Drinking Water Audit Report

County:	Kilkenny	**Date of Audit:**	09/08/16
Plant(s) visited:	Galmoy / Rathdowney Public Water Supply 1500PUB1025	**Date of issue of Audit Report:**	16/08/16
		File Reference:	DW2016/136
		Auditors:	Ms. Michelle Roche Ms. Criona Doyle Ms. Pauline Gillard
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 *Drinking Water Report*. • EPA Drinking Water Advice Notes No.s 1 to 15.		

MAIN FINDINGS

i. **A bacteriological failure in the Galmoy-Rathdowney public water supply was notified to the EPA on 07/07/2016 when Coliform Bacteria (2,419 No. /100 ml) was found during operational monitoring at the reservoir. Following consultation with the HSE, a boil water notice was placed on the supply on 08/07/16.**

ii. **The cause of the bacteriological failure was identified as inadequate residual chlorine in the network due to a high chlorine demand associated with a build-up of material in the treated water reservoir.**

iii. **The installation of a reservoir bypass system is underway to facilitate cleaning of reservoir. Irish Water expects it will take 4 days to complete the cleaning of the reservoir once the bypass works are completed. The work is scheduled to be completed by 04/09/2016.**

iv. **The boil water notice will remain in place until the remedial actions have been completed and Irish Water can demonstrate to the satisfaction of the EPA and the HSE that the water supply is wholesome and clean and meets the requirements of the Drinking Water Regulations.**

1. INTRODUCTION

Under the *European Union (Drinking Water) Regulations 2014* the Environmental Protection Agency (EPA) 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 07/07/2016 of the failure to meet the Coliform bacteria parametric value (as specified in Table C of Part 1 of the Schedule of the Regulations) and the subsequent issuing of a boil water notice to consumers in the Galmoy-Rathdowney Public Water Supply.

The Galmoy-Rathdowney Public Water Supply (PWS) was originally a private supply referred to as the Galmoy Replacement Water Supply Scheme. The water treatment plant (WTP) was constructed in 1995 and was operated, monitored and serviced by Galmoy Mines until the WTP was taken in charge by Irish Water in July 2016. The WTP is currently being operated under contract by EPS. The WTP is located in County Kilkenny while a portion of the network is located within County Laois.

The Galmoy-Rathdowney PWS also supplies water to the Galmoy Public Group Water Scheme (GWS). The overall scheme serves 1,886 persons (641 properties). A Boil Water Notice (BWN) was issued on the 08/07/2016 and applied to 124 households serving an estimated population of 281 comprising of 114 no. households served by the PWS (estimated population 259) and 10 no. households (estimated population 22) served by the GWS.

The supply is groundwater based with 2 no. boreholes utilised on a duty and standby basis. The raw water from borehole is pumped to the WTP where it undergoes filtration, UV treatment and chlorination (sodium hypochlorite). The single cell reservoir has an overall storage volume of 1,900m^3 with a working capacity of 1,625m^3 to provide approximately 24 hours storage.

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

The opening meeting commenced at 10:30am at the WTP at Galmoy. The scope and purpose of the audit were outlined at the opening meeting. The purpose of the audit was to observe the operation of the treatment plant site and Borehole No. 1. The audit process consisted of interviews with staff, review of records and observations made during an inspection of the treatment plant and Borehole No. 1. 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:
Ms. Deirdre O'Loughlin, Compliance Specialist, Irish Water
Ms. Catherine Rice, Compliance Analyst, Irish Water
Mr. Padraic Dunne, Area Supervisor, EPS
Mr. Alan Hyland, Executive Engineer, Kilkenny County Council
Mr. John Fitzgerald, DBO Engineer, Irish Water
Mr. Mariuz Galeski, Area Supervisor, EPS
Representing the Environmental Protection Agency:
Ms. Michelle Roche, Inspector
Ms. Criona Doyle, Inspector
Ms. Pauline Gillard, 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.	**Exceedances of the Parametric Values** a. The EPA received notification from Irish Water on 07/07/16 in relation to a bacteriological failure during operational monitoring on the network. Coliform bacteria were detected at a concentration of 2,419/100ml in a sample taken on the 01/07/16. b. The reason cited for the bacteriological failure was low chlorine post treatment due to a build-up of material in the treated water reservoir. Following consultation with the HSE a boil water notice was placed on the supply 08/07/16. The installation of a bypass system is underway to facilitate bypassing of the reservoir. This will allow the reservoir to be

	shutdown to facilitate cleaning while avoiding disruption to customers.
2.	**Treated Water Storage and Distribution Network** a. A system to bypass the reservoir is currently being installed to allow treated water to be discharged directly into the distribution system to facilitate reservoir cleaning. b. Cleaning of the reservoir will be undertaken following the completion of the bypass works. It is estimated the cleaning will take 4 days to complete. The work is scheduled to be completed by the 4th of September 2016. In 2014 divers examined the reservoir and sediment was present at that time. c. The mesh on the reservoir vent pipes was examined and it is recommended that a finer grade mesh be installed to prevent entry of vermin, etc. into the reservoir. d. No network scouring has been undertaken. There is no programme currently in place for scouring of the network. It is proposed that scouring will be undertaken following the cleaning of the reservoir. e. No details on the pipework composition of the 29.5 km network were available on the date of the audit.
3.	**Source Protection** a. The Galmoy / Rathdowney PWS is supplied from groundwater. Borehole No. 1 located in the vicinity of the WTP provides approximately 1,400m^3/d. Borehole No. 2, located 3km from WTP is operated on a stand by basis (1 day per week) and was not visited as part of the audit. The boreholes are not pumped on a continuous basis but operate in response to levels set at the reservoir. Borehole No. 1 is pumped at a rate of 145m^3/hr. b. Borehole No. 1 is located within agricultural land approximately 200m east of the reservoir. The borehole is located within a secure fenced compound. The wellhead is sealed (see Photo No. 1). Cattle were observed grazing within 3m of the wellhead. c. Zones of Contribution (ZOCs) are reported to have been delineated for both supply boreholes. No measures are currently in place for monitoring of the potentially polluting activities within the ZOC. The surrounding landuse is agricultural while the Galmoy Mines tailing ponds are located within 500m of Borehole No. 1 (to the east). d. The supply has a current *Cryptosporidium* Risk Score of 2 (low risk) after installation of filters in 2013 reduced the score from 75 (moderate risk).
4.	**Filtration** a. There is a raw water turbidity monitor present, which was displaying 0.15 NTU at the time of the audit. b. Pressure filters were installed in 2013 following the *Cryptosporidium* Risk Assessment. The WTP has 2 no. Hi Flo 9 Filters (Culligan) which work in parallel with all water passing through both filters. The filter media is composed of low density anthracite and chemically inert silica sand. c. Backwashing is operated on an automatic timer setup with backwashing taking place twice a week. The cycle involves 7 minute backwashing with backwash water from the storage tanks, followed by a 3 minute idle interval which is followed by a 5 minutes rinse period with rinse water from borehole being pumped to waste. The water supply is shut down while the backwashing takes place. There is a valve controlled 5 minute run to waste rinse from the borehole prior to the borehole coming into production following backwashing operations. d. Filter maintenance requirements are for an annual inspection to include a check of filter media. The first maintenance check is scheduled to take place in the coming weeks. e. EPS and Irish Water are currently assessing the backwash data to determine if the current frequency is adequate. Backwash tanks are in place since 2013. There is no information available on the frequency of the emptying of the backwash tanks. f. Final water turbidity was 0.098 NTU on the day of the audit. There is no turbidity alarm on

	the filters but an alarm is present on the outlet from the reservoir.
5.	**Disinfection** a. Primary disinfection is achieved by UV treatment in 2 no. UV units (Trojan UV Swift) installed on site. At present only 1 no. unit was operational. The UVI sensor in the second unit has been sent for calibration and is due back in 2 -3 days. When both units are operational they work as duty and standby with automatic switch over. There is a 5 min warm up period for lamps before the borehole pump is switched on or switch over from other UV unit takes place. The units contain automatic cleaning wipers and spare bulbs are kept on site. b. The UV validation certification was available to review on site. UVT is currently alarmed at 60%. The current flow through UV is 145m^3/hr on this basis the alarm should be changed to 84% UVT, in accordance with the UV validation certificate. c. There is no automatic shut down in place in the event of a trigger of the UVT alarm. There is potential for water that is not adequately disinfected to be pumped to the reservoir. The alarm dials out to EPS operators who man the cascade call out system. d. Secondary disinfection is undertaken using sodium hypochlorite (14-15%). There are duty and standby chlorine pumps present with automatic switch over on a 30 minute frequency. The day tank is filled twice a week. The pumps are serviced every 6 months. The chlorine dose is automatically set based on the residual chlorine levels leaving the reservoir. e. The current chlorine daily dose level is 4 mg/l. This level is in response to the recent incident and the level will be reduced following the completion of remedial works. At present a residual of 0.5 mg/l is aimed for leaving the reservoir due to recent incident. The alarms are currently set with a high level alarm at 0.6 mg/l and a low level alarm of 0.44 mg/l for the treated water, in response to the Coliform exceedance f. Under normal circumstances the alarm levels are set at 0.5 mg/l for high level and 0.2 mg/l for low level. g. Chlorine residual records were checked. Chlorine residuals prior to the incident were not available on the day of the audit. h. There is no programme of chlorine residual monitoring on the network. Because the PWS crosses the Kilkenny/Laois county boundary, Kilkenny County Council (on behalf of Irish Water) are responsible for the section of distribution network as far as the Glosha Booster Station. Laois County Council personnel were not present at the audit but Laois County Council (on behalf of Irish Water) are responsible for monitoring the network after the booster station at Glosha. No information was provided on the chlorine boosting arrangements at the Glosha Booster Station. i. In the event of an emergency EPS have a list of contact numbers for both KCC and LCC on site in addition to contacting the DBO lead. j. Currently an expiry date is not provided on the sodium hypochlorite drums. The batch number is used by EPS to monitor the production date. EPS report that they use stock within a 2 month period. The provision of a production date on the certificate of compliance would assist in stock management to ensure the expiry date is not exceeded.

3. AUDITORS COMMENTS

The Galmoy water treatment plant has recently been taken in charge by Irish Water and the plant is being operated by EPS. A boil water notice has been in place since 08/07/16 following the detection of Coliform Bacteria (2,419 No. /100 ml) during operational monitoring at the reservoir. Irish Water originally identified that the reservoir cleaning works would take place early in week of 11/07/16. However, this timeframe has slipped and the completion date for the installation of the bypass works and the cleaning of the reservoir is now being given as the 04/09/16. The cleaning of the reservoir should be progressed without any further delay in order to restore the Galmoy-Rathdowney public water supply to compliance with the Drinking Water Standards and to allow the lifting of the boil water notice, subject to HSE agreement.

Following the taking over of the scheme by Irish Water no programme of residual chlorine monitoring was established in the network. It is recommended that such a programme be put in place without delay in order to ensure that the water supply is adequately disinfected.

A review of the filter backwash programme is required to determine if the current programme is sufficient and in particular to examine if the activation of the backwash sequence can be linked to a high level set-point on the turbidity monitor after the filters.

The management and control of the UV disinfection system also needs to be improved to ensure the system is operating within the validated operating criteria for the flow levels passing through the plant. In order to prevent inadequately treated water entering the distribution system the option of automatic shutdown of the UV units in the event of the UVT alarm being triggered should be investigated.

4. RECOMMENDATIONS

Treated Water Storage & Distribution Network

1. Irish Water should complete the remedial actions to clean the reservoir and restore the Galmoy-Rathdowney public water supply to compliance with the Drinking Water Standards without delay.

2. Irish Water should ensure that a finer mesh is installed on reservoir vents and sized to prevent entry of vermin, large insects, etc.

3. Irish Water should ensure that free residual chlorine levels at the end of the distribution network are maintained at 0.1mg/l. Irish Water should establish a programme of residual chlorine monitoring in the network.

Source Protection

4. Irish Water should liaise with Kilkenny 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:

    a. Organic fertiliser or soiled water is not applied to land within 200 m of the abstraction point; and
    b. Farmyard manure held in a field prior to landspreading is not placed within 250 m of the abstraction point.

5. Irish Water should fully assess the risks identified in the zones of contribution to the drinking water sources and take action to minimise these risks where possible.

Filtration

6. Irish Water should review the frequency of the filter backwash programme.

7. Irish Water should examine the feasibility of automatically activating the filter backwash sequence in response to a high level set-point on the turbidity monitor after the filters, or alternatively including an alarm setting on the turbidity monitor to alert the caretaker to the need to manually trigger the backwash sequence.

Disinfection

8. Irish Water should ensure that the UV disinfection system operates within its validated range at all times.

9. Irish Water should review the current UVT alarm set point to ensure it is appropriate to the minimum validated operating criteria of the UV disinfection system. The review should take into account the flow levels passing through the UV units and the UV dose required to achieve sufficient disinfection.

10. Irish Water should investigate whether automatic shutdown of the UV units is required in the event of a trigger of the UVT alarm, in order to prevent inadequately disinfected water entering the distribution network.

11. Irish Water should put a system in place so that a record is maintained of sodium hypochlorite expiry dates and that stock is used in accordance with these dates.

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.

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: Fiona Doyle **Date:** 16th August 2016

Inspector

Photograph No. 1: Borehole No. 1 Wellhead Completion with cattle grazing in background (< 3m)