

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	Whitegate Regional
Organisation	Irish Water
Scheme Code	0500PUB2407
County	Cork
Site Visit Reference No.	SV18510

Report Detail	
Issue Date	14/01/2020
Prepared By	Criona Doyle

Site Visit Detail			
Date Of Inspection	04/12/2019	Announced	Yes
Time In	10:30	Time Out	14:11
EPA Inspector(s)	Criona Doyle Regina Campbell		
Additional Visitors	HSE: Catherine McCarthy		
Company Personnel	Irish Water: Deirdre O'Loughlin; Tommy Roche; Oliver Harney; Robert Kennedy; Neil Smyth. Cork County Council: Eimer O'Riordan; Graham Whittaker; Jim O'Neill; Mary Hickey.		

> Summary of Key Findings

(1) The treatment process in operation on the day of the audit is not sufficient to deal with periods of elevated raw water turbidity. Infrastructure was installed in 2016 to provide a coagulation stage prior to filtration to deal with periods of high turbidity in the raw water. Irish Water indicated that the coagulation stage has not been used in the last two years and the coagulation process may not have been fully commissioned in 2016 due to limited variation in raw water conditions experienced at that time. The EPA had been informed in December 2016 by Irish Water that the process was operational at that time. Irish Water commenced process optimisation on 26/11/19 to establish the level of coagulant dosing required under different raw water conditions.

(2) The audit identified that bypassing of alarm turbidity set points took place between the 21/11/19 and 26/11/19. This resulted in the turbidity of the treated water being above the 1 NTU parametric value.

(3) No documented alarm response procedure was in place at the water treatment plant. Training should be provided to all staff on how to respond to the activation of alarms and the appropriate escalation of alarms to senior staff.

> Introduction

The Whitegate Regional Public Water Supply produces 6,191m³/d and serves a population of 9,508. The source of the supply is the Dower spring which is located in an area of karst limestone. The source has a very high Cryptosporidium risk score. Treatment includes microfiltration followed by UV, fluoridation and chlorination.

The EPA were notified by Irish Water on 27/11/19 that a Boil Water Notice (BWN) was being issued to all consumers supplied by the Whitegate Regional Water Supply due to the risk of inadequate disinfection as a result of elevated turbidity.

This audit was carried out to investigate the operational issues at the plant which resulted in the issuing of a BWN. The BWN was subsequently lifted on 20/12/19 following consultation with the HSE.

A Regulation 16(1) Direction was issued by the EPA on 23/12/19 requiring Irish Water to install and commission a suitable coagulation dosing system before the filtration stage at Kilva Water Treatment Plant by 28/02/20.

> Supply Zones Areas Inspected

The audit included the inspection of the filtration, UV disinfection and chlorination stages of the treatment plant. The infrastructure for the operation of a coagulation stage prior to filtration was not in use but was inspected as part of the audit.



1. Incident Management

1.1

	Answer
Was the incident suitably alerted to the plant operators, escalated and managed in order to maintain water quality and protect public health?	No
Comment	
<p>(1) The Dower Spring is prone to rapid water quality changes after rainfall.</p> <p>(2) Treatment at the plant consists of microfiltration followed by UV and chlorination.</p> <p>(3) On 26/11/19 at 11:15 hours the Whitegate treatment plant was shut down as the turbidity post filters was above 1 NTU. Investigations by Cork County Council identified the turbidity alarm set points had been bypassed.</p> <p>(4) On 26/11/19 a contractor was called to site to examine the microfilters but no instrumentation faults were identified. The plant remained shut down overnight with water being supplied from the reservoir. Water samples were taken on 26/11/19 for analysis of microbiological parameters in addition to <i>Cryptosporidium</i> and <i>Giardia</i> and the results confirmed no detections.</p> <p>(5) On 27/11/19 Irish Water undertook consultation with the HSE as critically low water levels were being approached in the storage reservoirs. The HSE placed a BWN on the supply and the treatment plant was brought back online at 2:30pm. The EPA were notified of the BWN.</p> <p>(6) During the audit the following high high alarm setpoints were viewed on site: filtered turbidity 1 NTU at the outlet from each individual filter and 0.9 NTU UV inlet turbidity (combined filters). The alarms operate on a cascade system to alert the Shift Curator, Executive Engineer and Senior Executive Engineer. There is no automatic shutdown of the raw water pumps based on turbidity as it was considered this would lead to frequent shutdowns. The purpose of the filtration stage is to deal with the variation in the raw water turbidity.</p> <p>(7) Coagulation infrastructure was installed upstream of the filters in 2016 but had not been operated for the last two years. Coagulation trials including jar testing commenced on 27/11/19 to establish coagulant dosing bands.</p> <p>(8) As a result of broadband issues at the site the SCADA could not be examined in detail at the audit. It was outlined at the audit that the files were available to download from the site records. Irish Water subsequently forwarded the SCADA print outs to the EPA on 13/12/19.</p> <p>(9) A review of the SCADA data subsequent to the audit confirmed that bypassing of the pre UV turbidity alarm set point level (0.9 NTU) and the automatic plant shutdown level (1 NTU) took place between 12:30 hours on 21/11/19 and 11:15 hours on 26/11/19.</p> <p>(10) The SCADA confirmed that the UV unit was shut down between 06:17 hours and 12:47 hours on the 21/11/19, however no water was going into supply during this time.</p> <p>(11) The SCADA confirmed that while the UVT dropped below the UVT alarm set point of 84% the UVT did not drop below the minimum level of 68.7%. The SCADA trends indicate a UV dose of 14.68 mJ/cm² was achieved at all times when water was going into supply during the alarm bypassing period.</p> <p>(12) The filters had remained in operation at all times when water was going into supply during the alarm bypassing period.</p> <p>(13) A protocol had been agreed with Irish Water in December 2016 to cover periods of high raw water turbidity. The protocol allowed for Irish Water to increase the turbidity limit to 1.8 NTU pre UV disinfection for short periods of time subject to prior consultation with the EPA and the criteria set by the EPA. Irish Water did not consult with the EPA to activate the protocol to cover periods of increased turbidity between 21/11/19 and 26/11/19. In addition the 1.8 NTU upper turbidity limit which was one of the criteria previously agreed under the protocol was exceeded with filtered water turbidity of up to 9.3 NTU being recorded.</p>	



2. Coagulation Clarification Flocculation (CFC) Stage

2.1

Were the CFC processes visually observed to be operating appropriately during the audit?

Answer

No

Comment

The infrastructure to provide a coagulation stage prior to filtration was installed in December 2016. The coagulation stage was not in operation at the plant on the day of the audit. It was confirmed that it has not been in operation for the previous two years. Irish Water outlined that the commissioning of the coagulation stage had not been fully completed in 2016 as the raw water conditions had not been suitable.

Irish Water commenced coagulation trials including jar testing on 27/11/19 to facilitate the reintroduction of the coagulation stage prior to the filtration stage.



3. Filtration

3.1

Are the filters designed and managed in accordance with EPA guidance?

Answer

Yes

Comment

There are 2 no. self cleaning Amiad microfilters which operate in parallel. Each filter is designed to treat up to 150m³/hr (300m³/d combined). The filters are automatically backwashed based on pressure differential which typically results in daily backwashing. The filters were installed in 2016 and have a lifespan of approximately 7 years.

3.2

Was there visual indication that the filters were operating appropriately?

Answer

Not Applicable

Comment

The filters are not visible as they are contained in enclosed units. Alarms are in place to indicate if the filters are operating outside of normal levels. There is a high level turbidity alarm on each individual filter at 0.7 NTU and a high high alarm at 1 NTU. The plant is set to automatically shut down if the post filter turbidity level is > 1 NTU for 15 minutes on either filter and on the combined filtered water turbidity on the inlet to the UV unit.

A review of the SCADA indicates that the alarm set points were bypassed from 12:30 hours on 21/11/19 to 11:15 hours on 26/11/19 and that filtered water turbidity values in excess of the 1 NTU continued to be discharged to the supply during this time with filtered water turbidity up to 9.3 NTU being recorded.

3.3

Does monitoring indicate that the filters are operating effectively?

Answer

No

Comment

There has been no maintenance or service contract in place for the 2 no. microfilters since they were installed in 2016. The filters were inspected between 26/11/19 and 27/11/19 and no issues were identified when the units were stripped down and inspected.

The SCADA trends for the period 21/11/19 to the 03/12/19 indicate that the microfilters (2 micron pore size) cannot ensure a filtered water turbidity of < 1 NTU due to the nature of the raw water.

The SCADA trends for the 21/11/19 indicate that the filtered water turbidity levels (Filter No. 1, Filter No.2 and combined filtered water turbidity pre UV unit) were higher than the raw water turbidity levels between 03:45 and 20:00 hours.



4. Disinfection

4.1

Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?

Answer

Yes

Comment

On the day of the audit there were issues accessing the trended data due to a problem with the broadband at the site from 21/11/19 to the 02/12/19. The data was recorded on the system at the plant and was subsequently provided to the EPA on 13/12/19. The data was examined and no issues were identified with the recording of the trended data.

4.2

Are duty and standby chlorine pumps/ UV units in operation?

Answer

Yes

Comment

There are duty and standby chlorine dosing pumps which automatically change over every 3 hours. A trim dosing pump is also provided.

There is a single UV unit in place as there is > 24 hour storage provided on site to cover maintenance periods for the UV unit.

4.3

Is the UV system suitably validated?

Answer

Yes

Comment

A single Trojan UV Swift SC D12 disinfection system validated to UVDGM (USEPA) is provided at the Kilva reservoir. The UV unit is validated for flows between 11.1 and 689.8m³/hour, for a UVT range of 68.7% to 97.4% and a RED range of 3.0 mJ/cm² to 269.6 mJ/cm².

4.4

Is the UV disinfection system operating within its validated range?

Answer

Yes

Comment

The SCADA data provided on 13/12/19 confirmed that the UV unit is operating within its validation range. The data indicates a UV dose of 14.68 mj/cm2 was achieved at all times that water was being produced at the treatment plant.

There was an issue with bypassing of the alarm set points from 21/11/19 to 26/11/19. The alarm set points for the UV unit are UV dose 13.90 mj/cm2 low and 13.80 mj/cm2 low low; UVT 86% low and 84% low low and UV inlet turbidity 0.70 NTU high and 0.90 NTU high high. Dial out alarms are triggered after 15 minutes delay.

The unit was serviced on 05/09/19 with the next service due in January 2020.

	Answer
4.5 Does the trend in chlorine residual at the treatment plant indicate adequate and stable levels of disinfection?	Yes
Comment	
The SCADA data provided confirmed that adequate chlorine levels were maintained during the period of elevated turbidity between the 21/11/19 and 26/11/19.	

	Answer
4.6 Is there adequate chlorine contact time before the first connection?	Yes
Comment	
Irish Water confirmed a contact time of 25.91 mg.min/l is being provided. The target contact time is 23.4 mg.min/l.	

	Answer
4.7 Is there a suitable monitoring frequency for residual chlorine in the network with records available?	No
Comment	
Irish Water outlined that monthly monitoring was being undertaken of chlorine residuals at the end of the network.	



5. Management and Control

5.1

Are suitable alarm settings in place to alert operators to deteriorating water quality and/or the failure of a critical treatment process?

Answer

No

Comment

The review of the SCADA confirmed that despite suitable alarms being in place for both the filtered water turbidity and the UV unit the alarm set points were bypassed for 5 days from 21/11/19 to 26/11/19. This resulted in the turbidity of the filtered water being > 1 NTU.

5.2

Are relevant alarms dialled out via a cascade system to allow a timely response by plant operators?

Answer

Yes

Comment

A cascade system is in place for all alarms which includes the site caretaker, executive engineer and acting senior executive engineer. However on the day of the audit no documented alarm procedure was available on site.

5.3

Is the data obtained from sampling and monitoring used to actively inform the processes on site and in the distribution network?

Answer

Yes

Comment

One of the turbidity monitors was not reading correctly on the day of the audit. It was reported that the monitor was not in use as it had not been calibrated but there was no tag on the monitor to indicate that it was not to be used.

Subject	Whitegate Audit	Due Date	14/02/2020
Action Text	<p>Recommendation(s)</p> <ol style="list-style-type: none"> 1. Irish Water should investigate the robustness of the current treatment processes to deal with variations in raw water quality and take appropriate measures to ensure that treatment is not compromised during periods of raw water quality deterioration. 2. Irish Water should provide an update on the progress of the process optimisation work on the coagulant dosing. 3. Irish Water should develop documented procedures for all alarm responses and submit a copy to the EPA. The procedures should clearly document the security of the system controls in place. Irish Water should provide training to all staff including relief staff on the procedures. 4. Irish Water should develop documented procedures and provide training to all staff including relief staff, on the procedure for the notification and escalation of incidents internally and to the HSE and EPA. 5. Irish Water should undertake a review (of the current raw water turbidity alarm levels and turbidity alarm response) to ensure appropriate alarm levels and response procedures are in place in the event that the raw water quality is compromised. 6. Irish Water should ensure that all monitors are within service and calibration dates and ensure that any monitoring equipment that is out of calibration or faulty should be tagged as being out of service. 7. Irish Water should provide an update to the Agency on the outcome of the investigations as to why the filtered water turbidity levels were higher than the raw water turbidity levels on 21/11/19. 8. Irish Water should ensure a service and maintenance contract is in place for the 2 no. microfilters as per the manufacturer's recommendations and provide details to the Agency of the proposed maintenance schedule and routine testing including integrity testing. 9. Irish Water should ensure monitoring of residual chlorine levels is undertaken at the end of the network several times per week. 10. Irish Water should confirm the protozoal compliance requirements and source category for the supply. 11. Irish Water should consider the feasibility of installing additional permanent monitoring stations to measure water quality on the feeder streams to provide an early warning of elevated turbidity. <p>Follow-Up Actions required by Irish Water</p> <p>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.</p> <p>This report has been reviewed and approved by Dr. Michelle Minihan, Senior Inspector, Drinking Water Team.</p> <p>Irish Water should submit a report to the Agency on or before 14/02/20 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.</p> <p>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 DW2019/214 in any future correspondence in relation to this Report.</p>		

