

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	Inch PWS 044D
Organisation	Irish Water
Scheme Code	1300PUB1040
County	Kerry
Site Visit Reference No.	SV20434

Report Detail	
Issue Date	08/10/2020
Prepared By	Regina Campbell

Site Visit Detail			
Date Of Inspection	07/08/2020	Announced	Yes
Time In	11:00	Time Out	13:35
EPA Inspector(s)	Regina Campbell Orla Harrington		
Additional Visitors			
Company Personnel	Irish Water: Deirdre O' Loughlin, Oliver Harney, Kian Guihen* Kerry County Council: Paul Neary, Owen O' Sullivan, Paidi Flahive**, Colm Mangan** HSE: Anne Sheahan, John Moynihan		
	* Attended pre site visit meeting on 05/08/20 only. ** Attended site visit meeting on 07/08/20 only.		

> Summary of Key Findings

1. *Cryptosporidium* was detected in the Inch Public Water Supply (PWS) on 07/07/20 and 27/08/18. Remedial works are required on the rapid gravity filters at Inch Water Treatment Plant to ensure that there is adequate filtration at the plant and to ensure that the *Cryptosporidium* barrier is not compromised. At the audit Irish Water advised that refurbishment of the filters would be completed in Quarter 3 2020. Irish Water had previously indicated that these filter refurbishment works would be completed in Q1 2019. However there were delays in commencing the filter refurbishment works during 2019 and during the first half of 2020. Irish Water should confirm the scope of the works undertaken and when they are completed.
2. The current turbidity alarms and shutdowns on the filtered water at the Inch treatment plant do not provide an adequate *Cryptosporidium* barrier when applying the log credit performance approach to the plant. Irish Water should review and implement all turbidity alarms and inhibits at the plant to ensure that an adequate barrier to *Cryptosporidium* is maintained at all times.

> Introduction

The Inch Public Water Supply (PWS) serves a population of 1,350 and produces 581 m³/day. The source of the supply is the Ballyarkane river. Treatment consists of pH correction, coagulation, clarification, rapid gravity filtration and chlorination and the plant operates 24 hours per day. The audit was undertaken to assess Irish Water's performance in producing clean and wholesome water following the detection of *Cryptosporidium* in the supply on 07/07/20. Follow up sampling was clear. *Cryptosporidium* was also previously detected in the supply on 27/08/2018. Irish Water and Kerry County Council have consulted with the HSE in relation to each *Cryptosporidium* detection so as to assess the risk to public health. The comprehensive consultation and risk assessment undertaken by Irish water, Kerry County Council and the HSE determined that there was not a risk to the consumers of this supply and concluded that a boil water notice was not warranted for this supply.

> Supply Zones Areas Inspected

The intake at the river and the treatment processes were inspected.

In light of Covid-19 social distancing and enhanced hygiene measures, the audit comprised of a video conference with all relevant parties on 05/08/20 followed by a site visit with essential audit participants on 07/08/20.



1. Source Protection

	Answer	
1.1	Is the abstraction source(s) adequately protected against contamination?	Yes
Comment		
<p>The source of the supply is the Ballyarkane River which is an upland flashy river. The intake is approximately 400m from the treatment plant. There is a rough bar screen and 2no. mesh screens in place. Regular inspections and cleaning of the screens are undertaken and the intake is fenced off. There are no houses or development in the vicinity or upstream of the intake. There is some sheep grazing in the area. Raw water is monitored continuously for turbidity (alarm 4 NTU) and colour. The river is currently classified as an S2 under Irish Water's source classification system which requires a treatment log credit of 4 log. Irish Water advised that the methodology for the the source classification system is currently under review.</p>		



2. Coagulation Clarification Flocculation (CFC) Stage

		Answer
2.1	Is the pH within a suitable range for the coagulant used?	Yes
	Comment	
	pH correction takes place using sodium hydroxide. There are duty and standby pH dosing pumps with automatic changeover.	
		Answer
2.2	Is the CFC process optimised to respond to changes in raw water quality?	Yes
	Comment	
	8% aluminium sulphate is used as a coagulant with polyelectrolyte used as a coagulant aid (dose of 0.17 mg/l). Coagulant dosing is controlled by an algorithm based on raw water colour.	
		Answer
2.3	Are the CFC processes appropriately controlled?	No
	Comment	
	There is a duty and an assist coagulant dosing pump in place and a duty pump only for polyelectrolyte dosing. A static mixer and standpipe are in place to aid floc formation. It is recommended that full standby pumps are installed for both coagulant dosing and polyelectrolyte dosing.	
		Answer
2.4	Were the CFC tanks, channels and weirs observed to be clean, level and well maintained during the audit?	Yes
	Comment	
	The CFC tanks were covered to limit exposure from wind and sun. Therefore it was only possible to partially inspect the CFC process. Tanks, channels and weirs that were observed were clean with no floc carryover evident. There is a turbidity monitor on the settled water but it is not alarmed. Kerry County Council said that there are issues with high turbidity in settled water occasionally which is linked to rapid changes in the raw water during times of heavy rain.	



3. Filtration

		Answer
3.1	Are the filters designed and managed in accordance with EPA guidance?	No
Comment		
<p>There are 2 no. rapid gravity filters in operation and the filter media was last replenished in 2014. There was no depth marker in place on any of the filters to assist with the monitoring of the depth of the media.</p> <p>Filter refurbishment works are scheduled to be carried out in Quarter 3 2020. These works were originally scheduled to be completed in Quarter 1 2019. Irish Water said that the full scope of the works required will not be known until each filter is dismantled and assessed. Works are likely to include replacement of the media, backwash upgrades and replacement of any corroded parts. Temporary pressure filters and UV disinfection will be in operation during the filter upgrade works.</p>		

		Answer
3.2	Was there visual indication that the filters were operating appropriately?	No
Comment		
<p>Each filter is backwashed daily. The backwash sequence comprises of 6 minutes air and 6.5 minutes water and there is a delayed start of 26 minutes before the filters are put back into service. A backwash was observed of Filter No. 1 at the audit. Media carryover (indicating media loss) across the weir was observed and deadspots were observed indicating that the air was not being evenly distributed during the backwash.</p>		

		Answer
3.3	Does monitoring indicate that the filters are operating effectively?	No
Comment		
<p>There is a continuous turbidity monitor with alarm on each filter and on the final water. During the audit, the turbidity of the final water was 0.083 NTU. The turbidity monitor on Filter 1 was reading 0.052 NTU and on Filter 2 was reading 0.053 NTU.</p> <p>There is a turbidity alarm of 0.5 NTU (30 minutes delay) on each filter with no shutdown in place.</p> <p>There is a turbidity alarm of 0.3 NTU on the final water (30 minutes delay) with shutdown of 0.8 NTU (30 minutes delay).</p> <p>A trend graph submitted showed elevated turbidity above 0.5 NTU in water from both Filters 1 and 2 during the period 26th to 28th July and 2nd to 4th August which indicate that the filters were not operating effectively as a barrier for <i>Cryptosporidium</i> during these periods and there was a risk of <i>Cryptosporidium</i> breakthrough from the filters.</p> <p>The current turbidity alarms and setpoints on the filtered water at the plant do not provide an adequate <i>Cryptosporidium</i> barrier when applying the log credit approach.</p>		



4. Disinfection

		Answer
4.1	Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?	Yes
Comment		
<p>Disinfection takes place using 10% sodium hypochlorite. The target residual chlorine level is 1.0 mg/l with high and low chlorine alarms in place (1.5 mg/l and 0.5 mg/l respectively). Scada trends are available.</p> <p>It is advisable that shutdown based on high and low chlorine setpoints are also installed to ensure that inadequately treated water does not enter the network</p>		

		Answer
4.2	Are duty and standby chlorine pumps/ UV units in operation?	Yes
Comment		
<p>Duty and standby chlorine dosing pumps are in operation with automatic changeover every 6 hours or in the event of breakdown.</p>		

		Answer
4.3	Is the chlorine dosed appropriately?	Yes
Comment		
<p>Chlorine is dosed flow proportionally with trim based on the target residual chlorine.</p>		

		Answer
4.4	Is the residual chlorine monitored at a suitable sample location after contact time has been completed?	Yes
Comment		
<p>Residual chlorine is monitored after contact time has been achieved in the reservoir.</p>		

Answer

4.5	Does the trend in chlorine residual at the treatment plant indicate adequate and stable levels of disinfection?	Yes
Comment		
The SCADA trends indicate adequate and stable levels of disinfection in the water.		

		Answer
4.6	Is there adequate chlorine contact time before the first connection?	Yes
Comment		
The chlorine contact time was confirmed to be 25.96 mg.min/l.		

		Answer
4.7	Is there a suitable monitoring frequency for residual chlorine in the network with records available?	No
Comment		
Records show that there are gaps of up to 6 days between sampling for residual chlorine in the network. It is recommended that residual chlorine monitoring in the network takes place several times a week to ensure that any water quality issues in the network are picked up in a timely manner.		

		Answer
4.8	Is there a chlorine residual ≥ 0.1 mg/l throughout the network?	Yes
Comment		
Records showed adequate residual chlorine in the network.		



5. Reservoirs and Distribution Networks

	Answer
5.1 Is treated water in tanks and reservoirs suitably protected against contamination?	Yes
Comment	
The on-site reservoir is protected against contamination and has mesh on the vents. There is a two celled reservoir with 637 m3 storage.	



6. Management and Control

		Answer
6.1	Are suitable alarm settings in place to alert operators to deteriorating water quality and/or the failure of a critical treatment process?	No
Comment		
<p>Information submitted by Irish Water for the pre-audit meeting showed a low pH alarm of 5 in place at the plant. However at the audit, the low pH alarm was set at 6.5. Irish Water should confirm the low pH alarm in place.</p> <p>There is a turbidity alarm of 0.5 NTU (30 minutes delay) on each filter with no shutdown in place. There is a turbidity alarm of 0.3 NTU on the final water (30 minutes delay) with shutdown of 0.8 NTU (30 minutes delay). The current turbidity alarms and setpoints on the filtered water at the plant do not provide an adequate <i>Cryptosporidium</i> barrier when applying the log credit approach.</p>		

		Answer
6.2	Are relevant alarms dialled out via a cascade system to allow a timely response by plant operators?	Yes
Comment		
<p>A cascade system is in place for responding to any alarms. However as per section 6.1 above, suitable alarm settings are not in place to alert operators if the water quality deteriorates or if there is a failure of a critical treatment process</p>		

		Answer
6.3	Is the data obtained from sampling and monitoring used to actively inform the processes on site and in the distribution network?	No
Comment		
<p>The SCADA trend for Final Water Turbidity is incorrectly labelled as 'Countywide Treated Water Turbidity 2 trend'. All trends should be correctly labelled so that the data obtained from monitoring is used to actively manage the treatment processes. The inappropriate alarms in place for turbidity do not allow for effective and optimal management of the treatment processes at the plant.</p>		

		Answer
6.4	Are instrument calibrations within date?	Yes
Comment		
<p>All instruments checked were within calibration dates.</p>		



7. Drinking Water Quality

	Answer
7.1	Have relevant failures to comply with the requirements of the European Union (Drinking Water) Regulations 2014, as amended, been notified to the EPA? Yes
Comment	
<p>Two <i>Cryptosporidium</i> detections have been notified to the EPA for samples taken on 27/08/18 and 07/07/20. It was not possible to genotype the oocysts. Tens round of <i>Cryptosporidium</i> sampling have taken place so far in 2020. Irish Water and Kerry County Council have consulted with the HSE in relation to each <i>Cryptosporidium</i> detection so as to assess the risk to public health. The comprehensive consultation and risk assessment undertaken by Irish water, Kerry County Council and the HSE determined that there was not a risk to the consumers of this supply and concluded that a boil water notice was not warranted for this supply.</p>	

Recommendations

Subject	Inch Audit Recommendations	Due Date	08/11/2020
Action Text	<p>Recommendations</p> <ol style="list-style-type: none"> 1. Irish Water should complete the filter refurbishment works without delay and confirm that all works required have been completed and commissioned satisfactorily. 2. Following completion of the filter refurbishment works, Irish Water should review and implement all turbidity alarms and shutdown setpoints in place on each filter and on the combined filtered water to ensure that there is an adequate <i>Cryptosporidium</i> barrier in place at all times in accordance with the log credit performance approach. 3. Irish Water should submit details, including timeframes, of how any treatment log deficit at the plant will be addressed. 4. Irish Water should continue to monitor the supply in accordance with the Irish Water '<i>Rationale for Determining the Frequency of Cryptosporidium Monitoring in Public Water Supplies</i>'. 5. Irish Water should ensure that all SCADA trends and alarms are correctly labelled so that the data obtained from monitoring is used to actively manage the treatment processes. 6. Irish Water should install an alarm on settled water turbidity In order to allow better operational management of the clarification process. 7. Irish Water should confirm the low pH alarm at the plant. 8. Irish Water should install high and low shutdowns based on residual chlorine in the water leaving the plant. 9. Irish Water should install a standby pump for a) coagulant dosing and b) polyelectrolyte dosing to ensure that in the event of a breakdown of the duty pumps that the standby pumps are capable of dosing at the required level. 10. Irish Water should ensure that depth marker posts are installed in the filters so that media depth can be monitored. 11. Irish Water should label each filter. 12. Irish Water should ensure that residual chlorine monitoring takes place in the network several times a week to ensure that any disinfection issues in the network are picked up in a timely manner. <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 08/11/20 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 the Action Reference Number DW20180156 in any future correspondence in relation to this Report.</p>		

