

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	an Daingean PWS 030D
Organisation	Irish Water
Scheme Code	1300PUB1034
County	Kerry
Site Visit Reference No.	SV19587

Report Detail	
Issue Date	16/03/2020
Prepared By	Regina Campbell

Site Visit Detail			
Date Of Inspection	24/01/2020	Announced	Yes
Time In	11:30	Time Out	13:50
EPA Inspector(s)	Regina Campbell Orla Harrington		
Additional Visitors			
Company Personnel	Irish Water: Deirdre O' Loughlin, Oliver Harney, Tommy Roche Kerry County Council: Paul Neary, Brian Lennon, Colm Mangan, Seamus O' Mahony, Seamus King, Owen O' Sullivan HSE: John Moynihan		

> Summary of Key Findings

1. In response to concerns about low residual chlorine levels in final water leaving the An Daingean Water Treatment Plant (WTP) on the morning of 12/01/20, operational staff at the plant manually dosed sodium hypochlorite directly into one of the reservoirs in order to increase chlorine levels in the final water. However an error lead to overdosing of the disinfectant which in turn increased levels of residual chlorine in the supply between approximately 8am on 12/01/20 and midday on 13/01/20 when supply in the network was shut-off. The high residual chlorine alarm (2mg/l) was triggered at 8am on 12/01/20 as a result of the manual chlorine overdosing. The alarm was acknowledged and it was assumed by the operational staff that the high chlorine alarm was as a result of the increased chlorine dosing undertaken. No manual residual chlorine testing was undertaken of the final water leaving the plant or in the network on 12/01/20 to establish the effectiveness of the manual dosing or in response to the high chlorine alarm having been activated. Operational staff did not inform management at Kerry County Council of the incident on 12/01/20.
2. Approximately twelve complaints related to taste and odour issues were received by Irish Water and Kerry County Council on the morning of 13/01/20. Kerry County Council took immediate corrective actions on 13/01/20 and scoured the network, emptied the town reservoir and flushed the mains. The network was then recharged.
3. Kerry County Council consulted with the HSE at approximately 2.45pm on 13/01/20 in relation to the incident and no water restriction was issued. Irish Water were not notified of the incident until approximately 4.45pm on 13/01/20. The EPA were not notified until 14/01/20. Kerry County Council failed to notify Irish Water of this incident promptly as per the Irish Water Initial Notification Record (INR) Process. Kerry County Council and Irish Water failed to notify the EPA of the incident promptly.
4. There was inadequate training and supervision of Kerry County Council staff in relation to the appropriate corrective actions and treatment decisions to take place in response to a) the low residual chlorine level in the reservoir and b) in response to the activation of the high residual chlorine alarm which meant that Irish Water were not notified of this incident immediately.

> Introduction

The An Daingean Public Water Supply (PWS) produces 1,861 m³/day and serves a population of approximately 1,720. The source of the supply is the Garfinny River. Treatment includes coagulation, DAFF (Dissolved Air Flotation and Filtration) chlorination and pH correction. The EPA were notified on 14/01/20 that there was an overdosing of disinfectant (sodium hypochlorite) on 12/01/20. The scope of the audit was primarily to investigate the issues that lead to the overdosing of disinfectant and how the matter was subsequently handled by Irish Water and Kerry County Council.

> Supply Zones Areas Inspected

During the audit, treatment processes and controls were inspected. It was noted that the plant was tidy with all key infrastructure clearly labelled. All monitors inspected were within service or calibration date.



1. Incident Management

1.1

Was the incident suitably alerted to the plant operators, escalated and managed in order to maintain water quality and protect public health?

Answer

No

Comment

1. On 10/01/20 and 11/01/20, there were intermittent air-locking issues with the chlorine dosing pumps at An Daingean Water Treatment Plant. The pumps were repaired on 10 and 11/01/20 but the chlorination dosing system continued to give problems and plant production was switched off at 11pm on 11/01/20 as there was adequate supply in the reservoirs.

2. On 12/01/20 a low residual chlorine level of 0.12 mg/l was noted by staff at 6.30am at the Wastewater Treatment Plant in the town. In response to concerns about inadequate disinfection of the water leaving the reservoir, the operational staff at the plant took corrective action by pouring 10 drums of 25L sodium hypochlorite (10-12%) directly into reservoir No. 2 at 8am. This reservoir contained approximately 1000 m3 of water at the time. The amount dosed was far in excess of what was required and Kerry County Council estimated that it resulted in a level of 20-25 mg/l of residual chlorine in the water in the reservoir versus the normal chlorine dosing target rate of 0.7-0.8 mg/l. The WHO (World Health Organisation) guideline for chlorine in drinking water is 5 mg/l. There are two reservoirs at the plant. Only reservoir No. 2 was in operation on 12/01/20 because of planned cleaning works to the other reservoir.

3. The residual chlorine monitor recorded a level of 2 mg/l in water leaving the reservoir at about 8am on 12/01/20 which is the maximum reading that can be recorded. The high chlorine alarm was activated and was acknowledged by operational staff and assumed to be as a result of the increased chlorine dosing carried out. No manual residual chlorine tests were undertaken to confirm the actual chlorine level in the final water leaving the plant on 12/01/20 or to establish the levels of residual chlorine in the network as a result of the overdosing. A trend graph showed that the level of residual chlorine flatlined at 2 mg/l from 8am on 12/01/20 and then the trendline showed that it began to decrease below 2 mg/l in the final water in the early hours of 13/01/20. Operational staff did not escalate this incident to management within Kerry County Council on 12/01/20.

4. The water treatment plant was restarted at 9am on 13/01/20 and contractors replaced the chlorine dosing lines that morning.

5. Twelve complaints were received by the Council and Irish Water in relation to a strong smell and taste of chlorine. The first complaints were logged at 9:07am by Irish Water and the Council reported complaints being received from 11am onwards on 13/01/20. The residual chlorine monitor at the Wastewater Treatment Plant (WWTP) recorded a maximum residual chlorine level of 1.65 mg/l at 10pm on 12/02/20 which the Council said is a monitoring location that is representative of end of line residual chlorine in the network after the town reservoir. A manual test at about 1pm on 13/01/20 at the WWTP recorded a level of 1.2 mg/l. Records reviewed during the audit showed that residual chlorine levels at the WWTP on other days are typically in the range of 0.4-0.6 mg/l residual chlorine.

6. During the afternoon of 13/01/20 Kerry County Council took corrective actions by scouring the network, emptying the town reservoir and flushing the mains. There was no water in the network between about midday and 5-6pm on 13/01/20 when supply was restored. Testing verified that residual chlorine levels had returned to typical levels in the network of approximately 0.4 mg/l by morning of 14/01/20.

7. The HSE were informed of the incident by Kerry County Council at approximately 2.45pm on 13/01/20. No water restriction was issued following consultation with the HSE. The Council informed Irish Water of the incident at approximately 4.45pm on 13/01/20 and the EPA received notification of the incident on 14/01/20. The Council failed to notify Irish Water promptly following the incident as required by the Initial Notification Record Process. This meant that Irish Water was not included in the risk assessment of the risk to water quality prior to consultation with the HSE. Kerry County Council and Irish Water failed to notify the EPA of the incident promptly.

8. On 22/01/20 Irish Water advised the EPA that a full review was being undertaken into the incident. Corrective actions were to be implemented to prevent a reoccurrence of a similar incident including improvements to procedures in relation to new staff, induction, training, operation of the alarm cascade system and implementation of the INR process.



2. Disinfection

2.1

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

Answer

Yes

Comment

Residual chlorine monitoring takes place on the combined flow after the two reservoirs. The target residual chlorine is 0.6-0.7 mg/l leaving the reservoir. A reading of 0.63 mg/l residual chlorine was observed during the audit. High and low residual chlorine alarms are in place (0.8 mg/l and 0.5mg/l respectively).

There is shutdown setpoint for low residual chlorine of 0.2 mg/l and for high residual chlorine of 2 mg/l after 30 minutes delay. The time delay before shutdown is too long and the shutdown setpoint of 0.2 mg/l for low residual chlorine should be raised to prevent inadequately disinfected water entering the supply.

SCADA trends of residual chlorine are available at the plant.

There is a third reservoir in Dingle town (800 m3 capacity) and there is no residual chlorine monitor after this reservoir.

2.2

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

Answer

Yes

Comment

Duty and standby chlorine pumps are in operation at the plant. They automatically switchover every 6 hours or in the event of a breakdown. They were last serviced on 12/12/19. Generally any repairs to pumps are repaired in-house by Kerry County Council staff. As stated earlier in the report there were intermittent problems with air-locking of the pumps on 10/01/20 and 11/01/20 and the pumps were repaired on 13/01/20.

2.3

Is the chlorine dosed appropriately?

Answer

Yes

Comment

Chlorine is dosed flow proportionally with residual trim.

2.4

Is the residual chlorine monitored at a suitable sample location after contact time has been completed?

Answer

Yes

Comment

There is a residual chlorine monitor on the combined flow leaving the two reservoirs at the treatment plant.

There is a third reservoir in Dingle town (800 m3 capacity) and there is no residual chlorine monitor after this reservoir.

		Answer
2.5	Does the trend in chlorine residual at the treatment plant indicate adequate and stable levels of disinfection?	Yes
Comment		
Subsequent to the issue with the chlorine dosing pumps being rectified, SCADA trends viewed at the plant indicated that the chlorine residual trend is adequate and stable.		

		Answer
2.6	Are manual chlorine tests carried out and recorded on final treated water to compare with the continuous monitor results?	No
Comment		
No manual residual chlorine tests of the final water leaving the plant on 12/01/20 were available despite the reservoir having been manually dosed with disinfectant and the high residual chlorine alarm having been activated. The SCADA trends showed that the continuous residual chlorine monitor for the final water recorded up to 2 mg/l and then flatlined between approximately 8am on 12/01/20 and approximately 2.40am on 13/01/20 when the level begins to decrease below 2 mg/l again. Chlorine levels in the final water leaving the plant stabilised at approximately 4.00pm on 14/01/20.		

		Answer
2.7	Is there adequate chlorine contact time before the first connection?	Yes
Comment		
The target contact time is 31.2 mg.min/l and this is being achieved at the plant.		

		Answer
2.8	Is there a suitable monitoring frequency for residual chlorine in the network with records available?	No
Comment		

At present residual chlorine is monitored daily at the tap at the Dingle Wastewater Treatment Plant (WWTP). It is recommended that residual chlorine is undertaken several times a week in other parts of the network.

2.9

		Answer
Is there a chlorine residual ≥ 0.1 mg/l throughout the network?		Yes
Comment		
Records of residual chlorine readings since the plant returned to normal operations indicated stable levels of residual chlorine in the network.		



3. Treatment Process Chemicals

3.1

Are chemicals appropriately produced/ approved and suitable for use in drinking water treatment?

Answer

No

Comment

Sodium hypochlorite (10-12%) is used for disinfection. It is delivered in bulk to the plant. No expiry date is provided by the supplier. The PCS number was available.



4. Management and Control

4.1

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

Answer

Yes

Comment

There is a alarm cascade system in place with four people on the cascade.

However, it is considered that on 12/01/20 there was a lack of supervision and oversight by Kerry County Council of the corrective actions and treatment decisions taken by operational staff at the plant.

Recommendations

Subject	An Daingean Audit Recommendations	Due Date	16/04/2020
Action Text	<p><i>Recommendations</i></p> <ol style="list-style-type: none"> 1. Irish Water and Kerry County Council should develop documented procedures for responding to and escalating all alarms generated at the water treatment plant. The procedures should clearly document the corrective actions to be taken in relation to each type of alarm generated and clearly set out delegation of responsibilities. The procedures should document treatment decisions and should ensure that there is adequate supervision and approval of treatment decisions in place at all times. 2. Irish Water and Kerry County Council should ensure that all staff, including relief staff and new staff, are adequately trained to manage and control the operation of the water treatment plant and that records of such training are maintained. Adequate supervision should be provided at all times. 3. Irish Water and Kerry County Council should ensure that there is a documented communications protocol in place for the reporting of all incidents which could potentially impact the quality of water produced at An Daingean water treatment plant so the relevant parties involved (Kerry Council, Irish Water, HSE, EPA) are alerted promptly and a timely assessment of the risk to public health can be undertaken. Irish Water and Kerry County Council should ensure that the relevant staff are trained in the protocol and understand the instances in which the protocol should be used. 4. Irish Water and Kerry County Council should ensure that a manual residual chlorine test of the final water is taken at the plant daily and compared to the reading on the continuous monitor and the readings entered into a daily log book. Where emergency disinfection has taken place, Irish Water and Kerry County Council should ensure that an increased operational monitoring programme is undertaken to verify the effectiveness of the emergency disinfection of the final water and in the network. 5. Irish Water should review the time delays on the low and high residual chlorine shutdown setpoints. The time delay of 30 minutes is too long. 6. Irish Water should increase the shutdown residual chlorine setpoint of 0.2 mg/l for the final water as it is too low to prevent inadequately disinfected water in the network. 7. Irish Water should ensure monitoring of residual chlorine levels is undertaken at various locations at the end of the network several times per week. 8. Irish Water should put a system in place to ensure stocks of sodium hypochlorite onsite are regularly checked to see if they are in date. <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 16/04/20 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 DW2020/3 in any future correspondence in relation to this Report.</p>		