233 c. Filter 1: 0.3NTU (backwashed filter) d. Filter 2: 0.135 NTU e. Filter 3: 0.121NTU f. Clear Water Tank: 0.131NTU f. After a backwash there is no facility to run the filter to waste. Typically a filter will stand for 35 minutes and following this standing period the outlet slowly opens over the next 20 minutes (a slow start).
<p>4.</p>	<p>Chlorination and Disinfection</p> <ul style="list-style-type: none"> a. Disinfection is with chlorine gas. Two duty and two standby cylinders with auto switchover in place dosing flow proportionally just prior to the clear water tank. b. A chlorine monitor at the outlet of the clear water tank was reading 0.65mg/l at the time of the audit. The monitor had been moved the previous day and it was expected that readings would settle down in the next few days and would be recalibrated. The monitor has a low alarm set point of 0.4mg/l and a high alarm set point of 1.3mg/l. The chlorine alarm dials out to the caretaker, supervisor and area engineer at the same time. There is no cascade system in place. Out of hours response to alarms is in place. The caretaker lives 5 minutes away and responds to out of hours alarms. c. Residual chlorine readings are taken by the caretaker once a week in the network, including the ends of the network. Sampling teams take check samples (including residual chlorine readings) twice a month.
<p>5.</p>	<p>Treated Water Storage and Distribution Network</p> <ul style="list-style-type: none"> a. The leakage rate is approximately 35-40%. Plant throughput has dropped from 7,800 to $7,200\text{m}^3/\text{day}$ through water conservation work done by WCC in the past few years. b. There is one clear water tank and two domed reservoirs at the plant. The two domed reservoirs have been inspected in the past two years and did not require cleaning. There are two reservoirs in Coolcots which feed the Ballindinas pumping station which serves the Shelmalier reservoir and the Knockbroad reservoir which serves Taghmon village. The two reservoirs in Coolcots were inspected 8 years ago and were cleaned then. The Shelmalier and Knockbroad reservoirs are 4 years old. c. The Coolcotts reservoirs could not be inspected on the day of the audit as ladders were not available to inspect the top of the reservoir. The plant caretaker stated that he had visited the reservoirs a few months ago - vent meshes were intact and access hatches were locked. d. The Shelmalier reservoir was visited during the audit. Re-chlorination is in place - duty and standby chlorine dosing pumps were in place but there was no automatic switchover between duty and standby chlorine pumps should the duty pump fail. A chlorine monitor at the outlet of the reservoir was reading 0.27mg/l at the time of the audit. The chlorine monitor is alarmed and dials out to the caretaker, supervisor and area engineer. The chlorine day tank holds two weeks supply of sodium hypochlorite. Reservoir vents were meshed and access hatches locked at the Shelmalier reservoir. WCC stated that the Knockbroad reservoir had meshed vents and locked access hatches. e. WCC stated that they plan to do implement a uni-directional flushing and scouring programme in County Wexford and this will include the Wexford Town supply
<p>6.</p>	<p>Monitoring and Sampling Programme for treated water</p> <ul style="list-style-type: none"> a. Check samples are taken in the network twice a month. b. Residual chlorine levels are taken in the network every week by the caretaker. c. 5 <i>Cryptosporidium</i> have been taken in 2014 and all were clear of <i>Cryptosporidium</i>.

7.	<p>Exceedances of the Parametric Values/Incidents</p> <p>a. On Friday 5th April there was a phased drop out/voltage drop in the electricity supply to the Newtown treatment plant. The compressors operating the inlet and outlet valves to the filters ceased to operate. The standby compressor failed to start up due to the electricity fault as did the second standby compressor. At this point the plant automatically shut down. The inlets and outlets to the filters closed. Dosing of aluminium sulphate, chlorine and fluoride all ceased as they all operate on a flow-proportional basis. No untreated or undisinfected water entered supply during the incident. There was no impact on final water quality as a result of the incident. A relief caretaker was operating the plant during when the incident occurred. The regular caretaker returned to the work at the Newtown plant on Monday 8th April and the plant was returned to normal operation. The incident was notified to the EPA on 30th May 2014.</p>
8.	<p>Chemical storage and bunds</p> <p>a. Fluoride dosing is flow proportional with duty and standby pumps operating with automatic switchover. Fluoride tanks were banded.</p> <p>b. All chemical deliveries are supervised.</p>
9.	<p>Hygiene and Housekeeping</p> <p>a. The storage area under the balancing tank contained a lot of material, some of which could be disposed of or stored elsewhere.</p> <p>b. Empty sodium hypochlorite drums were being stored at the Shelmalier re-chlorination house.</p>
10.	<p>Management and Control</p> <p>a. Monitors are calibrated by the caretaker when they don't correspond to bench tests. Monitors are calibrated by a WCC technician (frequency unknown).</p> <p>b. The raw water ammonia monitor has been out of order for the past three weeks. WCC are waiting for a part so the monitor can be repaired.</p>

3. AUDITORS COMMENTS

The Wexford Town (Newtown) treatment plant is generally a well operated plant. The EPA previously audited this treatment plant in 2010. Generally, the recommendations of this audit have been implemented. However, there are some opportunities to optimise the treatment processes at the plant, which were recommended in the 2010 audit report, in particular, continuous online monitoring of raw water colour, optimisation of coagulation/flocculation processes and upgrading of filters. Further work should be carried out on source protection and to ensure prompt and effective response to alarms.

4. RECOMMENDATIONS

Source Protection

1. The Water Services Authority should implement the requirements of the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014)* to ensure, for river supplying the Coolree Impoundment, 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.
2. The Water Services Authority should install a continuous automatic colour monitor at the raw water balancing tank to alert plant operators of any changes in raw water quality.

Coagulation, Flocculation and Clarification

3. The Water Services Authority should consider re-finishing of the clarifier walls to prevent excessive build-up of algae on the walls of the clarifier.
4. The Water Services Authority should ensure that the settled water outlet channels and the clarifier are cleaned on a regular basis to prevent build up of algae on the weirs and on the walls of the clarifier.
5. The Water Services Authority should undertake a review of the coagulation / flocculation processes at the water treatment works by way of a review by Irish Water process optimisation personnel. The review should take account of the recently published EPA Advice Note 15: Optimisation of Chemical Coagulation Dosing at Water Treatment Works available online at <http://www.epa.ie/pubs/advice/drinkingwater/dwadvicenote15.html>.
6. The Water Services Authority should investigate the efficiency of the sludge bleeds and should establish the optimum regime of sludge draw-off.
7. The Water Services Authority should ensure that settled water outlet channels are level, free from blockage and flow into these channels is even.

Filtration (General)

8. The Water Services Authority should consider re-finishing of the filter walls to prevent excessive build-up of algae on the walls of the filters.
9. The Water Services Authority should take measures to ensure that the design depth (700-800mm) of sand in the filters can be maintained and take appropriate action to prevent this loss of media. This was a recommendation in the report of the EPA audit of November 2010.
10. The Water Services Authority should replace the sand in filter 1 and test the effectiveness of filter media in the other two filters, replacing media if required.
11. The Water Services Authority should ensure that the air/water backwash is even across the filter and should ensure that air nozzles are fully functional and not blocked or damaged.

Disinfection

12. The Water Services Authority should install automatic switchover between duty and standby chlorine pumps at re-chlorination stations.

Distribution System

13. The Water Services Authority should instigate a regular programme of uni-directional flushing and scouring of the mains.

Hygiene and Housekeeping

14. The Water Services Authority should undertake a complete review of housekeeping and waste storage at the plant and take measures to ensure that the plant is kept well maintained, clean and tidy.

Management and Control

15. The Water Services Authority should implement a cascade system for all significant alarms to ensure that alarms are responded to promptly and effectively.

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 Mr Darragh Page, Drinking Water Team Leader.

The Water Services Authority is recommended to put such measures in place as are necessary to implement the recommendations listed in this report. The actions by Irish Water to address the recommendations taken will be verified by the Agency during any future audits.

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:**

Yvonne Doris

Date:

1st September 2014

Yvonne Doris

Inspector



Photograph 1: Aluminium sulphate injection point – liable to being damaged by plant



Photograph 2: Clear water from sludge bleeds



Photograph 3: Uneven air scour on Filter 1