Drinking Water Audit Report

County:	Dublin City	**Date of Audit:**	24th February 2017
Plant(s) visited:	Vartry Water Treatment Plant	**Date of issue of Audit Report:**	6th March 2017
		File Reference:	DW2009/397
		Auditors:	Ms. Michelle Roche
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. • The recommendations in any previous audit reports.		

MAIN FINDINGS

i. **Irish Water's investigation into the incident concluded that the lime discharge to the Vartry River occurred due to an historic connection between a lime slurry drainage pipe and a surface water drainage pipe.**
ii. **Irish Water should verify that the connection between the two pipes is the only pathway for lime slurry discharge to the Vartry River.**
iii. **Irish Water should verify that the remedial works to permanently disconnect the two pipes are successfully completed.**

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 an accidental discharge of lime slurry to the Vartry River on 21/02/17.

The Vartry Reservoir water treatment plant, which was originally constructed in the 1860's, consists of slow sand filtration, chlorination, fluoridation and pH correction with lime. The treatment plant produces approximately 75,000 – 80,000 m^3/day and serves a population of approximately 210,000 persons. The audit focused on the management of the pH correction treatment and the details of the lime slurry discharge.

Photographs taken by Michelle Roche 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 Vartry Reservoir 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: Mr. Andrew Boylan – Compliance Specialist, Irish Water Mr. Ger Brady – Operations Engineer, Irish Water Mr. Ronan O'Rourke – Senior Engineer, Dublin City Council Mr. Ned Fleming, Plant Engineer, Dublin City Council Representing the Environmental Protection Agency: Ms. Michelle Roche –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.	**pH Correction** a. pH correction is in place at the Vartry water treatment plant to ensure a sufficient final water pH is maintained at the outlet to the Callow Hill Tunnel and to reduce plumbosolvency against lead service pipes in the distribution network. The Callow Hill tunnel was cut through acidic rock which tends to reduce the pH of the final water. b. Lime slurry of 1% lime solution is made up on site at the water treatment plant from powdered lime. There are two sets of slurry make-up tanks and dosing pumps on-site. c. The lime slurry is dosed flow proportionately and the dosing point is located after chlorination and fluoridation, on the final water pipeline to the on-site closed reservoir. d. Lime is dosed to achieve a pH of 9 at the inlet to the on-site closed reservoir. A pH of 9 results in a pH of 8 at the outlet of the Callow Hill Tunnel. e. pH monitors are located at the inlet to the closed reservoir, the outlet of the closed reservoir and the outlet of the Callow Hill Tunnel. f. The pH monitor at the inlet to the closed reservoir is alarmed with a low level set point of 7.5. The alarm will call out based on a cascade system until the alarm is responded to.
2.	**Discharge Incident** a. On the evening of 20/02/17 the pH at the inlet to the reservoir dropped and the pH monitor alarmed as per the cascade system. The Plant Engineer was onsite and responded to the alarm. The Plant Engineer shook the pH sampler and the pH level started to rise. The Plant Engineer explained on the audit that they have had issues with the functionality of the pH monitor previously due to grit from the lime getting stuck in the sampler. b. Having seen the pH levels begin to rise on the covered reservoir inlet monitor the Plant Engineer also checked the pH dosing pumps and all was operating as normal. c. At 8:00 on the morning of 21/02/17 the Depot Attendant noted that the final water pH at the plant was low and began to investigate the drop in pH levels. d. The Depot Attendant noted that the lime delivery belts on Pump 1 were broken and therefore lime was not being dosed but the pump motor was still running. The Depot Attendant switched the lime slurry make-up and dosing to Pump 2 and dosing was back in operation by 8:30. e. The Depot Attendant then went to empty the lime slurry from make-up tank 1 into a dedicated lime slurry sump. The tank was emptied into a slurry drain which feeds into the slurry sump. Having emptied the tank the Depot Attendant went to check the sump to see if it was full and required emptying. On checking the sump the Depot Attendant noted that it

	was empty and the lime slurry had not reached the sump. f. The Depot Attendant informed the Plant Engineer and they discovered that the lime slurry had discharged via the surface water drains to the site overflow channel which runs into the Vartry River.
3.	**Incident Response** a. The water treatment plant staff immediately sandbagged the overflow channel approximately 3-4 metres downstream of the discharge point. This was the furthest point downstream where the staff could visually see the lime slurry in the water. b. The staff then began sucking the lime slurry out of the overflow channel using a 4-inch pump. The slurry was discharged to a flat area of grassland within the treatment plant and approximately 30 metres from the overflow channel. c. Wicklow County Council notified Inland Fisheries Ireland (IFI) who arrived to site at 13:20 on 21/02/17. The IFI carried out an investigation of the incident and took samples from various points along the Vartry River, downstream of the discharge point. d. The water treatment plant staff continued to pump out from the overflow channel until 18:00 on the 21/02/17 and again on the 22/02/17. e. On further investigation the Plant Engineer found that the lime slurry drainage pipe from the slurry make-up tank to the sump had previously been connected to a surface water drainage pipe that ran parallel to the slurry drainage pipe. The connection between these pipes had been blocked up with mortar at some point in the past but the mortar had subsequently fallen away and recreated a connection between the slurry drainage pipe and the surface water drainage pipe. f. The slurry in the make-up tank on the morning of 21/02/17 was so thick it blocked up the slurry drainage pipe and slurry flowed into the surface water drainage pipe and out into the overflow channel. g. The IFI returned to site on 22/02/17 and deemed that the pH of the Vartry River had returned to satisfactory levels. h. The Vartry water treatment plant Engineer continued to sample the pH of the overflow channel over the following days and on the day of the audit (24/02/17) the pH was 7.6. i. The slurry drainage pipe and the surface water drainage pipe were in the process of being replaced at the point where the connection was found on the day of the audit (Photograph 1). Irish Water stated that this section will be replaced without any connection between the pipes and a larger inspection chamber fitted. j. Following the works to the two pipes a dye tracer will be put through the system to ensure this was the only pathway to the overflow channel and the works were satisfactorily completed.

3. AUDITORS COMMENTS

The audit found that management of the pH dosing system at the Vartry water treatment plant is satisfactory. The discharge of lime to the Vartry River was due to an historic issue with the drainage infrastructure at the plant. This drainage infrastructure was in the process of being upgraded at the time of the audit and the works will be validated using dye tracer before the drainage pipes are brought back into use. Vartry water treatment plant staff reacted quickly to the incident to minimise the impact of lime discharge to the Vartry River.

4. RECOMMENDATIONS

Incident Response

1. Irish Water should confirm that;
    i. The connection between the lime slurry drainage pipe and the surface water drainage pipe was the only pathway for the lime slurry discharge to the site overflow channel and subsequently to the Vartry River.

ii. The works to upgrade the drainage pipes and permanently disconnect the two pipes are complete and the quality of the works is validated.

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:** 6th March 2017

Inspector

Photograph 1: Remedial works to lime slurry drainage and surface water drainage pipes.