



Drinking Water Audit Report

Local Authority:	Wexford County Council	Date of Audit:	29 th May 2012
Plant visited:	Castlemoyle WTP (3300PUB1589)	Date of issue of Audit Report:	11 th June 2012
		File Reference:	DW2012/65
		Auditors:	Mr Nigel Hayes Ms Yvonne Doris
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Communities (Drinking Water) (No. 2) Regulations, 2007</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. DAF coagulation is currently being bypassed at the plant as the low turbidity levels of the raw water do not allow the effective formation of floc.
- ii. The filter backwash was uneven throughout the filter. Large boils were observed in some parts of the filter and dead areas were observed in others.
- iii. The filter is brought back into operation after approximately 15 minutes. There is no turbidity monitor on the outlet of the filter to determine the turbidity levels of the post backwash filtrate.

1. INTRODUCTION

Under the *European Communities (Drinking Water) (No. 2) Regulations 2007* the Environmental Protection Agency is the supervisory authority in relation to the local authorities and their role in the provision of public water supplies. This audit was carried out in response to the notification by Wexford County Council of the detection of *Cryptosporidium* in the New Ross supply between the 2nd May and 28th May 2012.

The Castlemoyle drinking water treatment plant supplies water to approximately 6,000 people in the New Ross area. The Agency carried out an audit of the supply in February 2008 and all of the resulting audit recommendations have been complied with. Treatment at the plant consists of pH correction, Dissolved Air Flotation (DAF), filtration, fluoridation and chlorination.

The Castlemoyle plant is supplied by two sources, the Dranagh Source and the Poulmounty River. The Dranagh Source is infrequently used as the variation in colour has resulted in problems with chemical dosing. On the day of the audit, the Poulmounty River was the only source in operation. The Council advised that the *Cryptosporidium* Risk Screening Score for the supply is 202 (very high risk). Both sources are pumped directly to a balancing tank before being pumped to the Castlemoyle plant.

The plant is currently undergoing upgrade works. The current stream will receive a complete upgrade and a new stream is also due to come online. The works are due to be completed before the end of 2012. The additional stream will allow one stream to be taken out of commission for certain periods and will also allow smaller water volumes through individual streams during periods of variable raw water quality.

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

The opening meeting commenced at 10.00am at the Castlemoyle 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 Local Authority:

Name – Job Title

Gerry Forde – Senior Executive Engineer (Water Services)

Dan McCartan – Senior Executive Engineer (New Ross Area)

Peter Keogh – Caretaker

John Sheehan – Relief Caretaker

Paul Delahunty – Executive Engineer

Representing the Environmental Protection Agency:

Name – Job Title

Nigel Hayes – Inspector

Yvonne Doris – Inspector

Alan Forde – Observer

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. Dranagh source <ul style="list-style-type: none"> i. The source originates from an upland spring. ii. Forestry is the predominant feature of land use in the catchment. iii. Source protection works, including the erection of fencing, were carried out at the Dranagh impoundment approximately four months ago (see Photograph 1). iv. Online monitors measure ammonia, pH and turbidity of the source water. v. The Dranagh impoundment is inspected on a daily basis by water services personnel. b. Poulmounty source <ul style="list-style-type: none"> i. Agriculture is a predominant feature of land use in the catchment. ii. The Council advised that the source is supplemented by numerous tributaries. One of these tributaries appeared to have an animal access point (see Photograph 2).

	<ul style="list-style-type: none"> iii. Two WWTP's are located upstream of the source. iv. Land owners within the catchment have been instructed to contact the Council if they are undertaking any work tasks that may compromise the quality of the source water. v. Catchment surveys are on-going. To date, no single site has indicated that gross pollution is occurring, however, a number of sites have received Section 12 notices. vi. A drum screen is located at the source. vii. The water passes through a sand trap before being pumped to the balancing tank at Ballyleigh (see Photograph 3). viii. Online monitors measure ammonia, pH and turbidity of the source water. ix. On the day of the audit, the turbidity of the source water measured 1.47 NTU. x. The source is visited on a daily basis by water services personnel.
2.	<p>Coagulation, Flocculation and Clarification</p> <ul style="list-style-type: none"> a. Clarification is achieved using Dissolved Air Flotation (DAF) and dosing with aluminium sulphate b. The DAF Unit incorporates a Rapid Gravity Filter. c. pH is adjusted automatically using soda ash. d. Alum dosing is adjusted automatically and the stroke is determined by the colour and visual quality of the raw water. Jar tests are also done as a comparison. e. The sides of the DAF unit were exposed to the elements but the Council stated that these would be covered with mesh as part of the upgrade works. f. On the day of the audit, the water was not being dosed with aluminium sulphate. The Council stated that dosing with coagulant at very low turbidity levels caused floc carryover to the filter. The Council stated that the design specification of the plant indicated that chemical dosing should not be carried out at the plant when the colour of the raw water is < 5 Hazen Units.
3.	<p>Filtration</p> <ul style="list-style-type: none"> a. A single Rapid Gravity Filter is in operation at the plant. b. The depth of the sand is approximately 800 mm. c. The sand was replaced approximately three years ago. d. Prior to May 2012, the frequency of backwashing was determined by headloss which equated to a backwashing frequency of approximately two per week. The filter is now backwashed on a daily basis. e. The backwash carried out on the day of the audit was uneven throughout the filter (see Photograph 4) and large boils were observed in some parts of the filter and dead areas were observed in others. f. The filter is brought back into operation after a slow start of approximately 15 minutes. The Council stated that they cannot extend the slow start time due to supply demand. g. There is currently no turbidity monitor on the outlet of the filter and there is no capacity to run the filter to waste. The Council have indicated that these items will be addressed as part of the plant upgrade.
4.	<p>Chlorination and Disinfection</p> <ul style="list-style-type: none"> a. Sodium hypochlorite (H grade) is the disinfectant used at the plant. b. A free chlorine residual level of between 0.8 and 0.9 mg/l is maintained at the plant. c. Duty and standby chlorine dosing pumps are in operation at the plant but there is no automatic changeover function present. d. Chlorine dosing at the plant is residual based. e. Sodium hypochlorite (H grade) is also dosed at the chlorine booster station at Hewitsland Tower.

	<ul style="list-style-type: none"> f. The Council have agreed to forward on the chlorine alarm limits to the Agency. g. Chlorine residuals are measured at the extremities of the network and concentrations are generally between the range 0.1 to 0.2 mg/l.
5.	Treated Water Storage <ul style="list-style-type: none"> a. Two storage tower reservoirs are in place on the supply, the Castlemoyle Tower (346 m³ storage) and the Hewitsland Tower (530 m³ storage). b. CCTV cameras were in operation on the Hewitsland Tower.
7.	Exceedances of the Parametric Values <ul style="list-style-type: none"> a. <i>Cryptosporidium</i> has been detected on 10 occasions between 2nd May and 29th May 2012. b. Six of the detections have been typed as <i>C. Andersoni</i>. The remaining detections are either awaiting typing or were unable to be typed due in insufficient DNA in the samples.
9.	Hygiene and Housekeeping <ul style="list-style-type: none"> a. The treatment plant was clean, tidy and well maintained. b. Signage in the vicinity of the chlorine dosing room indicated that chlorine gas was still used as a disinfectant at the plant. The Council indicated that chlorine gas use at the plant was discontinued approximately 14 years ago.
10.	Management and Control <ul style="list-style-type: none"> a. The Council intend to have an operational UV treatment unit in place at the plant within the next three months. b. The Council carry out unidirectional flushing on the network on a regular basis.

3. AUDITORS COMMENTS

The current practice of bypassing the chemical dosing and coagulation phase should cease. There is no effective *Cryptosporidium* barrier in place when the chemical dosing and coagulation phase is not operational. A *Cryptosporidium* barrier must be maintained at this plant at all times. The Agency has issued a Direction under Regulation 16(1) in this regard and a report is due to be submitted to the Agency on this matter by 15th June 2012.

The Agency is aware that improvement works are on-going at the plant and it is anticipated that these works will address many of the audit recommendation contained in this report. That said, the Council should ensure that the current treatment plant processes are optimised, pending the completion of these upgrade works.

4. RECOMMENDATIONS

Source Protection

1. The Water Services Authority should ensure that the source protection and catchment risk assessment score for the *Cryptosporidium* risk assessment is urgently reviewed in detail and appropriate measures implemented to reduce the risk.

Coagulation, Flocculation and Clarification

2. The Water Services Authority must ensure, as an imperative, that a *Cryptosporidium* barrier be maintained at the Castlemoyle Water Treatment plant at all times. Coagulation at the DAF

plant should not be bypassed. The Agency has issued a Direction under Regulation 16 (1) in this regard.

3. The Water Services Authority should ensure that the sides of the DAF unit are meshed to prevent the entry of animals and debris.

Filtration (General)

4. The Water Services Authority should install continuous turbidity monitors on each filter and the final treated water at the water treatment plant. 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.
5. The Water Services Authority should investigate the cause of the boils in the filter media and should take appropriate action to optimise the operation of the filter.
6. 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.
7. The Water Services Authority should review the operation and condition of the sand filter and ensure that any of the abnormal operating conditions (as outlined on pages 43 to 45 of the EPA publication "*Water Treatment Manual on Filtration*") are urgently rectified.
8. In relation to the observations above on filtration the Water Services Authority should follow the guidance as specified in the EPA publication "*Water Treatment Manual on Filtration*" and in particular the following action is required as a priority;
 - i. Ensure that the minimum depth of filter media (excluding the gravel layer) is no less than 800 mm ;
 - ii. Ensure that the filtration rate in the rapid gravity filters does not exceed $7.5 \text{ m}^3 / \text{m}^2/\text{hour}$;
 - iii. Review the filter backwash process to ensure that the maximum backwash water flow rate does not exceed $20 \text{ m}^3 / \text{m}^2/\text{hour}$;
 - iv. Ensure that the filter backwash water is not returned to the head of the works;
 - v. Ensure that, following backwashing, the filters are run to waste for an appropriate period of time or that there is a slow start when the filter is brought back into use ; and
 - vi. Review the operation of the filters to ensure that the levels of turbidity in the filtered water are as low as possible and no greater than 0.25 NTU.

Disinfection

9. The Water Services Authority should install a duty and standby chlorine pump with automatic switch over in the event of the failure of one of the pumps.

With regard to the installation of the UV unit at the plant;

10. The Water Services Authority should ensure that the UV disinfection system is validated in accordance with an appropriate internationally accepted validation system.
11. The Water Services Authority should ensure that the UV disinfection system operates within its validated range at all times.
12. The Water Services Authority should ensure that there are duty and standby UV disinfection arrangements with automatic changeover in the event of failure of one of the UV disinfection units.

13. The Water Services Authority should install a continuous UVI or UVT monitor at the point of disinfection and this monitor should be alarmed and linked to a recording device to ensure that any deviation of the quality of water outside the validated range for the UV treatment system or a failure of the UV disinfection system is immediately detected.

Hygiene and Housekeeping

20. The Water Services Authority should ensure that the chlorine gas signage is removed from the vicinity of the chlorine dosing room.

Management and Control

14. The Water Services Authority should provide the Agency with details of the chlorine alarm limits and chlorine alarm response procedures for the supply.
15. The Water Services Authority should ensure that upgrade works are completed on schedule and monthly updates should be submitted to the Agency in this regard.

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 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 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 Wexford County Council.

Please quote the File Reference Number in any future correspondence in relation to this Report.

Report prepared by:	Nigel Hayes	Date:	11 th June 2012
	_____		_____

Inspector



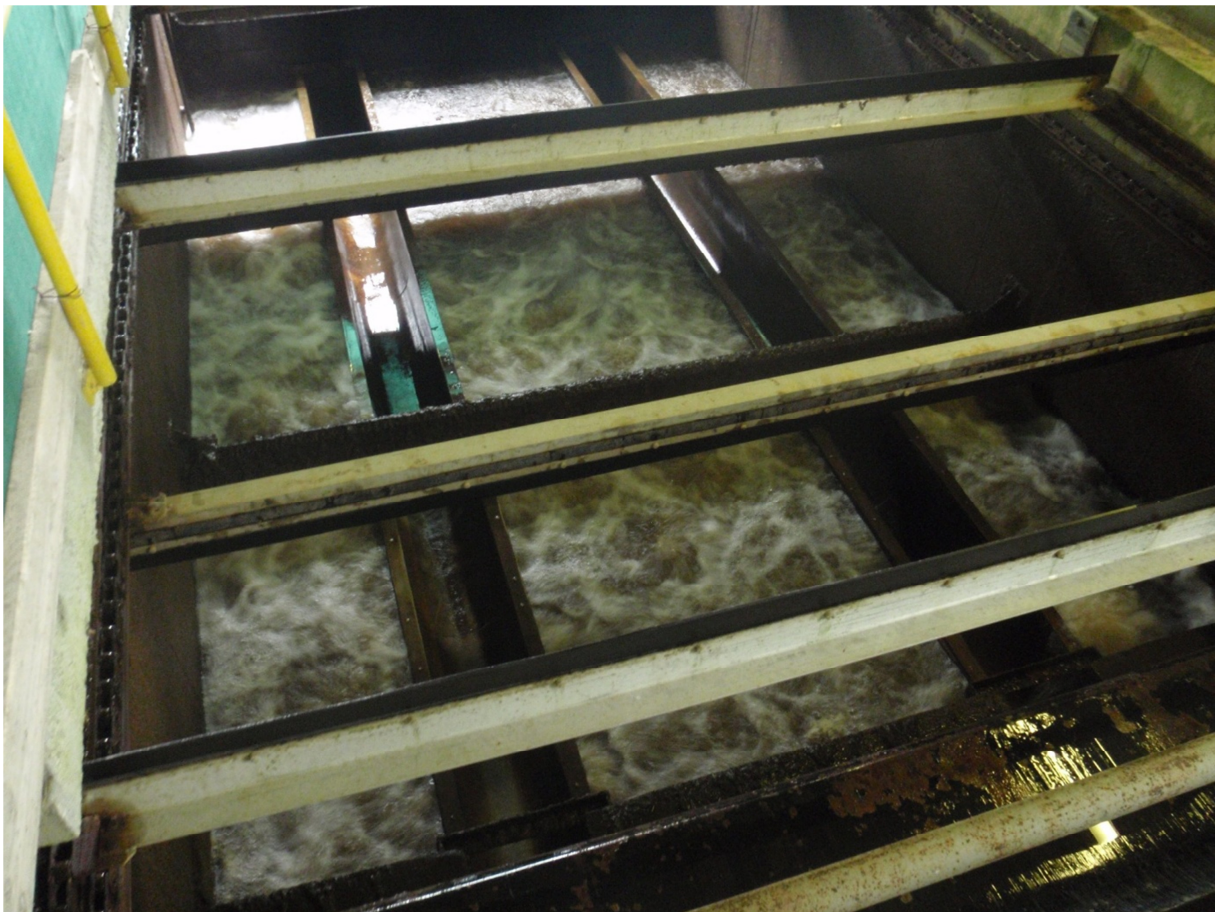
Photograph 1: Dranagh impoundment



Photograph 2: Possible Animal Access Point in Poulmounty Tributary



Photograph 3: Poulmounty source water entering the Ballyleigh Balancing Tank



Photograph 4: Filter backwash at the Castlemoyle Plant