

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	Kereen
Organisation	Irish Water
Scheme Code	3100PUB1057
County	Waterford
Site Visit Reference No.	SV22227

Report Detail	
Issue Date	19/03/2021
Prepared By	Regina Campbell

Site Visit Detail			
Date Of Inspection	10/03/2021	Announced	Yes
Time In	14:40	Time Out	15:25
EPA Inspector(s)	Regina Campbell		
Additional Visitors			
Company Personnel	Irish Water: Pat Duggan, Samantha Keane, Colin Cunningham Waterford City & County Council: Ciaran Bourke, Maura Phelan, Paul Carroll		

> Summary of Key Findings

1. A Boil Water Notice was placed on the Kereen Public Water Supply (PWS) on 19/02/21 due to an increase in turbidity to levels > 1 NTU. The increase in turbidity is thought to be linked to earthworks undertaken on nearby private land that influenced the quality of the water in the borehole. The excavation has been backfilled and trends in water quality are being monitored. Irish Water should notify the EPA of any change to the HSE health advice.
2. Irish Water were unable to demonstrate that the UV unit is operating within its validated range. There is no automatic shutoff in the event of a failure of the primary disinfection UV unit. As there is no treated water storage at the plant, there is a risk of inadequately disinfected water entering the supply if there is a failure of the UV unit and Irish Water should install automatic shutoff.
3. The audit found that prior to the Boil Water Notice being put in place, that the turbidity monitor was not alarmed or linked to a datalogger. If this control had been in place, fluctuations in the water quality caused by the nearby earthworks may have been picked up an earlier date. Irish Water confirmed at the audit that the turbidity monitor was now alarmed (0.8 NTU) and connected to a datalogger.

> Introduction

The Kereen Public Water Supply serves a population of 28 and produces 80 m³/day. The source of the supply is a borehole and the plant operates 24 hours/day. The audit was undertaken to assess Irish Water's performance in producing clean and wholesome water following the placing of a Boil Water Notice on the supply on 19/02/21. The Boil Water Notice was placed due to an increase in turbidity to levels > 1 NTU. The increase in turbidity is thought to be linked to earthworks undertaken on nearby private land that influenced the quality of water in the borehole. Treatment at the plant consists of UV and chlorination.

> Supply Zones Areas Inspected

The audit consisted of a video conference call with Irish Water and Waterford City and County Council staff. The Kereen water treatment plant was not visited during the audit due to Covid-19 restrictions. The audit assessed each step of the treatment process.



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>On the 19/02/21 the caretaker visited the Kereen water treatment plant and noticed that the turbidity in the water was elevated (>20 NTU). The UV and chlorine disinfection systems were both operational at the time. The caretaker also noticed that the UV unit was not linking correctly to the datalogger. Irish Water were unable to submit trends to show that the UV unit is operating within its validated range. Irish Water and Waterford City & County Council consulted with the HSE and on foot of the consultation a Boil Water Notice was placed on the supply on 19/02/21.</p> <p>Waterford City and County Council staff said that excavation works were undertaken on private lands in close proximity to the borehole (~ 3m at nearest point) during late January 2021. These works resulted in the overburden layer of material being removed which resulted in surface water making its way into the aquifer. It is thought that this was the cause of the elevated turbidity at the plant. There was also heavy rain during the previous two days to the Boil Water Notice being imposed which may also have contributed to the deterioration in water quality. Works were undertaken on the 27/02/21 to backfill the excavation with stone, terram and clay overlay. Following completion of these works Irish Water intend to monitor the water quality to assess if the remedial works have been successful in addressing the issue.</p> <p>While there was a turbidity monitor at the supply prior to the incident, it was not alarmed and not connected to a datalogger. If a turbidity alarm had been in place, then any fluctuations in the raw water quality may have been picked up at an earlier stage.</p> <p>Since the boil water notice was issued, the issue with the connection of the UV unit to the datalogger has been fixed. The turbidity monitor has been alarmed at 0.8 NTU and the UVT monitor has been alarmed at 80% and both are connected to the datalogger since 08/03/21 and trends are being collected. Waterford City & County Council said that rainfall has caused some spiking of turbidity > 1NTU in the last few days prior to the audit.</p>	



2. Source Protection

2.1

	Answer
Is the abstraction source(s) adequately protected against contamination?	No
Comment	
<p>The supply is fed by one borehole and Waterford City and County Council said it is thought to have been constructed in the 1970's. There is no borehole log available. The incident has shown that the borehole quality is vulnerable to any activities in the immediate catchment. Waterford City & County Council advised that the production volume is 80 m3/day and daily logs of flow are kept at the plant.</p> <p>The borehole is located within the pumphouse and a photo submitted prior to the audit indicated that the well-head is not capped or sealed fully.</p> <p>Monitoring results submitted reported a nitrate level of 42.4 mg/l in a sample taken on 04/06/20. While not above the drinking water standard of 50 mg/l, the result does indicate elevated levels of nitrate in the groundwater. Waterford City & County Council said that relevant landowners have not been written to in the past in relation to the requirements of the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014). The activities in the catchment are mainly agricultural and the borehole may be vulnerable to contamination from landspreading activities in the immediate vicinity due to its construction.</p>	



3. Disinfection

		Answer
3.1	Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?	No
Comment		
UV provides primary disinfection with chlorination used for secondary disinfection in the supply.		
<u>UV</u>		
There is a duty only Trojan UVMax Pro 20 UV unit in place at the plant. The UV unit is alarmed at a UV dose of 45 mJ/cm ² and is connected to a datalogger. There is no shutdown in place if the unit operates outside of its validated range. Since the incident, an alarm of 80% UVT has also been put in place at the supply. No trends were submitted at the audit to verify that the UV unit is operating within its validated range.		
<u>Chlorination</u>		
There is a continuous chlorine monitor with a low chlorine alarm of 0.3 mg/l in place and data is recorded and can be viewed. There is no shutdown based on low chlorine and there is no high chlorine alarm or shutdown in place.		

		Answer
3.2	Are monitors and alarms operational via dial out and being responded to with a suitable cascade system in place?	Yes
Comment		
Alarms are operational via dial out and are responded to with a suitable cascade system in place. There are 3 personnel on the cascade and the duty caretaker responds to the alarms.		

		Answer
3.3	Are duty and standby chlorine pumps/ UV units in operation?	No
Comment		

UV

A single Trojan UVMax Pro 20 unit is in place and there is no automatic shutoff in the event of failure of the UV unit.

There is no treated water storage and so there is a risk of inadequately disinfected water entering the supply in the event that the UV unit fails or operates outside of its validated range.

Chlorination

Duty and assist chlorine dosing pumps are in operation with automatic changeover in place. The assist pump is capable of providing the full required dose. 10% sodium hypochlorite is dosed on a flow proportional basis.

	Answer	
3.4	Is the UV disinfection system operating within its validated range?	No
Comment		
It could not be ascertained at the audit if the UV unit is operating within its validated range as no trends were submitted.		
The Trojan UVMax Pro 20 unit is validated in accordance with the NSF/ANSI Standard 55 Validation Protocol and is designed to deliver a minimum UV dose of 40 mJ/cm ² . A NSF certificate was submitted in advance of the audit indicating that the unit can operate at a flowrate of up to 20 gpm (equivalent to 4.54 m ³ /hr). The Kereen supply operates at a maximum of 3.6 m ³ /hr according to Waterford City & County Council and logs of daily flows are maintained at the plant. No trends were submitted at the audit to demonstrate that the UV unit is operating within its validated range.		

	Answer	
3.5	Is the chlorine dosed appropriately?	Yes
Comment		
Chlorine is dosed flow proportionally and the target residual chlorine level is 0.5 mg/l.		

	Answer	
3.6	Is there a chlorine residual ≥ 0.1 mg/l throughout the network?	Yes
Comment		
Records submitted show adequate residual chlorine of ≥ 0.1 mg/ throughout the network.		



4. Management and Control

	Answer	
4.1	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	No
Comment		
At the audit Irish Water were unable to confirm if the protozoal compliance log treatment requirements had been identified for the plant.		

	Answer	
4.2	Are suitable alarm settings in place to alert operators to deteriorating water quality and/or the failure of a critical treatment process?	No
Comment		
There is a low chlorine alarm (0.3 mg/) in place but no high chlorine alarm in place at the plant.		

	Answer	
4.3	Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network?	No
Comment		
There is no shutdown in the event that the UV unit fails to deliver the minimum required dose of 40 mJ/cm ² .		
While there is a high turbidity alarm in place (0.8 NTU), there is no shutdown based on turbidity > 1 NTU.		
There is also no shutdown based on low or high chlorine level.		
As there is no treated water storage at this plant, the supply is very vulnerable to inadequately disinfected water entering the supply in the event of failure of the UV or chlorine disinfection systems.		

Recommendations

Subject	10/03/21 Keen Audit Recommendations	Due Date	19/04/2021
Action Text	<p>Recommendations:</p> <ol style="list-style-type: none"> 1. Irish Water should install automatic shutoff in the event of failure of the UV treatment unit. 2. Irish Water should submit 1 month of trends to demonstrate that the UV unit is operating within its validated range. 3. Irish Water should submit 1 month of trends for residual chlorine and turbidity in the final water. 4. Irish Water should install a high chlorine alarm and shutdown setpoints for high and low residual chlorine level in the final water. 5. Irish Water should install shutdown based on high turbidity at the plant. 6. Irish Water should ensure that the borehole well-head is inspected and any necessary construction works are undertaken to cap and seal the borehole in accordance with Advice Note No. 14: Borehole Construction and Wellhead Protection. 7. Irish Water should confirm the protozoal log treatment requirement for the plant. 8. Irish Water should liaise with Waterford City and County Council to ensure that all landowners are made aware of setback distances in the European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No. 31 of 2014) for the source of the supply. 9. Irish Water should undertake additional nitrate monitoring of the supply to assess any risk to the supply from landspreading activities. 10 . Irish Water should notify the EPA of any change to the HSE health advice. <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 19/04/21 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 the Compliance Plan DW20210019 in any future correspondence in relation to this Report.</p>		