



Drinking Water Audit Report

County:	Sligo	Date of Audit:	03 September 2014
Plant(s) visited:	Riverstown Water Treatment Plant (Heapstown Spring)	Date of issue of Audit Report:	25 September 2014
		File Reference:	DW2014/217
		Auditors:	Ms Derval Devaney
Audit Criteria:	<ul style="list-style-type: none"> • The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>. • <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> • 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 Zone of Contribution (ZOC) for the spring source needs to be delineated further to ensure the water supply is adequately protected.
- ii. The disinfection process was recently upgraded but additional measures are recommended to increase the security of the water supply (e.g. automatic shutoff in the event of failure of the UV treatment unit).
 - i. Further investigations are required to determine whether THMs is an issue in the supply due to the lack of water quality data available. The Water Services Authority is to increase monitoring to investigate this matter further.

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 to assess the performance of Irish Water in providing clean and wholesome drinking water and in response to the notification by Irish Water dated 21 May 2014 of the failure to meet the Coliform Bacteria parametric value (as specified in Table C of Part 1 of the Schedule of the Regulations) in the Riverstown Public Water Supply. 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.

The Riverstown PWS is sourced from Heapstown Spring located on marshy land just North of Lough Arrow, Co. Sligo. Originally, in the 1970's, the supply was abstracted from Lough Arrow, that source was then made redundant and 335 m³/day is now abstracted from the spring serving a population of 133 over a 20km network.

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

The opening meeting commenced at 2:15 pm at Heapstown Spring. 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:
 Pamela Bergin, A/ Senior Executive Scientist; Noel Harran, Senior Executive Engineer; Peter Duignan Technician, Micheal Connolly, Caretaker; Sligo Co Co; Anne Bonner, Water Compliance Liaison Specialist, Irish Water.

Representing the Environmental Protection Agency:
 Derval Devaney, Inspector; Aoife Loughnane, 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>Source Protection</p> <ul style="list-style-type: none"> a. The Riverstown PWS is sourced from Heapstown Spring (see Photo 1), North of Lough Arrow with 335 m³/day currently being abstracted by duty and standby pumps (on weekly manual switchover). Abstraction takes place over 11 hours - from 12am (mid-night) to 11am at a fixed rate (max. flow from pumps is 32.4 m³/hr). These pumps were upgraded 1.5 years ago and are alarmed if the raw water pump fails. b. The caretaker visits the site on a daily basis. c. The EPA and the Western River Basis District team under the Water Framework Directive Groundwater Monitoring Programme delineated a Zone of Contribution (ZOC) for the Riverstown Public Water Supply. This report (dated August 2011) was discussed during the audit and that the delineation was assigned a very low confidence and that the report had recommended further study involving flow measurement, karst mapping and tracer testing to understand the of the ZOC. d. The catchment area is marshy around the spring and has non-intensive farming (e.g. sheep grazing) in the catchment area. Raw water monitoring is taken on a monthly basis from the spring source. The Water Services Authority (WSA) stated that the source has stable raw water quality. e. The <i>Cryptosporidium</i> risk assessment score for the supply was updated in July 2014. The area is closely monitored by the Local Authority due to it being in close proximity to Lough Arrow. Sligo Co Co staff present on the day of the audit stated its environment section carried out septic tank inspections within the catchment of the spring source but have a number yet to complete by the end of 2014.
2.	<p>Chlorination and Disinfection</p> <ul style="list-style-type: none"> a. A UV unit was installed on the supply in Q1, 2014 as a primary disinfectant. The unit is alarmed (on flow > 32.4 m³/hr, < 85% UVT and lamp failure). Flow, lamp functionality and UVT are linked to SCADA which was also very recently installed. UVT ranged from 92-94 % over the last few days as shown on the monitor. A text is sent out to alert the relevant person of an alarm. b. There are 3 lamps attached to the UV unit and spares have yet to be delivered to the plant. c. Sodium hypochlorite 14% is dosed as secondary residual disinfectant post UV disinfection. d. There is a chlorine duty and standby pump which is manually switched over once per week. The Water Services Authority is to automate this process. The pumps automatically come into service at 12am. The target chlorine residual is 1.8 mg/l with a target residual in the reservoir of 0.35-0.45 mg/l. The Water Services Authority stated that the lowest

	<p>chlorine residual in Riverstown would be 0.15mg/l.</p> <ul style="list-style-type: none"> e. There is a chlorine analyser post at Ross Rd. pumping station and one recently installed on the outlet from the reservoir. The low alarm is set at 0.3 mg/l. The reservoir chlorine residual is linked to SCADA and was reading 0.34 mg/l on the day of the audit. The reservoir water level is also recorded on SCADA. f. It was noted on the SCADA that the chlorine residual on the outlet of the reservoir dropped to 0.1 mg/l on 03/09/14 at 00:45:35 however the Water Services Authority stated that the system was recently installed with the alarms just being verified on the day of the audit. g. It was stated that chlorine residual readings are not taken at the plant but are being taken 3 times per week on the network. However these results were not available for review during the audit. It was stated that the chlorine residuals at the tap at the church range from 0.24 – 0.28 mg/l. It was also stated that the caretaker takes a sample every few weeks and compares to the residual monitor. h. It was stated that the reservoir monitor has just recently been installed the day before the audit and sampling will also be recorded at this location and compared to the SCADA readout.
3.	<p>Treated Water Storage</p> <ul style="list-style-type: none"> a. The reservoir used to store treated water off-site has been cleaned and is cleaned once/year. The access ladder to the roof of the reservoir requires work to ensure it is safe to use (installation of protection cage). The Water Services Authority is working to complete this within the next number of weeks. As a result the vents at the reservoir could not be inspected but the Water Services Authority re-assured the audit team that the vents were covered and inspection points had lockable covers and proposed to submit photographs of the vents to show that they are of satisfactory status.
4.	<p>Distribution Network</p> <ul style="list-style-type: none"> a. The Water Services Authority stated that the supply generally supplies 250 m³/day to serve the population of 133 persons. The Water Services Authority stated that the current abstraction rate of 335 m³/day indicates a leak in the 20km network or on the consumer's side (327 m³/day was reported in the 2013 Drinking Water returns). This water supply volume would equate to 2,500 L per person per day which appears excessive. There is one district metered area for Riverstown water supply and flows are assessed to determine unaccounted for water (ufw) levels in the 20km network. Much of the network mains are cast iron.
5.	<p>Exceedances of the Parametric Values</p> <ul style="list-style-type: none"> a. There was one failure to date in the 2014 audit results - Coliform Bacteria 200.5 no. per 100 ml taken on 20/05/14 which was notified to the EPA on 21/05/14. Due to the chlorine residual being 0.23 mg/l at the consumers tap and there being no operational issues at the plant and resamples being complaint Irish Water attributed the failure to sampling point contamination at the time of sampling.
6.	<p>Chemical storage and bunds</p> <ul style="list-style-type: none"> a. Sodium hypochlorite 14% is stored outside the pumphouse near the spring in an enclosed banded storage area. Micro-bio provided the supply of drums and while the product is registered with the DAFM (PCS No 96201), there is no expiry date displayed on the drums (see Photo 2).
7.	<p>Monitoring and Sampling Programmes for Treated Water</p> <ul style="list-style-type: none"> a. One audit and 4 check samples are taken on the supply annually. One THMs sample is required by the Drinking Water Regulations. While THMs taken in May 2012 (12 ug/l) and May 2014 (16 ug/l) were complaint and TOC was 1.48 mg/l (May 2012) and 0.86 mg/l (May 2014) in the same network samples, studies on the raw water show that TOC can vary from < 1 mg/l to 6.45 mg/l. Due to the high concentrations of TOC in the raw water, the WSA agreed to monitor for THMs and DOC once a month from Sept. to Dec. 2014 to determine if THMs is an issue in the supply.

3. AUDITORS COMMENTS

While a ZOC report was completed for this supply in August 2011, it was delineated with low confidence. The delineation of the ZOC using additional information (flow data, tracer test results, etc.) is imperative in the protection of this supply, given that disinfection is the only form of treatment for this spring source water supply. Once the ZOC is complete it is recommended that further investigations are carried out in the catchment to ensure the risk of pollution is mitigated.

The installation of UV as a primary disinfectant in addition to chlorination using sodium hypochlorite adds an additional security to the supply in terms of a *Cryptosporidium* barrier. It is important that the recommendations regarding the disinfection process such as having a shut-down facility in the event that the UV unit operating outside its validated range, for example, is in place to ensure that consumers always receive water that is safe. Added security measures, such as reviewing the location of chlorine monitors, are also recommended in order to improve the operation and control of the supply.

As monitoring for THMs is only required to be carried out once per year, due to the population size of the supply it is questionable as to whether there is an issue with THMs on the supply given the TOC levels of up to 6 mg/l evident in the spring water. The Water Services Authority, on the day of the audit agreed to increase the monitoring of THMs and DOC in the final water until the end of 2014 to determine if this is an issue.

Leakage on the network should also be investigated and acted upon to ensure water losses are contained, which in will not only bring about energy and cost savings but water resources benefits also.

4. RECOMMENDATIONS

Source Protection

1. The Water Services Authority should delineate the Zone of Contribution for the Riverstown PWS.
2. Upon delineation of the ZOC, the Water Services Authority should examine the appropriateness of the setback distances in the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014)* for the source of the supply. The Water Services Authority should have regard to the EPA guidance on alternative setback distances.
3. The Water Services Authority should ensure that farmers and other users of the catchment are informed of the ZOC, setback distances and the catchment protection measures they can undertake to protect the water supply.
4. The Water Services Authority should liaise with the River Basin District team responsible for implementing the Water Framework Directive and establish links with the Environment Sections in Sligo County Council to ensure that they are aware of the issues potentially impacting on the raw water abstraction point and it's ZOC. The Water Services Authority should work with these bodies to identify all potentially polluting discharges into the catchment (ZOC) of the water source and implement mitigation measures, where appropriate, to reduce the potential impact of these discharges. This work should include the completion of the septic tank inspections and follow-up on mitigation measures, where identified.

Disinfection

5. Regarding the disinfection system, the Water Services Authority should ensure that:
 - (i) there is automatic shut-down of the UV unit in the event of its failure, if it operates outside its validated range, the system alarms or lamps run beyond their life timeframe, etc.;
 - (ii) there are spare lamps onsite to support the UV disinfection system;
 - (iii) the calibration of the chlorine pumps, due in September 2014, is carried out and the pumps switchover automatically;
 - (iv) a comparison of the residual chlorine readings on the chlorine monitors and the results of the manual residual chlorine tests (taken at the same location) are carried

out daily and recorded at the plant and made available for inspection. The Water Services Authority should investigate any discrepancies that occur between the residual chlorine readings from the monitors and the manual samples;

- (v) chlorine residual readings taken on the network are recorded and are available for inspection;
- (vi) additional security measures are investigated in the provision of disinfection to the consumers e.g. the location of a chlorine monitor pre-reservoir, flow throughput through plant to ensure a chlorine residual of 0.1 mg/l is maintained at the end of the network at all times;
- (vii) an expiry date should be displayed on the sodium hypochlorite drums and a system in place to ensure stock is rotated so as to ensure product is used before its expiry date.

Treated Water Storage

- 6. The Water Services Authority should ensure that access to the reservoir roof is made secure so that it is possible to inspect to ensure all vents on the reservoirs are secured against ingress of animals or deliberate introduction of any contaminant or acts of vandalism. The Water Services Authority is requested to submit photographic evidence that the vents are covered and inspection points are lockable, once access is made secure.

Distribution Network

- 7. The Water Services Authority should determine the volume of water lost on the supply (i.e. unaccounted for water), identify where leakage is an issue and put in place measures to reduce leakage in the network to an acceptable level.

Monitoring and Sampling Programmes for Treated Water

- 8. The Water Services Authority should commence monthly monitoring of the final treated water for trihalomethanes (THMs) and dissolved organic carbon (DOC) as discussed and agreed during the audit (from Sept. to Dec. 2014) to determine if THMs is an issue in the supply and submit the results to the EPA.

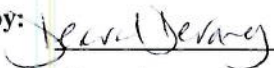
FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

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 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: 
Inspector

Date: 25-09-14
25/09/14



Photo 1 Heapstown Spring Source with protection cover in place (disinfection & pump house on RHS of photo)

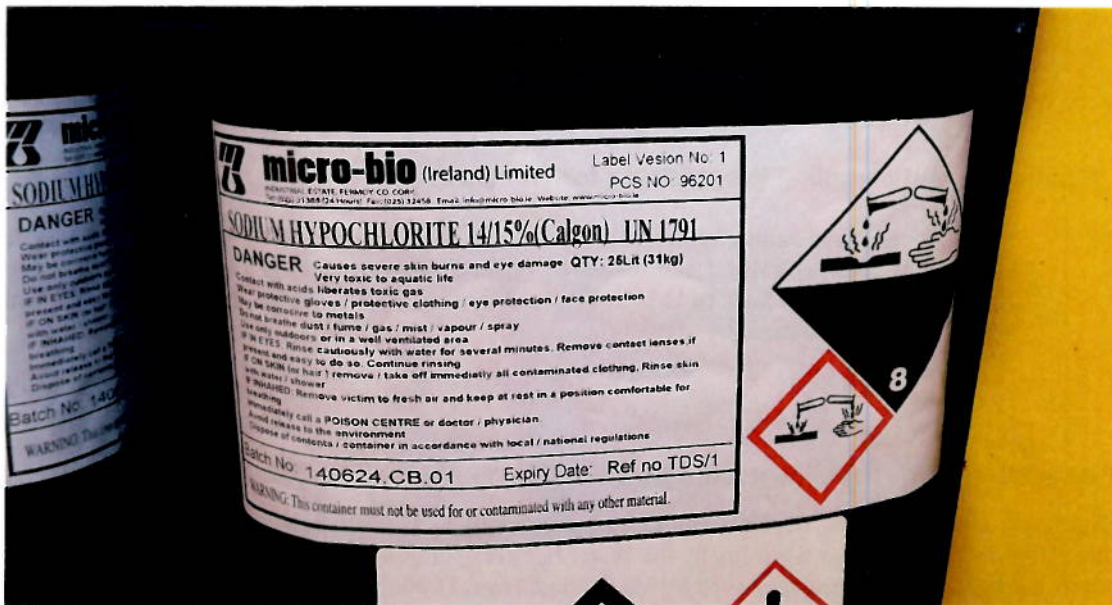


Photo 2 Sodium Hypochlorite disinfection chemicals with no expiry date on label