Drinking Water Audit Report

County:	Kerry County Council	**Date of Audit:**	06/10/2014
Plant(s) visited:	Barraduff 1300PUB1015	**Date of issue of Audit Report:**	10/10/2014
		File Reference:	DW2009/103
		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 Water Supplies (ISBN: 978-1-84095-349-7)* • The recommendations specified in the EPA Report on *The Provision and Quality of Drinking Water in Ireland.* • The recommendations in any previous audit reports.		

MAIN FINDINGS

i. **A new treatment plant for this supply was commissioned in 2012. However, since the plant has been commissioned, there have been subsequent THM exceedances. Irish Water must develop proposals, with timeframes, for the resolution of THMs exceedances on this supply.**

ii. **The turbidity monitor after the slow sand filters does not have a dial out alarm in place. Irish Water must ensure that a dial out alarm is placed on the turbidity monitor and that alarm levels allow sufficient time for staff to respond appropriately.**

iii. **The cleaning and maintenance of the filters is based on headloss. Irish Water should ensure that turbidity is taken into account when scheduling the cleaning of and when bringing the filters back into service.**

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 in response to on-going THM exceedances and to the THM notification on the 27/01/2014 of 124 µg/l in the Barraduff PWSS. Where the text refers to the Water Service Authority this refers to Irish Water in accordance with Section 7 of the Water Services (No. 2) Act 2013.

This supply is fed from an unnamed mountainous stream. The daily flow through the plant is estimated at 270 m^3/day, and the population served is approximately 400. Treatment consists of slow sand filtration with chlorine disinfection. This is a new treatment plant, commissioned in 2012.

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 12.00 pm at the Baraduff treatment plant. 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 audits observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

Representing Irish Water: (* indicates that person was also present for the closing meeting) Conor Foley: IW; Above Ground Lead*; Kevin Murphy: IW; Water Engineer*; John Ahern: KCC; Acting Senior Executive Engineer*; Seamus O Mahony: KCC; Executive Engineer*; Kathleen Casey: KCC; Technician*; Denis Cremin: KCC; Caretaker*. Representing the Environmental Protection Agency: Niall Dunne: EPA; Inspector.

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. Land around the source is commonage. The source was not visited during the audit. KCC did give a source inspection report to the auditor, which was carried out in 27/11/2012. b. KCC stated that the Crypto risk score for this supply was calculated as 15.2, low risk. c. On observation of historical raw water data since 2010; the mean raw water colour result was calculated as 31.9 Hazen; the mean turbidity as 1.53 NTU and the mean TOC based on two results taken in 2011 as 2.4 mg/l. No raw water monitoring results were observed to have been taken in 2013. d. KCC stated that there is no turbidity monitor on the raw water.
2.	**Filtration** a. Filtration at this plant consists of four slow sand filters, with two filters in operation at any one time. At the time of the audit filters No 3 and No 4 were operational. According to KCC the filters are cleaned every 2-3 months, cleaning is scheduled based on head loss and not on turbidity. b. Water from the filters, which are not in use, is run to waste. The standby filters are brought straight back into service when required. c. KCC stated that the design and the actual flow through each filter is 18 m^3/hr and 6.5 m^3/hr respectively. The surface area of each filter is 81 m^2. d. KCC confirmed that the depth of the sand in the filter was 1m; and that the effective size of the sand was 0.36 mm. e. There is one turbidity monitor after the filters. This monitor automatically alternates readings between each filter every five minutes, and according to KCC, it takes approximately one minute after alternating for the monitor to adjust to the correct reading. It is indicated on SCADA which filter is being monitored at any one time. It was observed during the audit that the turbidity reading from filter No. 3 was 0.65 NTU, turbidity reading from filter No. 4 was 0.22 NTU. It was noted that for one of the turbidity reading cycles for filter No.3 that there was a discrepancy between the turbidity reading displayed on SCADA and the reading on the turbidity monitor. f. KCC stated that there is no alarm on this turbidity monitor. This monitor was last calibrated on the 24/07/2014.

	g. Two months turbidity results in graph form from the filters were also observed; the results showed the turbidity levels in filter No. 4, were of a consistently low level, at approximately 0.3 NTU with a consistent flow of approximately 1.00 m^3/hr. For filter No. 3 it was noted, prior to 16/08/2014, that there was a sudden increase in flow, 3.5 m^3/hr to 6 m^3/hr which resulted in a turbidity increase from 0.4 to 0.8 NTU. No explanation was given for the increase in flow or for the increase in turbidity. h. On observation of the SCADA at the time of the audit the flow through filter No. 4 was 0.8 m^3/hr and the turbidity reading of 0.208 NTU, while for filter No. 3 the observed turbidity was 0.672 NTU; SCADA did not appear be to reading the flow from filter No 3, (see photograph 1). i. It was noted from the filter log book on site that in some instances prior to the cleaning of the filters that the turbidity readings were in the region of 1NTU. j. In photograph 2, historical turbidity results can be seen for filter No. 1 on the 25/07/2014 as 1.27 NTU, and for filter No. 2 on the 24/07/2014 as 0.844 NTU. These filters were not in operation at the time of the audit. k. There was a filter log book on site which clearly documented the maintenance of the filters. Daily turbidity monitoring results after each filter were also documented.
3.	**Chlorination and Disinfection** a. There are three chlorine dosing pumps a duty, a standby and a trim pump. The chlorine set point is 0.6 mg/l and the low level dial out alarms is set to 0.4 mg/l. b. KCC stated that the chlorine contact time on this supply is calculated at 18 mg.min/l. c. Chlorine is dosed into a contact tank. The chlorine sampling point is located after the contact tank and a reservoir, but it could not be viewed as it was buried in an adjacent field. d. The observed chlorine reading on the monitor was 0.5 mg/l. The chlorine monitor was calibrated on the 30/07/2014. A chlorine reading taken with a hand held monitor on the day returned a result of 0.53 mg/l, the hand held monitor was calibrated on the 16/06/2014. e. Chlorine results are taken daily within the network by a different caretaker. A record of the network chlorine readings was on site, all observed readings were above 0.1mg/l.
4.	**Monitoring and Sampling Programme for treated water** a. KCC have initiated a TOC/SUVA/THM sampling program for the treated water for this supply. The highest result recorded from this program were; 7.4 mg/l TOC detected on the 09/06/2014; 3.5 L/mg-m SUVA detected on the 09/06/2014 and 75.3 µg/l THM detected on the 13/06/2014. b. There is a turbidity monitor on the final combined water. The final turbidity reading at the time of the audit was 0.41 NTU. The turbidity dial out alarm level is set at 0.8 NTU.
5.	**Treated Water Storage** a. There is a treated water storage tank prior to distribution. KCC estimated that there is approximately 13 hrs storage capacity within this reservoir. KCC stated that the reservoir was last cleaned approximately 24 months ago.
6.	**Exceedances of the Parametric Values** a. This slow sand filtration plant was commissioned in 2012, however, there has been subsequent THM exceedances in this supply. The most recent being 124 µg/l on the 27/01/2014.
7.	**Management and Control** a. The caretaker is also in-charge of wastewater treatment plants, there is no written procedure in place for staff working between waste and drinking water treatment plants. b. The caretaker is trained to FETAC level 5. c. All monitoring equipment is calibrated once a year by an external contractor and by KCC staff every two months. d. Signed off maintenance schedules were displayed on the notice board in the plant, (see photograph 3). e. The plant is a very clean and tidy and well run; with a very high standard of documentation and record keeping in place. f. Sealed and lockable covers were observed on all hatches, (see photograph 4).

3. AUDITORS COMMENTS

This plant was upgraded and commissioned in 2012, but it is currently on the RAL for inadequate treatment for *Cryptosporidium*. Since the plant has been commissioned, there have been THM exceedances, the most recent 124 µg/l on the 27/01/2014. Currently Irish Water do not have plans in place to rectify this issue. Irish Water must put plans, with timeframes, in place to resolve the on-going THM exceedances in this supply. This supply will remain on the RAL, however, the reason will change to "Elevated levels of THMs above the standard in the Drinking Water Regulations".

The cleaning schedule and when the filters are brought back into services does not take into account turbidity. Irish Water should ensure that both headloss and turbidity are taken into account when scheduling the maintenance, the cleaning and when the filters are brought back into service.

There is no alarm on the turbidity monitor after the filters. Irish Water must ensure that all turbidity monitors have dial out alarms in place. Alarms levels should be set so as to give the caretaker/ staff adequate time to respond to appropriately.

During the audit there appeared to be an issue with the displayed SCADA results for flow and turbidity for filter No 3. The Water Services Authority should ensure that the results displayed on SCADA are correct and that they mirror the results on the monitors.

The standard of record keeping at this plant is very high and the use of displayed signed off maintenance schedules is one that should be replicated in other water treatment plants. The caretaker and Kerry County Council should be commended in this regard.

4. RECOMMENDATIONS

1. The Water Services Authority should put plans, with time frames, in place to resolve the THM exceedances on this supply and in this regard should submit a report into the outcomes of the investigations and monitoring of THM formation in this supply. The Water Services Authority should also take note of the EPA Advice Note Number 4; Disinfection on By-Products in Drinking Water THM; located at the following address.
   http://www.epa.ie/pubs/advice/drinkingwater/DrinkingWaterGuide4_v8.pdf

2. The Water Services Authority should install a dial out alarm on the turbidity monitor after the filters. The alarm levels should be set to alert staff of any deviation from the acceptable operating range of the filters.

3. The Water Service Authority should review the procedure in determining when the filters are to be cleaned and brought back into service. The scheduling procedure should be based on both head loss and turbidity. Turbidity should to be kept as low as possible and not greater than 0.5 NTU.

4. The Water Services Authority should ensure that the readings for both flow and turbidity on the SCADA are properly displayed and correct.

5. Water Services Authority should investigate the difference in flow across filters, and should investigate turbidity increases as flow increase through the filters.

6. The Water Services Authority should consider installing a raw water turbidity monitor to alert plant operators of any changes in raw water quality.

7. The Water Services Authority should ensure that the chlorine dosing sampling point can be easily accessed for maintenance and inspection purposes.

8. The Water Services Authority should ensure that procedures are in place for caretakers who have responsibility for both water and waste water treatment plant so as to eliminate the potential of cross contamination between waste water and drinking water.

FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

During the audit the Water Services Authority representatives were advised of the audit findings and that action must be taken as a priority by the Water Services Authority to address the issues raised. This report has been reviewed and approved by Mr. Darragh Page, Drinking Water Team Leader.

The Water Services Authority 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.

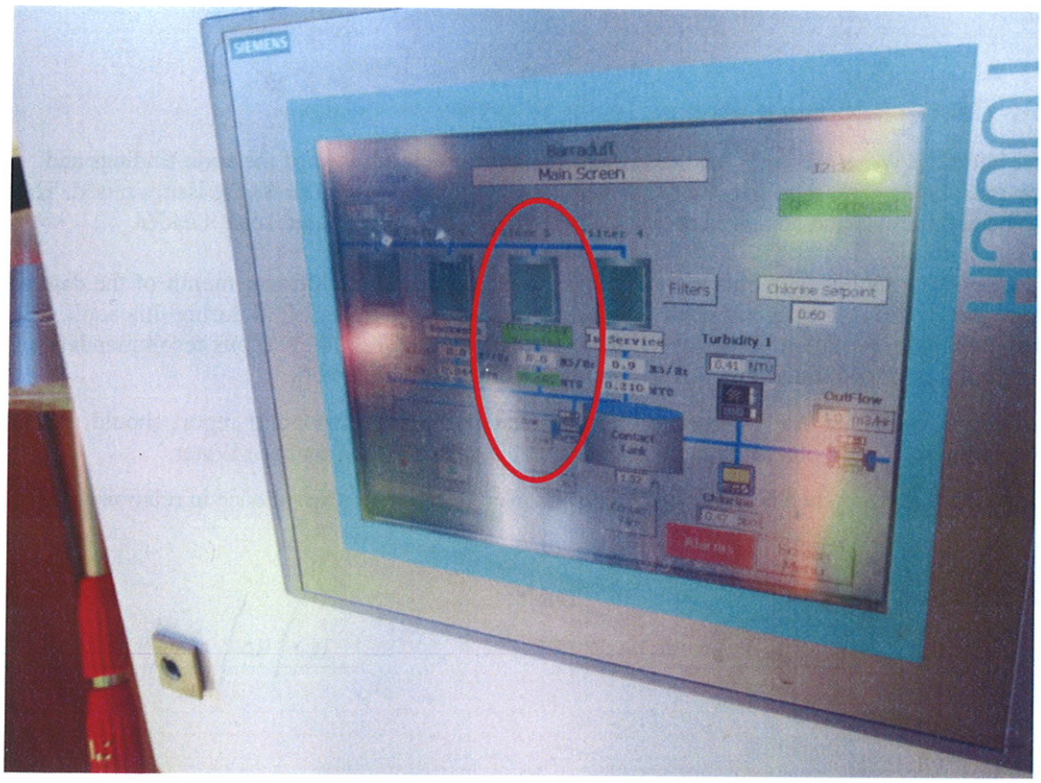
Please quote the File Reference Number DW2009/103 in any future correspondence in relation to this Report.

Report prepared by: **Date:** 10/10/2014

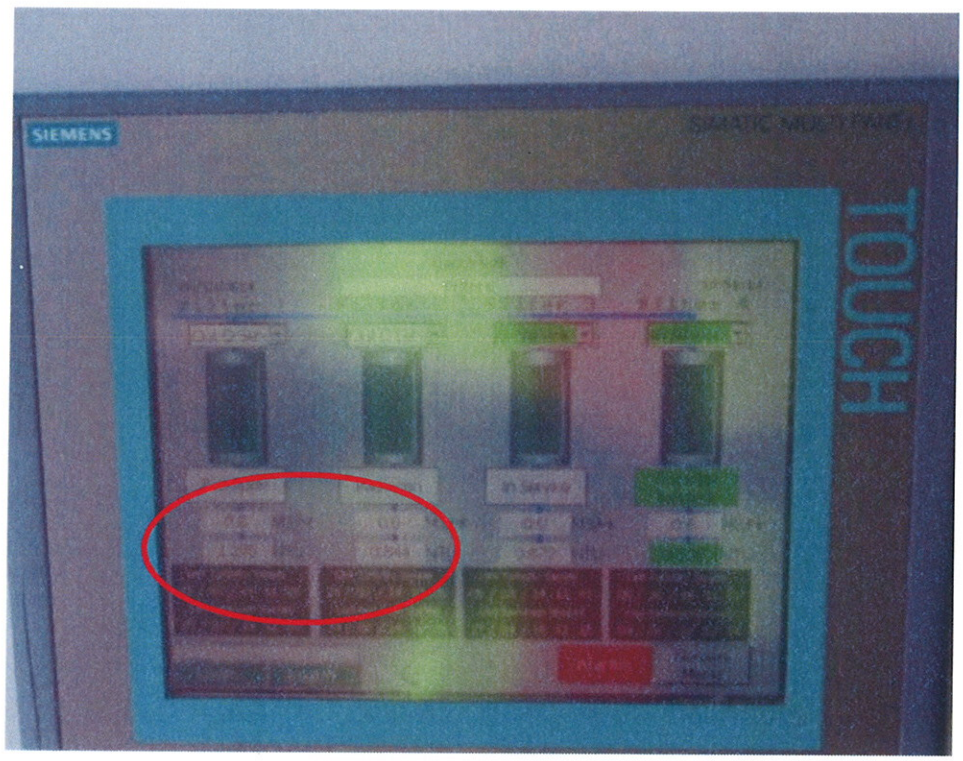
Niall Dunne

Inspector

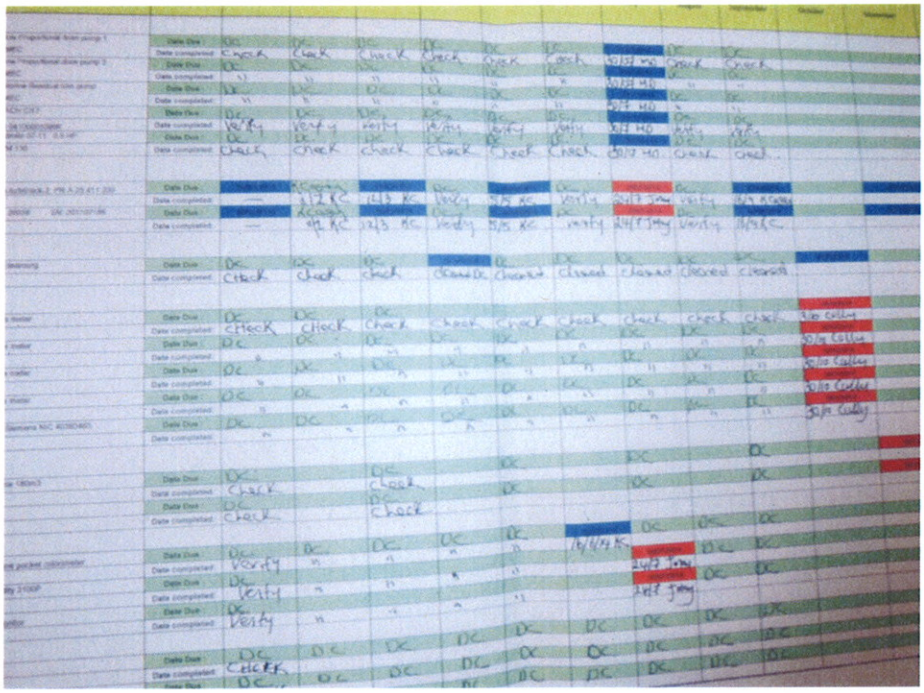
Photograph 1: Flow in filter 3 was reading 0.00 m3hr, Turbidity for filter 3 was reading 0.661NTU.



Photograph 2: Turbidity readings for filter 1 and 2, which were not in use at the time of the audit, were reading historical turbidity results of 1.27 NTU and 0.844 NTU. (please note that this picture was cropped to display the results.)



Photograph 3: Scheduled signed off maintenance plan.



Photograph 4: All hatches were sealed and lockable.