



Drinking Water Audit Report

County:	Galway County Council	Date of Audit:	28 th July 2015
Plant(s) visited:	Leenane Water Treatment Plant	Date of issue of Audit Report:	4 th August 2015
		File Reference:	DW2009/190
		Auditors:	Mr Darragh Page Ms Aoife Loughnane
Audit Criteria:	<ul style="list-style-type: none"> • 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. • The recommendations in any previous audit reports. 		

MAIN FINDINGS

- i. Leenane water treatment plant is not currently capable of adequately treating the raw water due to large variations in the raw water quality conditions (in particular colour and TOC) following heavy rainfall. In the past, the treatment plant and distribution network has experienced chlorination problems and the associated formation of trihalomethanes. While the chlorination system was upgraded in June 2015, it has now emerged that the UV disinfection system operates outside its validated range meaning that the plant's *Cryptosporidium* barrier is compromised. For this reason, this supply was placed on a Boil Water Notice as of 15th July 2015. The Leenane water treatment plant is not fit for purpose. Irish Water need to provide additional treatment for solids/organics removal at Leenane WTP or to connect to a new source where such treatment is in place. This is the subject of an EPA Direction issued on 5th June 2015 with a response due 4th August 2015.
- ii. Galway County Council observed that the Leenane water treatment plant was not adequately treating the water on 28th June 2015. Galway County Council did not communicate this issue to Irish Water until 10th July 2015 and Irish Water, in turn failed to bring this to the attention of the HSE until 14th July 2014. Thus, there was a failure in communications within Galway County Council and between Irish Water and the HSE which resulted in inadequately disinfected water being supplied to consumers in Leenane for 17 days before the boil water notice was issued.
- iii. Irish Water must ensure that clear documented incident response and escalation procedures are prepared and implemented in County Galway, with roles and responsibilities assigned to individuals, so that similar situations are dealt with in a timely manner and there is no delay in internal and external communications.

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 of the imposition of a Boil Water Notice on the Leenane public water supply on 15th July 2015.

Leenane water treatment plant supplies approximately 80 m³/day to a population of 219 people though serves a large transient population of tourists. Treatment consists of pressure filtration and disinfection by UV treatment and chlorination.

The opening meeting commenced at 11.00 am at Leenane 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:

Anne Bonner, Drinking Water Compliance Specialist, Irish Water

Shay Welsh, Engineer, O&M, Irish Water

Martin Lavelle, Senior Engineer, Galway County Council

Jim O'Connell, Water Services Supervisor, Galway County Council

Tony Kelly, Senior Executive Engineer, Galway County Council

Tina Ryan, Executive Scientist, Galway County Council

Dave Regan, Caretaker, Galway County Council

Representing the Health Service Executive:

Dr. Emer O'Connell, Consultant in Public Health Medicine

Niamh O'Callaghan, Public Health Registrar

Katherine Harkin, Public Health Registrar

Representing the Environmental Protection Agency:

Darragh Page, Senior Inspector, EPA

Aoife Loughnane, Inspector, EPA

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 source of Leenane public water supply is a mountain stream, located in an upland area where sheep are grazed extensively. The abstraction point is located above any housing development. The source was not visited as part of the audit.
- b. *Cryptosporidium* oocysts have been detected in both the raw and treated water on 20th and 21st July 2015. It is believed that sheep are the source of the *Cryptosporidium* oocysts entering the water supply. Typing of the oocysts was not available at the time of the audit.
- c. Raw water colour is monitored continuously and linked to the SCADA system. Raw water colour and TOC fluctuate significantly in response to heavy rainfall. Information submitted to the EPA (SCADA screenshots) shows raw water colour fluctuating between 5 and 80 Hazen units between 23rd June and 7th July 2015.
- d. Galway County Council has considered installing an automatic shut-down of the plant in the event of high colour. However, a set point has not been decided upon so the auto shut-

	down facility is not yet in place.
2.	<p>Filtration</p> <p>a. Raw water is filtered in a pressure filter containing silica sand media. Galway County Council representatives stated that the filter is effective at removing colour but not TOC removal.</p>
3.	<p>Disinfection – UV treatment</p> <p>a. The filtered water is disinfected using UV and sodium hypochlorite.</p> <p>b. The UV system is a single unit, validated to treat flows of up to 7 m³/hr to a UV intensity (UVI) of ≥ 17 W/m². There is no standby UV unit in the event of failure of the duty unit.</p> <p>c. There is no automatic shut-down of the treatment plant when the UV system deviates outside its validated range.</p> <p>d. Galway County Council representatives confirmed that the UV disinfection system operates outside its validated range. The daily log sheets submitted to the EPA show that the UVI dropped below the minimum requirement of 17 W/m² on 28th June 2015 and has remained below that threshold since then. This means that the disinfection system has been compromised as the inactivation of <i>Cryptosporidium</i> oocysts is not guaranteed, resulting in a serious risk to public health. As of 28th July 2015, the HSE confirmed that there was no reported sickness in the community.</p> <p>Disinfection - Chlorination</p> <p>a. Following UV treatment, the water undergoes chlorination using sodium hypochlorite. The chlorination system comprises duty and standby chlorine dosing pumps with automatic switch-over in the event of pump failure. The clear water tank on site provides chlorine contact time after primary chlorination.</p> <p>b. The chlorination system was upgraded in June 2015 under Irish Water’s Disinfection Programme. The upgrade involved the installation of chlorine boosting after the clear water tank, replacement of chlorine dosing pumps and installation of automatic switch-over facilities.</p> <p>c. The target chlorine residual leaving the plant is 0.28 – 0.5 mg/l. The final water undergoes chlorine boosting if the concentration leaving the clear water tank is < 0.28 mg/l.</p> <p>d. The low chlorine alarm is set at 0.28 mg/l which alerts the caretaker by phone. The caretaker manually adjusts the dose rate, however he does not currently record or report incidences of activation of the low chlorine alarm (there has not been any cases since the upgrade of the disinfection system).</p>
4.	<p>Treated Water Storage and Distribution Network</p> <p>a. The clear water tank at the plant provides 3 days water storage capacity.</p> <p>b. The distribution network measures approximately 2 km and is flushed on a weekly basis.</p> <p>c. Prior to the upgrade of the chlorination system, there were 17 occasions in 2014 when residual chlorine levels leaving the plant were below 0.1 mg/l, resulting in an inadequately disinfected water supply and a risk to public health. Galway County Council has confirmed that the recent upgrade of the chlorination system has eliminated this problem.</p>
5.	<p>Timeline of Events</p> <p>a. The timeline of events surrounding the disinfection incident and imposition of the BWN on the Leenane public water supply was outlined to the EPA during the audit. Irish Water subsequently provided confirmation by email of the chain of events (see Appendix 1).</p> <p>b. The UV disinfection system dropped below its validated operating range on Sunday 28th June. This was not brought to anyone’s attention or communicated internally within Galway County Council until 9 days later when the Water Services Supervisor visited the plant. During the audit, Galway County Council representatives stated that the UV</p>

	<p>disinfection system was new to them and they hadn't dealt with problems before. They admitted that the UV regularly drops below the validated range and this issue is not raised as an incident/emergency. GCC had discussed plant shut-off in the event of high colour but not in the event of inadequate UV treatment.</p>
6.	<p>Exceedances of the Parametric Values</p> <ol style="list-style-type: none"> a. The parametric value for THMs has been exceeded in this supply on several occasions. b. A Direction under Regulation 16(1) was issued by the EPA to Irish Water on 5th June 2015 requiring the submission of an action programme no later than 4th August 2015. c. Irish Water stated that a response would be submitted and they were considering replacement with Clonbur-Cornamona PWS or the installation of a solids removal plant. Irish Water stated that hydraulic modelling was being carried out in relation to the former.
7.	<p>Management and Control</p> <ol style="list-style-type: none"> a. EPS visit the plant monthly to check and service instruments. b. Galway County Council representatives have acknowledged that the UV disinfection system at Leenane WTP regularly dropped below the validated range and this issue was not being treated as an incident/emergency in the past. c. The plant is not automatically shut-off in the event of high raw water colour or inadequate UV treatment. d. There is no procedure for abnormal operations and escalation of incidents within Galway County Council or to Irish Water. e. The caretaker at the Leenane water treatment plant does not have access to the SCADA on site to assist in the management of the plant and the investigation of alarms.

3. AUDITORS COMMENTS

Leenane public water supply is on the EPA's Remedial Action List due to inadequate treatment for *Cryptosporidium* and elevated levels of Trihalomethanes. The EPA has been concerned about this water supply for some time and has highlighted significant issues to Irish Water (and previously to Galway County Council when they were the responsible body, i.e. prior to 1st January 2014). Neither Galway County Council nor Irish Water has made adequate progress to resolve these issues. On 5th June 2015, the EPA issued a Direction to Irish Water requiring an action programme to be submitted by 4th August 2015, outlining how Irish Water plans to secure compliance with the *European Union (Drinking Water) Regulations 2014* in the Leenane public water supply.

Subsequent to the EPA Direction, Leenane public water supply has been placed on a Boil Water Notice since 15th July 2015 due to the failure of the UV disinfection system at the plant.

The audit found that there are significant issues in the operation and management of Leenane water treatment plant, and in the system of communications both internally within Galway County Council, and between Galway County Council and Irish Water. The issues of most concern identified during the audit were:

1. The failure of Galway County Council staff to communicate internally the failure of UV disinfection system in a timely manner. Specifically there was a delay in escalating the issue from when the plant failed (28th June 2015) to when it was communicated to Irish Water (10th July 2015).
2. The failure of Irish Water to consult with the HSE in a timely manner once Irish Water became aware of the failure of the disinfection system. Irish Water became aware of the issue on 10th July 2015 but did not consult with the HSE until 14th July 2015.
3. The absence of documented procedures for dealing with alarms at the plant and the absence of clear criteria outlining when they should be escalated internally and externally.

4. While the EPA concerns about the adequacy of the disinfection system (brought to the attention of Irish Water on 5th January 2015) were addressed with the installation of a chlorine booster at the plant, Irish Water failed to identify the more substantive issue about the adequacy of the UV treatment system.

The EPA is particularly concerned that similar issues were identified during an audit of the Williamstown Public Water Supply on 4th November 2015 and the lessons learned from that incident do not appear to have been applied to this or other supplies in Galway.

4. RECOMMENDATIONS

The EPA has issued a Direction to Irish Water requiring the submission of an action programme no later than 4th August 2015. Therefore, the recommendations below are in addition to that which is required by the Direction.

Management and Control

1. Irish Water should prepare, submit and implement a documented procedure for the communication and escalation of incidents affecting drinking water supplies in County Galway. The procedure should cover the responsibilities and criteria where it is necessary to consult with the Health Service Executive to determine whether there is a potential danger to human health.
2. Irish Water should review the performance of the disinfection systems at all plants in Galway and identify whether there are any other plants operating UV treatment systems outside their validated range.
3. Irish Water should ensure that caretakers and/or plant operators have full access to the data pertaining to the performance of the plant. Specifically, access should be provided to raw and treated water quality trends.
4. Irish Water should carry out a review of all water treatment plants in Galway and ensure that adequate incident response procedures are in place and that there is appropriate communication such that incidents are escalated where necessary.

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.

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:



Date:

4th August 2015

Darragh Page

Senior Inspector

Appendix 1: Incident timeline at Leenane Water Treatment Plant

(as per email to EPA from Irish Water dated 30th July 2015).

Date	Event / Action
Sun 28 th June 2015	The UV disinfection system dropped below its validated operating range. This was not brought to anyone's attention or communicated internally within Galway County Council until 7/8 th July 2015 when Jim O'Connell (GCC) visited the plant.
Tues/Wed 7/8 th July 2015	<p>Jim O'Connell (GCC) visited Leenane WTP and subsequently raised the issue of the failure of the UV disinfection system internally within GCC.</p> <p>During the audit, GCC representatives stated that the UV system was new to them and they hadn't dealt with problems before. GCC admitted that the UV regularly drops below the validated range and this issue is not being raised as an incident/emergency. GCC had discussed plant shut-off in the event of high colour but not in the event of inadequate UV treatment.</p>
Fri 10 th July 2015	<p>Eoin Curran (GCC) emailed Shay Walsh (Irish Water) to notify that GCC were shutting off Leenane WTP due to spikes in raw water.</p> <p>Tony Kelly (GCC) instructed the plant caretaker to shut-off the plant.</p> <p>10:30 hrs: GCC caretaker shut-off the plant, emptied reservoir and flushed network.</p>
Sat 11 th July 2015	17:30 hrs: GCC caretaker re-started the plant.
Mon 13 th July 2015	<p>GCC caretaker recorded 39.5% UVT (i.e. below validated range) at 12:00 hrs and Tony Kelly (GCC) instructed that the plant be shut-off again.</p> <p>10:22 hrs: GCC advised IW that the plant is still out of specification</p> <p>16:18 hrs: IW requested info and requested GCC to contact HSE with update</p>
Tues 14 th July 2015	<p>11:30 hrs: IW contacted HSE and gave update</p> <p>Jim O'Connell (GCC) visited the plant.</p> <p>Plant was switched back on.</p> <p>16:30 hrs: Martin Lavelle (GCC) contacted the HSE to alert them that the plant's disinfection system was not operating satisfactorily.</p>
Wed 15 th July 2015	<p>15:00 hrs: Incident response team meeting commenced comprising of HSE/IW/GCC representatives. Boil Water Notice was issued by Irish Water/Galway County Council.</p> <p>Anne Bonner (IW) notified EPA of BWN placed on Leenane PWS due to:</p> <ol style="list-style-type: none"> 1. WTP operating outside UV validated range. 2. High crypto risk score.