Site Visit Report

Under the European Union (Drinking Water) Regulations 2014 as amended, 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 water to the visited public supply.

The audit process is a sample on a given date of the facility's operation. Where a finding against a particular issue has been reported this should not be construed to mean that this issue is fully addressed.

Water Supply Zone

Name of Installation	Ballivor
Organisation	Irish Water
Scheme Code	2300PUB1002
County	Meath
Site Visit Reference No.	SV22355

Report Detail

Issue Date	30/04/2021
Prepared By	Ruth Barrington

Site Visit Detail

Date Of Inspection	23/04/2021	**Announced**	Yes
Time In	16:15	**Time Out**	16:50
EPA Inspector(s)	Ruth Barrington		
Additional Visitors	Daryl Gunning Michelle Minihan Derval Devaney		
Company Personnel	Irish Water: Andrew Boylan, Fran Glancy, Donal Heaney, John Hand, Darran Killian, David Henry, Mairead Conlon, John Leamy Meath County Council: Gerry Boyle, Helen McDonnell, David O'Reilly, Norbert McMahon, Siobhán Johnston		

Summary of Key Findings

1. The only operational online process control monitoring in place at Kilmurray WTP at the time of the audit was for chlorine residual. None of the process monitoring and controls (including plant shutdowns in the event of low chlorine residual) installed as part of the Irish Water Disinfection Programme upgrade were operational.

2. No turbidity data was available to support the verification of disinfection, as the final water turbidity monitor has not been commissioned.

3. Following difficulties with commissioning of the UV system in early 2020, disinfection at the Kilmurray WTP was reverted to primary disinfection using sodium hypochlorite rather than the UV system. Insufficient chlorine contact time for the Ballivor Public Water Supply was identified previously and was the basis for the EPA Direction issued in 2019. The specific risks to public health of inadequate chlorine contact time were not considered in the decision to revert to primary chlorine disinfection.

4. At the time of the audit, the UV disinfection system installed in response to the Regulation 16 (1) Direction issued by the EPA was not in operation.

5. At the time of the audit, these treatment deficiencies had not been subject to timely consultation with the HSE for public health advice, nor were they formally notified to the EPA.

Introduction

The Ballivor Public Water Supply (PWS) serves a population of 2,493 people from a borehole abstraction at Kilmurray Water Treatment Plant (WTP). An additional borehole at Earl's Mill, previously used to supplement the supply, is not currently in use. Treatment processes at the water treatment plant include oxidation and pressure filtration for the removal of iron and manganese, with UV and chlorination as disinfection processes.

A Regulation 16(1) Direction with a completion date of 31/12/2019 was issued by the EPA on 22/11/2019 due to inadequate contact time for chlorine disinfection, identified by Irish Water as part of their National Disinfection Programme. In response to the Direction, Irish Water installed UV disinfection at the water treatment plant. The EPA audited Ballivor PWS (Kilmurray WTP) on 21/02/2020 and found that Irish Water had not complied with the Direction as the UV system had not been commissioned. Difficulties with repeated fouling of the UV lamps had prevented the completion of the commissioning phase, but there was a schedule of works planned to overcome this at the time of the audit on 21/02/2020.

This latest audit was carried out following a notification from Irish Water on 23/03/2021 that process monitoring alarms and shutdowns had been deactivated at Enfield WTP and that issues with treatment had also been identified at Kilmurray WTP and in Longwood Public Water Supply.

Supply Zones Areas Inspected

The audit was carried out by video conference due to the Level 5 Covid 19 restrictions in place on 23/04/2021.

1. Filtration

		Answer
1.1	Are the filters designed and managed in accordance with EPA guidance?	No

Comment

1. The two pressure filters at Kilmurray Water Treatment Plant are designed to remove iron and manganese present in the groundwater abstraction. There is a chlorination pre-treatment prior to the filters to oxidise the iron and manganese for removal in the filters.

2. During the audit, the operators stated that commissioning of the Disinfection Programme process monitoring and controls, including final water turbidity monitoring, was not completed due to carry over of iron and manganese from the filters causing fouling of the UV lamps, and turbidity spikes in final water repeatedly triggering the automatic plant shutdown.

3. There is very limited (less than 2 hours) storage of treated water in the network, so plant outages very quickly result in supply being lost or pressure decreases in the network.

4. There is no online monitoring of turbidity at each filter outlet. This means that in the event of turbidity rising in the final treated water, there is no way of easily determining whether an individual filter is at fault. Monitoring turbidity on individual filter outlets is best practice and has been recommended by the EPA for many years. It is a recommended critical control in the *EPA's Water Treatment Manual: Filtration*.

5. There is no run to waste following backwash of the pressure filters. Without a run to waste, returning the filters to service after a backwash is accompanied by a spike in turbidity which may trigger the automatic shutdown of the plant, and also may interfere with the adequacy of the disinfection processes through a potential shielding effect.

6. As part of the response to increased water treatment plant outages based on high final water turbidity, Meath County Council plan to move the chlorine pre-treatment dosing point back towards the borehole, to install a contact tank before the filters and to top up the filter media. These steps should allow more time for the oxidation of iron and manganese and enhance removal to decrease the risk of fouling of the UV lamps. As described under Point 3 Management and Control of this audit report, the optimisation of the pre-treatment system and the reduction in fouling was identified under the previous EPA audit and has still to be addressed over a year later.

2. Disinfection

		Answer
2.1	Is the chlorine dosed appropriately?	No

Comment

1. Following assessment during 2019 under Irish Water's National Disinfection Programme, the chlorine contact time at Kilmurray WTP was assessed as being inadequate. The EPA's Regulation 16 (1) Direction was issued on this basis and on the selection by Irish Water of UV as a suitable primary disinfection process for use in this Public Water Supply.

2. During the audit, Meath County Council stated that primary disinfection had reverted to chlorination due to issues with iron and manganese fouling of the UV lamps and frequent automatic shutdowns. There was no formal risk assessment carried out to support this decision, which was apparently taken to avoid frequent plant outages and consumer complaints of low pressure. The critical inadequate chlorine contact time in this public water supply was not considered as a specific risk to public health, the HSE were not consulted and the EPA was not notified.

3. The chlorine residual was the only online monitoring operating at the time of the audit. Disinfection Programme upgrades have not been brought into service, so automatic shutdown of the plant in the event of low chlorine residual has not been enabled. No turbidity data was available to support the verification of disinfection, as the final water turbidity monitor was not commissioned.

4. Meath County Council stated that the abstraction is vulnerable to rising turbidity in the borehole, as well as any operational in-process changes in turbidity which may occur as a result of iron and manganese carry over. At the time of the audit there was no monitoring in place to assess the extent of this or evaluate any potential shielding effect within the disinfection process.

5. The auditors noted during audit preparation that Irish Water's National Disinfection Programme update for Q3 2020 listed the upgrades at Kilmurray WTP as commissioned during April 2020. This was not the case.

3. Management and Control

		Answer
3.1	Is the water treatment plant resilient enough to cope with significant variations in raw water quality or demand?	No

Comment

1. Several inadequacies were identified during the audit at the Kilmurray Water Treatment Plant which point to a lack of resilience to deal with raw or in-process water quality variability.

(i) Inadequate treated water storage capacity prior to the distribution network leaving the supply vulnerable to plant outages;

(ii) lack of online turbidity monitors on individual filters;

(iii) lack of chlorine residual monitoring post filters;

(iv) lack of run to waste facilities on the pressure filters to prevent out of specification water from entering supply;

(v) the use of UV lamp sleeves vulnerable to fouling from iron and manganese carried over from the filters which increases required maintenance interventions.

(vi) the failure to commission monitoring and process controls installed as part of the National Disinfection Programme.

2. Inadequacies in the operational management and control of the Kilmurray water treatment plant were identified during the audit which pose a risk to public health.

(i) Irish Water and Meath County Council's failure to select adequate treatment, and subsequently to commission and operate facilities installed as part of the Irish Water Disinfection Programme;

(ii) Meath County Council's decision to revert to primary disinfection using chlorination, despite an inadequate chlorine contact time identified by Irish Water and followed by a legal Direction from the EPA to install UV disinfection for the supply;

(iii) Meath County Council's failure to risk assess this decision's potential impacts on public health;

(iv) Meath County Council's refusal to engage with the formal process (Incident Notification Record) set up to enable this assessment.

		Answer
3.2	Have the recommendations from the previous EPA audit been satisfactorily addressed?	No

Comment

1. An EPA audit to assess compliance with the Regulation 16(1) Direction was carried out on 21/02/2020. The audit report identified Irish Water's failure to comply with the Direction and made a number of recommendations, one of which was for Irish Water to provide an Action Programme to address UV lamp fouling, and another was to ensure filtered water turbidity was less than 1 NTU prior to UV treatment.

2. The Action Programme items relating to UV fouling and process controls, which Irish Water proposed on 09/04/2020 had not been implemented at the time of this current audit, over one year later. These comprised the optimisation of chlorination pre-treatment before the filters, upgrading the process control and inhibits into the PLC and HMI systems, installation of run to waste on the filters. It is understood that some of the delays were due to Covid 19 restrictions, however once those restrictions were lifted during 2020, the critical nature of these works was not given priority.

Recommendations

Subject	Ballivor (Kilmurray) Audit Recommendations	Due Date	31/05/2021

Action Text

Recommendations

1. Irish Water and Meath County Council should ensure prompt and timely consultation with the HSE and notification to the EPA of incidents and parametric failures as required in the *European Union (Drinking Water) Regulations, SI No 122 of 2014 as amended*. The use of chlorination as a primary disinfection with inadequate contact time should be immediately progressed through the INR process and notified formally to the EPA.

2. Irish Water should ensure adequate disinfection of the Ballivor PWS at all times, operating the disinfection processes within validation envelopes and in accordance with EPA guidance.

3. Irish Water should ensure that the Disinfection Programme process monitoring and control facilities including all treatment processes, alarms and inhibits are brought into active use at the Kilmurray Water Treatment Plant.

4. Irish Water should develop procedures for the management of critical alarms and inhibits at a water treatment plant level, including access permissions, designated risk assessments and sign off responsibilities.

5. Irish Water should provide timeframes to complete the identified works to reduce fouling of the UV lamps, including the re-location of the chlorine pre-treatment dosing, the installation of a pre-treatment contact tank, and topping up the filter media.

6. Irish Water should provide an Action Programme including timeframes for addressing the treatment deficiencies identified in Section 3.1(1) Management and Control of this Audit Report. This should cover the following points.

- Address the inadequate treated water storage capacity prior to the distribution network leaving the supply vulnerable to plant outages;
- Provision of online turbidity monitors on individual filters;
- Provision of chlorine residual monitoring post filters;
- Provision of run to waste facilities on the pressure filters to prevent out of specification water from entering supply;
- Maintenance of UV lamps vulnerable to fouling from iron and manganese carried over from the filters which increases required maintenance interventions.

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 Michelle Minihan, Senior Inspector, Drinking Water Team.

Irish Water should submit a report to the Agency on or before 31/05/2021 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 time frame 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 Action Reference Number in any future correspondence in relation to this Report.