

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	Ardfinnan Regional
Organisation	Irish Water
Scheme Code	2900PUB0102
County	Tipperary
Site Visit Reference No.	SV22672

Report Detail	
Issue Date	13/09/2021
Prepared By	Criona Doyle

Site Visit Detail			
Date Of Inspection	20/08/2021	Announced	Yes
Time In	11:00	Time Out	12:40
EPA Inspector(s)	Criona Doyle		
Additional Visitors			
Company Personnel	Tipperary County Council: John Crowley*; John Fogarty; Flan Real; Sharon O'Dwyer and Eamon O' Gorman. Irish Water: Pat Duggan; Colin Cunningham and Samantha Keane. Attended pre site visit meeting on 18/08/21 only*		

> Summary of Key Findings

1. A boil water notice was placed on the Ardfinnan Regional public water supply on 06/08/21 following consultation with the HSE (population affected 11,542). The notice was placed in response to a turbidity incident on 06/08/21 which may have compromised the *Cryptosporidium* barrier. *Cryptosporidium* was subsequently detected in samples of the final water on 06-07/08/21 and 07-08/08/21.
2. The boil water notice was rescinded on 12/08/21 following the return of the plant to normal operating conditions with the turbidity < 0.3 NTU and the receipt of 3 no. consecutive compliant samples for *Cryptosporidium*.
3. Irish Water intend to undertake remedial works at the plant to ensure the *Cryptosporidium* barrier is maintained at all times. It proposed to install automatic plant shutdown linked to the turbidity and chlorine alarms to ensure inadequately treated water cannot be discharged to the network.
4. As an interim measure it was agreed with the HSE that the raw water valve on the inlet to the flash mixer will be manually shutdown when the raw water colour exceeds 200 Hazen based on the high colour alarm setpoint. The Caretaker will also shutdown the plant in advance of bad weather if heavy rainfall is forecast. It is proposed that this interim measure will remain in place until the installation of the automatic plant shutdown has been completed.

> Introduction

The Ardfinnan public water supply serves a population of 11,542 and produces 5,520m³/d. Raw water is abstracted from 2 no. mountain streams. Treatment includes coagulation, dissolved air flotation, rapid gravity filtration, final pH correction, chlorination and fluoridation. Treated water is stored in the 2 no. reservoirs at the WTP (combined volume 4,545m³) with 2 no. additional reservoirs further out in the network at Edenmore and Jamestown.

The audit was undertaken in response to the turbidity incident on 06/08/21, the imposition of a boil water notice on the supply from 06/08/21 to 12/08/21 and the detection of *Cryptosporidium* in samples taken on 06-07/08/21 and 07-08/08/21.

> Supply Zones Areas Inspected

The audit consisted of a video conference call with Irish Water and Tipperary County Council staff on 18/08/21 and an on-site inspection of the Ardfinnan Water Treatment Plant (WTP) on 20/08/21. All areas of the treatment process were inspected during the audit including the coagulation, filtration, disinfection and fluoride dosing stages.



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?	Yes
Comment	
<p>Incident:</p> <p>An incident of elevated turbidity occurred at Ardfinnan WTP on 06/08/21. The turbidity was in excess of 1 NTU for a period of 3 to 4 hours on the night of the 05-06/08/21 as a result of high raw water colour.</p> <p>The final treated water turbidity alarm setpoint is 0.25 NTU at the clear water tank (PMAC system) and 0.30 NTU for each of the individual filters. The PMAC text alarms are sent to the Caretaker, General Services Supervisor and Process Control Technician. The following high alarm events occurred: Filter No. 2 at 04:00 hours; Filter No. 3 at 04:30 hours; clear water tank at 04:45 hours and Filter No. 1 at 06:45 hours. Alarm response cover is provided between the hours of 08:00 and 20:00 hours. There is no out of hours cover.</p> <p>There is no automatic plant shutdown at Ardfinnan WTP in response to the alarms. The plant can be shutdown remotely but normally is visited in response to alarms. The high turbidity water was pumped to the reservoir.</p> <p>Response:</p> <p>The pumps to the reservoir were shutdown at 07:45 hours on 06/08/21 by the Caretaker. At 08:35 hours backwashing of all 3 no. filters commenced. The <i>Cryptosporidium</i> sampling rig was put on at 09:00 hours to take a sample of treated water on the outlet from the reservoir. Samples were taken from the network at 10:40 hours and analysed for colour, pH, turbidity, aluminium, residual chlorine, fluoride and conductivity. At 11:55 hours the turbidity in the final treated water had returned to 0.10 NTU and the plant was restarted.</p> <p>A boil water notice was put in place on 06/08/21 following consultation between Tipperary County Council, Irish Water and the HSE. Irish Water notified the EPA of the imposition of the BWN and turbidity incident on 06/08/21.</p> <p><i>Cryptosporidium</i> was detected in the investigative samples taken on 06-07/08/21 and 07-08/08/21 in response to the turbidity exceedance. Further sampling was undertaken in the network on 07/08/21; 08/08/21 and 09/08/21 for colour, pH, turbidity, aluminium, residual chlorine, fluoride and conductivity.</p> <p>The boil water notice was lifted on 12/08/21 following consultation with the HSE and the receipt of 3 no. consecutive clear samples for <i>Cryptosporidium</i> (sample dates 08-09/08/21, 09-10/08/21 and 10-11/08/21) and confirmation that the treatment plant was back in compliance.</p> <p>On the day of the audit Tipperary County Council were awaiting the results of genotyping of the original positive sample.</p> <p>Further Actions Proposed:</p> <p>Irish Water outlined at the audit that the installation of automatic shutdown of the water treatment plant linked to the high turbidity and chlorine alarms (high & low) is being progressed. The scope of works is being examined by the Irish Water and a Contractor.</p> <p>As an interim measure Irish Water, Tipperary County Council and the HSE agreed that the raw water valve on the inlet to the flash mixer will be manually shutdown when the raw water colour exceeds 200 Hazen based on the high colour alarm setpoint. The Caretaker will also shutdown the plant in advance of bad weather if heavy rainfall is forecast. It is proposed that this interim measure will remain in place until the installation of the automatic plant shutdown has been completed.</p>	



2. Coagulation Clarification Flocculation (CFC) Stage

		Answer
2.1	Is the CFC process optimised to respond to changes in raw water quality?	Yes
Comment		
<p>Raw water is obtained from 2 no. mountain streams (Glen Breda and Ahearne's Glen) which are flashy and prone to sudden colour increases. Monitoring of raw water quality includes continuous monitoring of flow, pH, colour and turbidity. Warning alarm level setpoints are in place but there is no facility for automatic shutdown of the raw water inlet in the event the set points are exceeded.</p> <p>The automatic coagulation process is controlled by the PLC based on colour bands which have been developed to deal with the site specific raw water quality conditions. The optimum coagulation pH is maintained via soda ash dosing. Polyelectrolyte is added at the flash mixer to assist with coagulation.</p>		

		Answer
2.2	Are the CFC processes appropriately controlled?	No
Comment		
<p>8% aluminium sulphate coagulant is used with pH adjustment using soda ash to ensure optimal coagulation. On the day of the audit duty and standby dosing pumps were in operation for coagulant dosing. There is no automatic switchover of the dosing pumps from duty to standby if the duty pump fails. There is no routine scheduled automatic switch over between the duty and standby pumps. It was outlined that manual switch over of pumps occurs every 2 to 3 months.</p> <p>Tipperary County Council outlined that normally a duty / standby pumping arrangement is provided for soda ash dosing however on the day of the audit there was only a single soda ash dosing pump (pH control for coagulation stage) in place. The single pump had been in use for the previous six weeks.</p> <p>3 no. DAF/ rapid gravity filter streams are provided on site which operate in parallel. Each stream includes a series of 2 no. flocculation tanks prior to a DAF/rapid gravity filter. Floc is lifted to the top by the air / water mix and scrapers remove the floc to the sludge tank. The treated water then passes through the rapid gravity filter. All 3 no. streams operate continuously in parallel.</p>		

> 3. Filtration

		Answer
3.1	Are the filters designed and managed in accordance with EPA guidance?	No
Comment		
<p>Filtration is provided via 3 no. rapid gravity filters. The filter media (1.15m) was replaced in May 2017. There are no marker posts to allow monitoring of the current depth of the filter media.</p> <p>Filter backwashing is based on head loss or automatically on a timed basis (24 hour) whichever occurs first. There is no run to waste or slow start in place after filter backwashing.</p> <p>The Caretaker undertakes observations of the filter backwash every 2 to 3 weeks but observations are not recorded. Repairs had taken place to the wall of Filter No. 1 on the day prior to the turbidity incident and the filter was offline during these repairs.</p> <p>Each filter has a high turbidity alarm set point of 0.30 NTU which generates a warning alarm. There is no automatic backwashing linked to turbidity or in response to turbidity alarms. There is also a turbidity alarm of 0.25 NTU on the combined filtered water which generates a warning alarm. There is no automatic plant shutdown linked to the turbidity alarm.</p> <p>On the day of the audit the following turbidity levels were observed: Filter 1 0.06 NTU; Filter 2 0.00 NTU (after backwashing;) Filter 3 0.02 NTU and final filtered water 0.09 NTU.</p>		

		Answer
3.2	Does monitoring indicate that the filters are operating effectively?	Yes
Comment		
<p>Trends for the month of July were provided in the information submitted prior to the audit. The trends indicated the filters were operating < 0.3 NTU. A number of spikes for Filter No. 2 were related to air in line of turbidity monitor following backwashing.</p>		



4. Disinfection

		Answer
4.1	Are monitors and alarms operational via dial out and being responded to with a suitable cascade system in place?	Yes
Comment		
<p>The alarms on the outlet from the reservoir on the PMAC system are 1.5 mg/l high alarm setpoint and 0.65 mg/l low alarm setpoint and on inlet to reservoir 0.5 mg/l low and 2.0 mg/l high. PMAC alarms send a warning alarm text to the Caretaker, General Services Supervisor and Process Control Technician. There are also SCADA alarms on the outlet of the reservoir set at 0.60 mg/l low and 2.5 mg/l high. There is no automatic plant shutdown linked to the chlorine alarms but the plant can be shut down remotely.</p>		

		Answer
4.2	Is the chlorine dosed appropriately?	Yes
Comment		
<p>15% sodium hypochlorite is used on site for disinfection. Dosing is flow proportional on the inlet to the reservoirs with duty and standby pumps plus a boost function. Pumps automatically changeover on a 6 hour frequency. The boost function is based on the residual chlorine level on the common line from the outlet of both reservoirs. The target residual chlorine level is 1.0mg/l and the boost function kicks in at 0.85mg/l. There is booster chlorination at Edenmore (call in set point 0.65 mg/l) and Jamestown reservoirs (call in set point 0.7mg/l).</p>		

		Answer
4.3	Does the trend in chlorine residual at the treatment plant indicate adequate and stable levels of disinfection?	Yes
Comment		
<p>Residual chlorine trends for July provided in advance of the audit indicated stable residual chlorine trends on both the reservoir inlet and outlet. The trends for the week prior to the audit were checked on site and confirmed stable trends.</p>		

		Answer
4.4	Is the residual chlorine monitored at a suitable sample location after contact time has been completed?	Yes
Comment		
<p>A copy of the contact time calculation was provided and indicated a total effective contact time of 54.54 mg.min/l with monitoring of the residual chlorine level on the outlet of the reservoir with an appropriate alarm level to verify contact time is maintained at all times.</p>		

4.5

Is there a suitable monitoring frequency for residual chlorine in the network with records available?

Answer

No

Comment

The residual chlorine monitoring data from the network was provided in advance of the audit and indicated no readings in the network from the Edenmore reservoir between 13/07/21 and 23/07/21 or the Jamestown reservoir area between 15/07/21 and 26/07/21.



5. Treatment Process Chemicals

	Answer
5.1 Are treatment process chemicals appropriately managed and stored?	No
Comment	
The concrete block wall bund around the fluorosilicic acid tank was not lined with protective material.	



6. Management and Control

		Answer
6.1	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	Yes
Comment		
<p>Irish Water indicated the site has been assessed as having a Log 3 treatment requirement. There is no log deficit as the treatment provided meets the Log 3 requirement if operated in accordance with the EPA Water Treatment Manual: Filtration. Irish Water and Tipperary County Council undertake monitoring of <i>Cryptosporidium</i> 5 times per annum.</p>		



7. Sludge Management

	Answer
7.1 Is sludge arising from the treatment processes adequately managed?	Yes
Comment	
Supernatant from the Ardfinnan WTP is discharged to the Mountain Stream. 36m ³ of sludge is stored on site. Sludge is removed off site to the Ardfinnan Waste Water Treatment plant 3 times per week. Tipperary County Council undertake regular sampling of the supernatant and the results are recorded in the daily plant log book.	

Recommendations

Subject	Ardfinnan Audit	Due Date	13/10/2021
Action Text	<p>Recommendation(s)</p> <ol style="list-style-type: none"> 1. Irish Water should install automatic plant shutdown linked to the turbidity and chlorine alarms. 2. Irish Water should install marker posts to allow regular checking of the filter media depth in the rapid gravity filters. 3. Irish Water should ensure that the filters are run to waste for an appropriate period of time or install a slow start when the filter is brought back into use after backwashing. 4. Irish Water should monitor residual chlorine in the network, including the extremities, several times per week to ensure that a minimum of > 0.1 mg/l is maintained. 5. Irish Water should provide confirmation of the date of completion of the repair works to the duty / standby soda ash dosing pumps that provide pH control for the coagulation stage. 6. Irish Water should ensure automatic switchover of the alum and soda ash dosing pumps to ensure the chemical dosing pumps are regularly switched over to maintain the pumps' prime. 7. Irish Water should review the chemical storage arrangements for hydrofluorosilic acid storage in accordance with EPA guidance document –“<i>IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities</i>”. <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 Regina Campbell, Drinking Water Team Leader.</p> <p>Irish Water should submit a report to the Agency on or before 13/10/21 detailing how it has dealt with the issues of concern identified during this audit.</p> <p>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.</p> <p>Please quote Compliance Plan DW20210112 in any future correspondence in relation to this Report.</p>		