



# Drinking Water Audit Report

<b>County:</b>	Cavan	<b>Date of Audit:</b>	23/08/2015
<b>Plant(s) visited:</b>	Knockataggart water treatment plant, Cavan RWSS  Scheme Code 0200PUB0100	<b>Date of issue of Audit Report:</b>	27/08/2015
		<b>File Reference:</b>	DW2015/129
		<b>Auditors:</b>	Ms Ruth Barrington
<b>Audit Criteria:</b>	<ul style="list-style-type: none"> <li>• The <i>European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014)</i>.</li> <li>• <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></li> <li>• The recommendations specified in the <i>EPA Drinking Water Report</i>.</li> <li>• The recommendations in previous EPA audit reports dated 28/11/2008 and 22/07/2009.</li> <li>• Irish Water's notification to the EPA of a fish kill in the Laragh River and the progress of their investigation into the incident.</li> </ul>		

## MAIN FINDINGS

- i. **The audit was carried out in response to a spill of sodium hypochlorite on-site which entered the surface water drainage and was discharged to the Laragh River where it caused a substantial fish kill. Irish Water should undertake a survey of site drainage and pipework on-site and based on this should carry out works to ensure that leaks, spills or washings from chemical use or storage are contained on-site.**
- ii. **Irish Water should provide suitable information on chlorine residual trends to support the statement that disinfection of drinking water was not impacted by the incident.**

## 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 to the EPA by Irish Water of a fish kill in the Laragh River which was being investigated by Irish Water and Inland Fisheries Ireland (IFI) with a suspected link to activity at the water treatment plant. An initial telephone notification on 14/08/2015 was followed on 17/08/2015 by an email from Irish Water confirming a chlorine leak on-site had discharged to the Laragh River.

The Knockataggart water treatment plant supplies treated drinking water to a population of approximately 7,500 people via the Cavan Regional Water Supply Scheme. Raw water is abstracted from Lough Acanon and flows via gravity around 2 km in distance to the treatment plant. The raw water abstraction source is upstream of the plant and was not affected by the chlorine spill. It was not examined as part of the audit.

The plant is operated at present by Glan Agua under a design build operate contract for the upgrade of the plant. The operate phase of the contract is due to expire in late September, following which the

plant operations will be taken over by Cavan County Council on behalf of Irish Water. The plant upgrade comprised the addition of additional clarification and filtration capacity, upgrade of the disinfection system and enhanced sludge management including on-site thickening and pressing facilities. Disinfection is now provided via liquid sodium hypochlorite rather than chlorine gas.

The opening meeting commenced at 10.30 a.m. at Knockataggart water treatment plant. The scope and purpose of the audit were outlined at the opening meeting and the audit focussed on the incident follow up and disinfection elements of the treatment provided. 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.

<p>Representing Irish Water: (* indicates that person was also present for the closing meeting)</p> <p>Mr Fergus McLoughlin – Senior Resident Engineer, Cavan County Council*</p> <p>Mr Gary Boyd – Capital Project Manager, Cavan County Council*</p> <p>Ms Georgina O’Reilly – Water and Wastewater Engineer, Irish Water*</p> <p>Mr Andrew Young – Contracts Manager, Glan Agua*</p> <p>Ms Anne Bonner – Compliance, Irish Water*</p> <p>Mr John Fox – Operations Contract Manager, Glan Agua*</p> <p>Dr Louise Brennan – Compliance, Irish Water*</p> <p>Mr Eamonn Boylan – Caretaker (network), Cavan County Council</p> <p>Representing the Environmental Protection Agency:</p> <p>Ms Ruth Barrington – Inspector, EPA*</p>
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## 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.*

<p><b>1.</b></p>	<p><b>Sequence of Events and Incident Response</b></p> <ol style="list-style-type: none"> <li>a. The hypochlorite day tank was filled from the bulk tank by the operator on 11/08/2015. This is a routine part of the disinfection system and it was thought that the process was solely controlled by a deadman switch to control the transfer pump.</li> <li>b. On the 12/08/2015 the operator discovered the day tank bund was full of sodium hypochlorite. He then re-drummed this liquid but plant management was not informed.</li> <li>c. On the 13/08/2015 IFI responded to a report to their office of a fish kill in the Laragh River downstream of the water treatment plant. During their site investigation IFI contacted Cavan County Council as a spill at the plant was suspected. Glan Agua and Irish Water were subsequently informed later on 13/08/2015.</li> <li>d. The initial investigation by IFI, Irish Water, Cavan County Council and Glan Agua focussed on aluminium sulphate or sludge having been discharged to river, as in the past sludge management had been an issue at the site. Split samples were taken by Irish Water/IFI and analysis for aluminium, pH, COD, ammonia, chlorine and phosphate was carried out.</li> <li>e. The link to chlorine was established on 14/08/2015, as a smell of chlorine was detected at a surface water discharge point on the Laragh River. This was a known discharge pipe for surface water drainage on-site and reservoir overflow. Results of analysis showed 2.55 mg/l of chlorine in the discharge to river from this pipe.</li> <li>f. On the evening of 14/08/2015 the surface water drainage pipe was traced back up the site to the area adjacent to the chlorine bulk storage tank. An open gully and manhole with cover located in this area were identified and samples taken of the liquid in the gully. This</li> </ol>
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	<p>was found to contain 1,430 mg/l chlorine. Dye testing carried out by IFI and attended by Glan Agua established a link between the gully and the surface water discharge pipe at the Laragh River. The pipe was bunged to prevent any further discharge to the river.</p> <ul style="list-style-type: none"> <li>g. As some level of hypochlorite remained in the day tank bund it was the storage and transfer at this location which was investigated.</li> <li>h. On 17/08/2015, the bulk tank was emptied and cleaned out by Rialta. Hydrostatic testing was carried out on the tank and the bund, both passing the test. The day tank bund, chlorination room and associated ducting/ sump was also cleaned down by Rialta. The day tank integrity was confirmed by observation as it did not leak into the emptied bund.</li> <li>i. By the day of the audit (24/08/2015) the focus was on the transfer pump and lines from the bulk tank to the day tank. It was suspected that some siphoning effect had occurred in the transfer line (although an anti-siphon valve is in place), and this was to be tested.</li> <li>j. The use of the deadman switch to fill the day tank was also investigated. It was found that there was a remote switch on the control panel within the plant which over rode the deadman switch and allowed the tank to be filled without an operator present in the room, and that this remote switch had been used on 12/08/2015. The remote switch had been decommissioned at the time of the audit.</li> <li>k. The bulk tank has a working capacity of 7,000 l of sodium hypochlorite. Glan Agua estimated that approximately 3,000 l had been lost. The day tank has a capacity of 500 l with the required 110% retention capacity in the day tank bund.</li> <li>l. During the audit a previous contact from IFI was discussed where during July 2015 IFI contacted the site due to concerns over a discharge to the drainage ditch. This was investigated, three discharge points to the drainage ditch were removed and the tank has been isolated.</li> </ul>
<p><b>2.</b></p>	<p><b>Chlorination and Disinfection</b></p> <ul style="list-style-type: none"> <li>a. It was not possible to access HMI trends for chlorine residual during the audit. The system was displaying blank screens in trending mode.</li> <li>b. Irish Water and Glan Agua stated that chlorine dosing was operational as usual during the incident and that disinfection was maintained.</li> <li>c. Sodium hypochlorite is dosed at the outlet of the clear water tank. There is also an on-site reservoir for chlorine contact time, and the residual is monitored on the outlet of the reservoir. A residual in the range of 0.7-1.0 mg/l is aimed for, with a low chlorine alarm at 0.5 mg/l which alarms to a cascade system of staff for response.</li> <li>d. Ct calculations were not available during the audit.</li> <li>e. The supply is served by a primary (Killynebber) and secondary (Billis) reservoir. There are no connections prior to the primary reservoir and a chlorine booster system is provided at each reservoir. Control over these boosters is on a manual basis.</li> <li>f. Chlorine testing is carried out within the network but not always recorded.</li> <li>g. The records of chlorine residuals at the reservoirs were examined during the audit for the period 11/08/2015 to 22/08/2015. Low levels were noted at the Billis reservoir on 13/08/2015 and 15/08/2015. However in the absence of access to the HMI trends it was not possible during the audit to verify whether levels at the plant were also low on these or preceding days.</li> <li>h. Chlorine residual trends for final treated water contained in Glan Agua's monthly reports for February to July 2015 were examined during the audit. A residual just below 0.5 mg/l was identified on 20/07/2015 in the draft report for July 2015.</li> </ul>
<p><b>9.</b></p>	<p><b>Hygiene and Housekeeping</b></p> <ul style="list-style-type: none"> <li>a. The vent caps on the on-site reservoir were rusted and had fallen away from the vents, leaving potential ingress points for vermin.</li> </ul>
<p><b>10.</b></p>	<p><b>Management and Control</b></p> <ul style="list-style-type: none"> <li>a. The plant is not currently linked to the county wide SCADA. It is proposed to be added once the Glan Agua contract is completed and handed over.</li> <li>b. Glan Agua staff outlined the process of handover of the plant to include training days and a</li> </ul>

	<p>final handover file being prepared for Cavan County Council/Irish Water.</p> <p>c. It was noted that there is a farm adjacent to the on-site treated water reservoir with a slatted house on the boundary with the plant. It was not clear what steps have been taken to assess the risk this poses to the treated water during normal operations or in the event of an incident at the farm.</p>
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### 3. AUDITOR'S COMMENTS

The EPA welcomes the upgrade of the plant comprising the addition of additional clarification and filtration capacity, upgrade of the disinfection system and enhanced sludge management including on-site thickening and pressing facilities. The auditor noted that the 12-month process proving element of the contract is coming to an end in September.

The recent incident points to the importance of having a good knowledge of site drainage, layout and historical configuration. The lessons learned from this incident, particularly in regard to chemical storage areas adjacent to surface water drainage, should be applied to other water treatment plants and considered in the development of drinking water safety plans for public supplies.

### 4. RECOMMENDATIONS

#### Incident Response/Chemical Storage

1. Irish Water should report to the EPA on the follow up to the sodium hypochlorite spill. This report should focus on the following.
  - (i) The conclusions of the investigation into the cause of the spill with reference to the transfer line and pump between the chlorine bulk and day tanks, along with preventative measures to be taken to prevent future spills at these and other on-site chemical storage tanks.
  - (ii) Confirmation of the isolation of chemical storage and bunded areas from the surface water drainage system on site. Site infrastructure both in existing use and any decommissioned/unused facilities should be considered as part of the investigation which is to include a CCTV survey as proposed by Irish Water.
  - (iii) Verification of the disinfection system, including chlorine residual trends for the period 12/08/2015 to 22/08/2015 and the chlorine alarm log for July and August 2015.
  - (iv) The impact of the spill on the receiving water including a biological survey and any planned remediation, having regard to IFI advice.
2. Irish Water should liaise with agencies involved in investigation and response to potentially polluting activities to ensure that Irish Water and the plant operators are placed on the appropriate notification lists for contact in the event of an incident/ emergency which may affect the operation of the plant, the quality of the treated water, or which may have arisen due to activities at the water treatment plant.
3. Irish Water should implement a plant based incident procedure, informed by the content of a national DWIRP, to allow a timely and appropriate response to incidents. The procedure should cover responsibilities for reporting incidents to site management.

#### Disinfection

4. Irish Water should review the contact time for chlorine disinfection to ensure that the effective contact time achieved is a minimum of 15mg.min/l and that the first connections are receiving appropriately disinfected drinking water. Irish Water should submit a calculation of the effective contact time to the Agency.
5. Irish Water should install automatic controls over the secondary chlorination on the supply to minimise the manual interventions necessary and to provide dosing based on an online recorded chlorine residual.

6. Irish Water should ensure that all chlorine residual testing in the network is recorded and that the results are regularly reviewed to validate secondary disinfection. A minimum of 0.1 mg/l residual free chlorine should be maintained throughout the network.

### **Hygiene and Housekeeping**

7. Irish Water should ensure that vents on the reservoir are secured against ingress of animals or deliberate introduction of any contaminant or acts of vandalism.

### **Management and Control**

8. Irish Water should ensure that caretakers and/or plant operators have full access on-site to the data pertaining to the performance of the plant. Specifically, access should be provided to raw and treated water quality trends through the SCADA system as discussed during the audit.
9. Irish Water should ensure that the handover of the plant, following completion of the DBO contact, is accompanied by a comprehensive report which includes sections on Glan Agua's response to alarms or incidents, in order to build up a full picture of the plant operations and service history during the contract period.
10. Irish Water should ensure that the risk posed by agricultural activities (including slatted house) adjacent to the treated water reservoir is assessed, and that appropriate reduction measures to manage the risk are put in place. The risk assessment should include liaising with organisations (e.g. Cavan County Council Environment Section) that may have relevant information from inspections or other activities.

### **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 Mr Darragh Page, Senior Inspector.

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:**

27/08/2015

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Ruth Barrington

Inspector