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	Enfield
Organisation	Irish Water
Scheme Code	2300PUB1010
County	Meath
Site Visit Reference No.	SV22351

Report Detail

Issue Date	30/04/2021
Prepared By	Ruth Barrington

Site Visit Detail

Date Of Inspection	23/04/2021	**Announced**	Yes
Time In	14:55	**Time Out**	16:15
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. Enfield Water Treatment Plant process alarms and shutdowns, programmed at levels which protect public health against the risks of inadequately disinfected water, were deactivated during the period 25/02/2021 to 19/04/2021. This decision was taken by Meath County Council operating the water treatment plant on behalf of Irish Water, in the absence of a formal risk assessment of the potential impacts, without consulting with the HSE on appropriate measures to protect public health, and without notifying the EPA.

2. During the same time period Meath County Council switched the Enfield Water Treatment Plant back to primary disinfection using chlorination, rather than the UV system. Insufficient chlorine contact time for the Enfield 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.

3. Despite concerns around the validity of online monitoring data, Irish Water have identified three occasions during the same time period where final water turbidity was in excess of 1NTU for over 15 minutes which may have compromised the disinfection process. At the time of the audit, these incidents had not been subject to consultation with the HSE for public health advice nor were they formally notified to the EPA.

Introduction

The Enfield Public Water Supply (PWS) serves a population of 3,274 from a borehole abstraction. Treatment processes at the Enfield Water Treatment Plant (WTP) include oxidation and pressure filtration for the removal of iron and manganese, with UV and chlorination as disinfection processes.

A Regulation 16(1) Direction was issued by the EPA on 22/11/2019 due to inadequate contact time for chlorine disinfection in the Enfield PWS, 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 Enfield WTP on 21/02/2020 and the Direction was closed out on the basis of a validated UV system installed and operating effectively at the time of the audit. Irish Water's National Disinfection programme update for Q3 2020 indicated that upgrade works were completed at Enfield in 2019.

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 Water Treatment Plant.

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 three pressure filters at Enfield 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 final water turbidity increases had caused frequent triggering of the automatic shut down levels, resulting in repeated plant outages and consumer complaints since late 2020. There is limited storage of treated water, so plant outages very quickly result in supply being lost or pressure decreases in the network.

3. 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*.

4. 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, interfere with the adequacy of the disinfection processes through a potential shielding effect, and cause fouling of the UV lamps.

5. As part of the response to increased plant outages based on high final water turbidity, media replacement of all three filters was undertaken between 15/02/2021 and 30/03/2021.

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 Enfield WTP was assessed as being inadequate for primary disinfection. The EPA's Regulation 16 (1) Direction was issued on this basis and on the selection by Irish Water of UV as a suitable disinfection process for use in this Public Water Supply. The Direction compliance was therefore assessed by the EPA with UV as the primary disinfectant, with sodium hypochlorite being used to maintain a residual within the network as a secondary disinfectant, which does not require full contact time.

2. During the audit, Meath County Council stated that primary disinfection had reverted to chlorination from 26/02/2021 due to issues with frequent automatic shutdowns. The UV remained in operation as a secondary measure. 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. Teams within Irish Water were informed of the decision by Meath County Council, but due to a breakdown in communications within Irish Water, the Environmental Regulation Team was not informed of the issues in a timely way, meaning that 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. There is currently no chlorine analyser post filters to assist in determining the optimum sodium hypochlorite dose for disinfection purposes, taking into account the chlorine residual remaining from pre-treatment. This additional monitoring is planned but there was no timescale for this available at the audit.

4. The impact of any peaks in turbidity on disinfection were not mitigated against with final water turbidity alarms and shutdowns deactivated from 26/02/2021 to 19/04/2021. As described under the Management and Control Section 3 of this report, the online data provided by Irish Water in preparation for the audit can not be relied on due to observed duplicate timestamps and apparently frozen readings, however Irish Water have indicated at least three incidents during the time period where turbidity was in excess of 1 NTU for over 15 minutes. At the time of the audit, these incidents had not been formally notified to the EPA with accompanying HSE consultation on the potential public health impact.

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 at the Enfield Water Treatment Plant which point to a lack of resilience to deal with raw or in-process water quality variability.

(i) Lack of treated water storage 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.

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

(i) Meath County Council's decision to deactivate alarms and shutdowns of the water treatment plant, leading to a period of seven weeks where any interventions were being made on a reactive basis rather than preventing inadequately treated water entering supply;

(ii) Meath County Council's decision to revert to primary disinfection using chlorination, despite an inadequate chlorine contact time identified by Irish Water in 2019 and followed by a legal Direction from the EPA to install UV disinfection for the supply;

(iii) Breakdown in communications within Irish Water leading to a delay in identifying the potential public health risk of process decisions made at Enfield WTP;

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

(v) Meath County Council's refusal to engage with the formal process (Incident Notification Record) in place to enable this assessment.

		Answer
3.2	Is the data obtained from sampling and monitoring used to actively inform the processes on site and in the distribution network?	No

Comment

1. Data provided as part of the audit process was considered unreliable for the purposes of both assessment and water treatment plant operational control. Duplicate timestamps and 90% of turbidity readings frozen at the lower limit of detection of 0.02 NTU were evident in the data.

2. Meath County Council stated during the audit that further data review and downloads had been requested from the contractors in an attempt to verify the output of online monitoring.

3. During the period 25/02/2021 to 19/04/2021, online data was not being used to control the water treatment plant as the alarms and shutdowns had been disabled.

Recommendations

Subject	Enfield 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 incidents of turbidity over 1NTU for periods over 15 minutes, identified by Irish Water during the period 25/02/2021 and 19/04/2021, should be immediately progressed through the INR process and notified formally to the EPA. 2. Irish Water should ensure adequate disinfection of the Enfield PWS at all times, operating the disinfection processes within validation envelopes and in accordance with EPA guidance. 3. Irish Water should ensure that the Enfield Water Treatment Plant is operated and controlled using representative, verifiable data as a basis, and that the results of online monitoring are actively used to control the 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 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. a. Address the lack of treated water storage which leaves the supply vulnerable to plant outages; b. Provision of online turbidity monitors on individual filters; c. Provision of chlorine residual monitoring post filters; d. Provision of run to waste facilities on the pressure filters to prevent out of specification water from entering supply; e. Maintenance of UV lamps vulnerable to fouling from iron and manganese carried over from the filters. **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.		