Drinking Water Audit Report

County:	County Kerry	**Date of Audit:**	23/06/2016
Plant(s) visited:	Castlecove PWSS 023H (1300PUB1052)	**Date of issue of Audit Report:**	07/07/2013
		File Reference:	DW2009/206
		Auditors:	Mr Niall Dunne
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014).* • *The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water2009 Supplies (ISBN: 978-1-84095-349-7)* • The recommendations specified in the EPA *Drinking Water Report*. • EPA Drinking Water Advice Notes No.s 1 to 15. • The recommendations in any previous audit reports.		

MAIN FINDINGS

i. **This supply has been on the RAL since 2008 for having an inadequate barrier against *Cryptosporidium*. A new plant was commissioned in 2014. Since commissioning there have been aluminium exceedances and issues with floc formation at this plant. KCC have completed trials to improve chemical mixing and dosing. From inspection the results appear to have improved water quality. Permanent remedial works are now scheduled. Irish Water must ensure that the permanent works are completed without delay to ensure that water quality is maintained and the supply is removed from the RAL.**

ii. **In 2015 there were aluminium exceedances of which the EPA was not notified; this has been the subject of a warning letter issued to Irish Water on 31/05/2016. IW should ensure that all exceedances are promptly notified to the EPA are per *The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies.* Failure to do so is a non-compliance under Article 10(3) of the *European Union (Drinking Water) Regulations 2014.***

1. INTRODUCTION

Under the *European Union (Drinking Water) Regulations 2014* 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 drinking water.

This supply serves a population of approximately 370 and supplies 175 m^3/day. The main source for the treatment plant is a mountain stream, which is occasionally supplemented by a borehole located on the site of the water treatment plant. Treatment consists of coagulation, flocculation, two rapid gravity filters and chlorine disinfection. There have been aluminium and THM exceedances in this supply in the past.

Photographs taken by Niall Dunne during the audit are attached to this report and are referred to in the text where relevant.

The opening meeting commenced at 11.20 am at Castlecove WTP. The scope and purpose of the audit were outlined at the opening meeting. The audit process consisted of interviews with staff, review of records and observations made during an inspection of the treatment plant. The audit observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

Representing Irish Water (IW): Deirdre O'Loughlin – Compliance Specialist – IW Patrick Duggan – Compliance Analyst – IW Kevin Murphy – Water Engineer- IW Representing Kerry County Council (KCC): John Ahern –Senior Executive Engineer - KCC Raymond Lyne- Water Capital Engineer- KCC John Paul O'Sullivan – Caretaker - KCC John Horgan – Technician – KCC Representing the Environmental Protection Agency: Niall Dunne – Inspector – EPA

2. AUDIT OBSERVATIONS

The audit process is a random sample on a particular day of a facility's operation. Where an observation or recommendation against a particular issue has not been reported, this should not be construed to mean that this issue is fully addressed.

1.	**Source Protection** a. The main source for the supply is a mountain stream called the Gowla River. A borehole located adjacent to the WTP supplements supply during high demand. The borehole was observed to be properly capped and well protected, (see photograph 1). b. The land surrounding the stream is used for grazing sheep. The stream source was observed to be well fenced off. c. KCC stated that they have colour and pH monitors on the raw water and that these are alarmed. The colour alarm is set at 30 Hazens. d. It was observed from documented raw water data that the turbidity is generally in the region of 0.2 NTU and the colour varies from 96.2 to 170 Hazen. e. KCC stated that the water from the borehole is run to waste for 2-3 days prior to being brought into service and that microbiological, iron, manganese, pH and turbidity samples are taken prior to use. There is no turbidity monitor on the borehole. f. Water from the stream and the borehole are blended prior to treatment.
2.	**Coagulation, Flocculation and Clarification** a. KCC stated that since the plant was commissioned in 2014, there have been issues with floc formation. This, according to KCC, is due to good raw water quality and inadequate chemical dosing and mixing.

	b. KCC stated they have been trialling mixing the sodium hydroxide and the aluminium sulphate within the raw water blending tank for a contact time of approx. 25 mins, to assist with flocculation. On observation of results it appears that the trial has made an improvement to water quality. c. KCC stated it is proposed to install a permanent chemical mixing tank and a pH probe which should assist with flocculation. This work is scheduled to be completed by end of September 2016. d. KCC stated that the chemical dosing is currently fixed dosing based on colour with a variable manual control. e. After the blended tank, water is passes through a flocculation tank, with an estimated retention of approx. 50 mins. f. Poly of 0.1 mg/l is dosed after the flocculation tank. The poly is made up on site. g. There are duty/standby alum dosing pumps which alternate every 24 hours. There are also duty/standby pre and post sodium hydroxide dosing pumps. h. KCC stated that jar tests were initially done daily, but now are only done periodically. i. Pin floc was observed within the clarifier. j. Sludge from the clarifier is initially held within a waste water tank. Supernatant from the tank is overflowed to a local stream. Sludge from the wastewater tank is then pumped to two sludge holding tanks, which are emptied approximately every three months. k. KCC stated that there are aluminium monitors after the clarifier and alarms are set to 190 ug/l. l. On the onsite SCADA the final aluminium trends were not set up and hence not observable, KCC stated that aluminium trends are observable on SCADA remotely.
3.	**Filtration** a. There are two rapid gravity filters; the filter rate through each filter is estimated as 12.5 m^3/hr. b. KCC stated that the filters are backwashed automatically every 24 hours. The filters are brought back into service with a slow start. KCC confirmed that as part of the upgrade works a run to waste facility is being considered. c. A back wash cycle was observed during the audit, there did not appear to be any issues. d. There are turbidity monitors after the filters, alarm levels are set to 0.3 NTU. e. The observed turbidity readings on SCADA from each filter were 0.06 and 0.15 NTU, (see photograph 2). f. KCC stated that the filtered turbidity is not measured directly from the filter outlet but from open holding tanks, (see photograph 3). KCC stated that this could result in a time lag of up to 20 min in displayed turbidity readings. KCC also expressed concerns regarding the open tanks and their potential for contamination.
4.	**Disinfection** a. There are duty, standby and trim residual chlorine dosing pumps in place. The chlorine monitors are alarmed, the target dose is set at 0.7 mg/l and the low level alarm is set to 0.4 mg/l. b. KCC stated that the caretaker takes chlorine readings within the network once a week. c. The chlorine contact time was not available at the time of the audit.
5.	**Treated Water Storage and Distribution Network** a. According to KCC the reservoir has up to three hours storage. b. The vents and covers, (see photograph 4), on the reservoir were of a good standard so as to prevent contamination and insect ingress.
6.	**Monitoring and Sampling Programme for treated water** a. The final aluminium alarms are set at 0.125 mg/l, the final observed aluminium reading was 0.045 mg/l, (see photograph 2), documented reading varied from 0.028 to 0.04 mg/l. c. The final target pH is 7.5; the observed final pH was 7.3. d. The observed final turbidity was 0.03 NTU, (see photograph 2), the documented recorded readings varied from 0.02 to 0.05 NTU.

7.	**Exceedances of the Parametric Values** a. On the 16/05/2016 an aluminium exceedance of 1,800 µg/l was recorded in this supply. According to KCC elevated iron and manganese readings were also recorded at this time. The iron and manganese values were not available at the time of the audit. KCC stated that a split sample taken on the same date returned an aluminium result of < 200 µg/l. Network scouring was carried out 27/05/2016. Follow up sampling results, taken within the network, on the 02/06/2016 and 07/06/2016 returned aluminium results of 39 µg/l and 10 µg/l respectively. KCC stated that the exceedance may have been due to build-up of aluminium within the network. b. EPA noted that there were additional aluminium exceedances on this supply in 2015, which were not notified to the EPA. KCC acknowledged that they had not been notified due to internal reporting errors within KCC. c. On the 15/06/2016 a PLC board operating the coagulant dosing at the plant malfunctioned. This caused the plant to cease operation for a period of five hours. As there is only three hours storage within the reservoir, inadequately treated water entered the supply for a two hour period. KCC stated that the PLC board malfunctioned due to a failure of contract staff to update software after implementing procedural changes.
8.	**Hygiene and Housekeeping** a. The site was very well maintained and documentation was to a high standard. b. All equipment, monitors and dosing pumps were appropriately calibrated with visible calibration stickers.
9.	**Management and Control** a. KCC stated that the technician that works on this plant also works on waste water treatment plants.

3. AUDITORS COMMENTS

This supply is on the RAL for inadequate barrier against *Cryptosporidium*. In 2014 a new plant with coagulation, flocculation, clarification and rapid gravity filtration was commissioned. Since its commissioning the plant has had aluminium exceedances and issues with flocculation. This according to KCC is due to good water quality and inadequate chemical dosing and mixing. KCC have initiated trials to correct the dosing and mixing procedures. From observed results, the trials appear to have made improvements in water quality. KCC stated that permanent works are now scheduled to be completed by the end of September 2016. IW must ensure that these works are progressed so drinking water quality in the Castlecove supply is maintained and the supply is removed from the RAL.

There have been aluminium exceedances in this supply which were not notified to the EPA, this has been subject of a warning letter issued to IW dated 31/05/2016. IW must note that non notification of exceedances is a non-compliance under Article 10(3) of the *European Union (Drinking Water) Regulations 2014*. IW must ensure that all exceedances of the appropriate parametric values are notified in a timely manner to the EPA as per the EPA Handbook for Public Water Supplies.

On the 15/06/2016 a PLC board which controls the chemical coagulant dosing of the plant malfunctioned, leaving the Crypto barrier ineffective for a period of five hours. IW should put procedures in place to ensure that any future malfunction is prevented at this and all other treatment plants in its ownership.

4. RECOMMENDATIONS

Source Protection

1. Irish Water should review the documented raw water colour results, which at the time of the audit appeared high.

Coagulation, Flocculation and Clarification

2. Irish Water should ensure that the proposed upgrade works, to assist with coagulation and flocculation, are carried out as scheduled to ensure drinking water quality of the Castlecove supply is maintained and the plant is removed from the RAL.

3. Irish Water should investigate the option of using variable automated chemical dosing.

4. Irish Water should investigate the cause of the pin floc in the clarifiers and put measures in place to ensure that there is no chemical carryover to the filters.

5. Irish Water should ensure that the aluminium trending can be viewed on the onsite SCADA display.

Filtration (General)

6. Irish Water should progress the installation of the run to waste facility following backwash of the filters.

7. Irish Water should review the practice of discharging the supernatant to the local stream to ensure that there is no environmental degradation of the stream.

8. Irish Water should review the alarm levels of the filters to ensure that filtered turbidity does not exceed 0.2 NTU. Alarm levels should also allow adequate time for the caretaker to respond appropriately.

9. Irish Water should review the current location of the turbidity sampling points to ensure that accurate real time turbidity results are recorded and that the potential risk of contamination from open tanks is eliminated.

Disinfection

10. Irish Water should submit the chlorine contact time calculation to the Agency.

Exceedance of the Parametric Values

11. Irish Water must ensure that all exceedances of the parametric values are notified to the EPA in a timely manner as per the EPA Handbook for Public Water Supplies, and should conduct a review of the notification procedure within KCC.

12. Irish Water should put procedures in place to eliminate the events that caused the PLC board malfunction and resultant chemical dosing failure.

Management and Control

13. Irish Water should review the practice of staff working on both water and waste water treatment plants.

FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

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. This report has been reviewed and approved by Ms Emer Cooney, Drinking Water Team Leader.

Irish Water should submit a report to the Agency within one month of the date of this audit report 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 timeframe for commencement and completion of any planned work.

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.

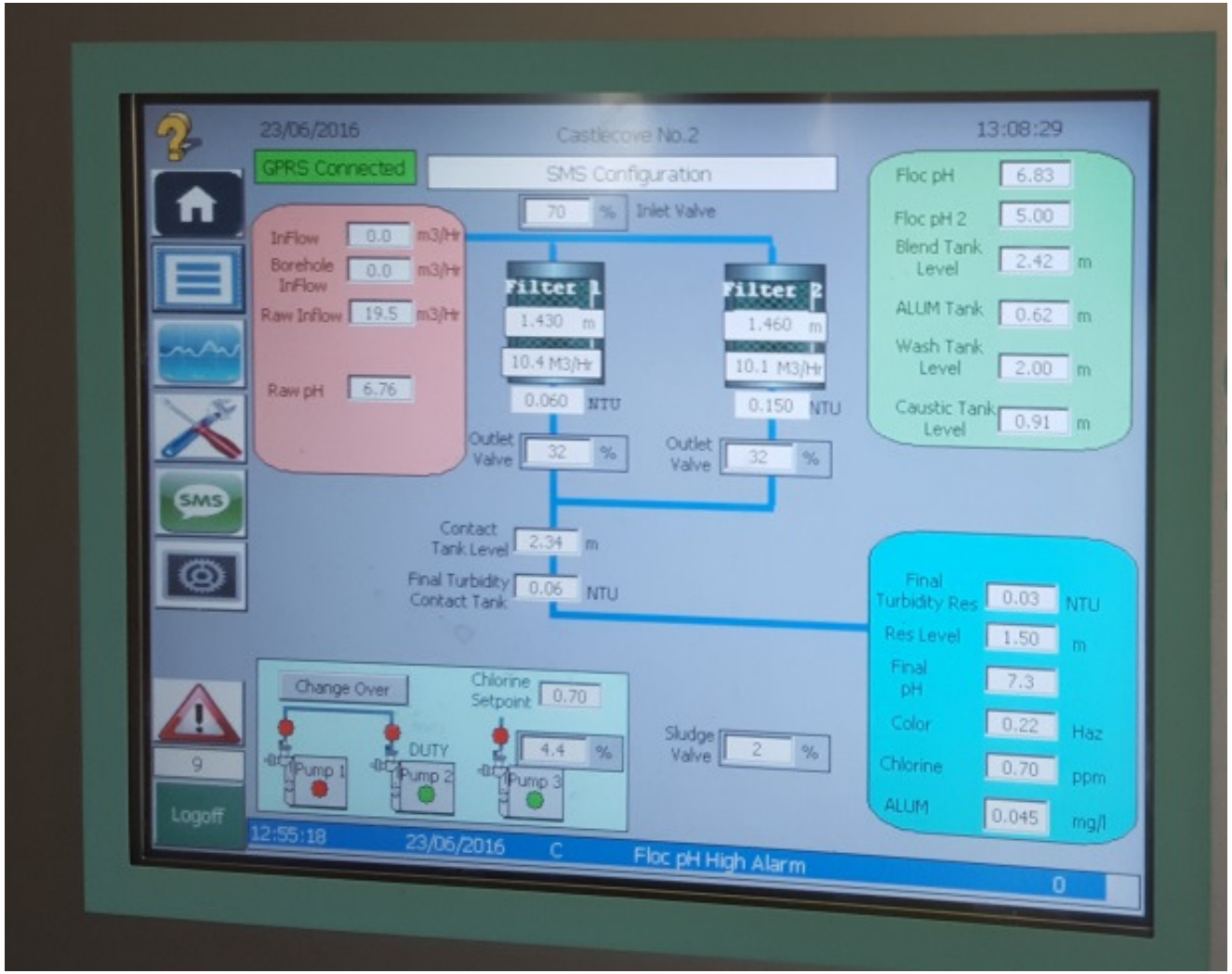
Please quote the File Reference Number DW2009/206 in any future correspondence in relation to this Report.

Report prepared by: _____ **Date:** 07/07/2016

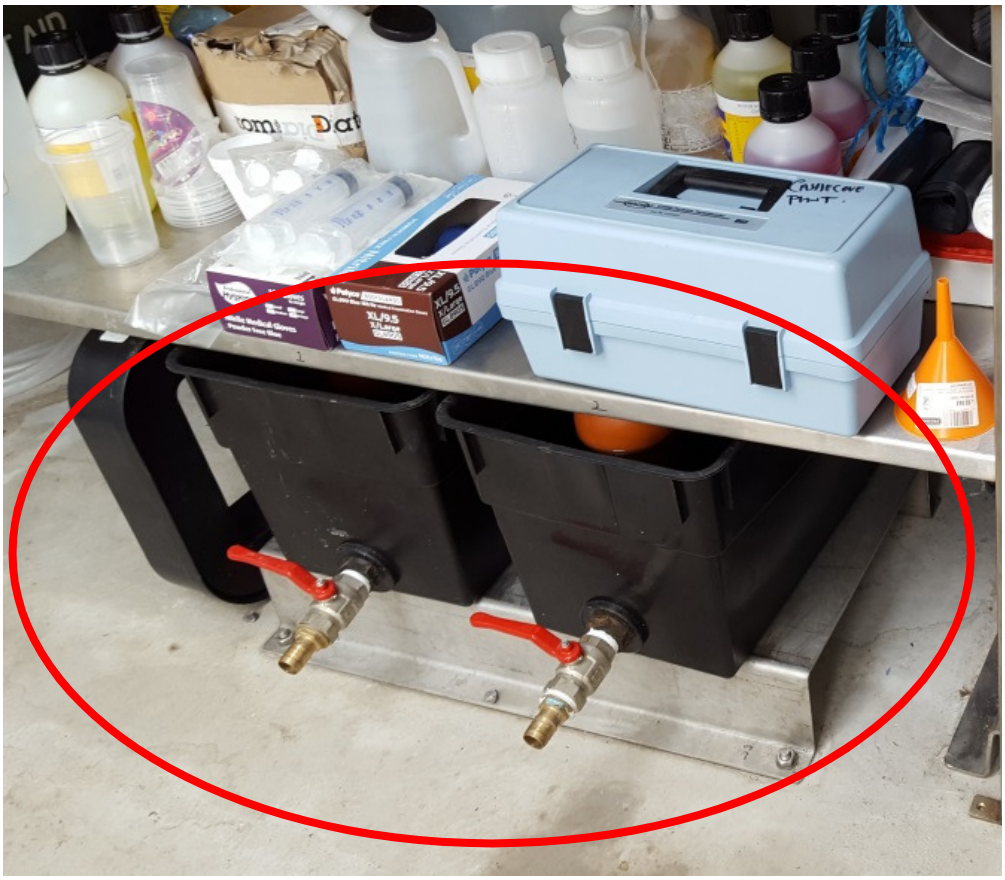
Inspector

Photograph 1: Borehole head adequately sealed and protected.

Photograph 2: Monitoring Results: (Picture was cropped for clarity)



Photograph 3: Open tanks where turbidity readings are taken from. (Picture cropped for clarity).



Photograph 4: Appropriate covers on reservoir to stop contamination and insect ingress.