Drinking Water Audit Report

County:	Galway	**Date of Audit:**	13 May 2014
Plant(s) visited:	Cineal Feicin PWS	**Date of issue of Audit Report:**	23 May 2014
		File Reference:	DW2014/6
		Auditors:	Mr. Darragh Page
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. **The source of the Cineal Feicin PWS is in a poor location as it was constructed too close to a pre-existing farmyard and slatted slurry tank and therefore there is a risk of contamination. No assessment of the vulnerability of the source has been carried out. In the absence of this assessment and given the historical results (intermittent high turbidity and microbiological failures) it would appear that the treatment in place provides no barrier against *Cryptosporidium*, however further assessment of the borehole construction is necessary.**

ii. **The management of the chlorination system was also poor and the feedback control over the chlorine dosing was inappropriate and difficult to manage as it currently stands. This leads to the levels of chlorine in the final water regularly going too low as was observed on the day of the audit. Control over the chlorination system needs to be improved.**

iii. **While the chlorine monitor was installed as required by the Direction the alarm procedure was not in place at the time of the audit and must be submitted to enable this Direction to be closed out.**

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 verify compliance with the EPA Direction issued on 13th February 2014. 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.

The Cineal Feicin PWS is a small public water supply serving 28 persons. It was originally developed as a private housing estate in 2006 that has subsequently been taken in charge by Galway County Council. Treatment consists of chlorination only.

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

The opening meeting commenced at 10:30 am at the Cineal Feicin water 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)

Eunan Canavan* – Engineer O&M, Irish Water

Diarmuid Croghan* – Senior Executive Engineer, Galway County Council

Tara Meehan* – Technician, Galway County Council

Adrian Raftery* – Executive Engineer, Galway County Council

Billy Hourigan* – General Services Supervisor, Galway County Council

Sean Neville*, Caretaker, Galway County Council

Representing the Environmental Protection Agency:

Darragh Page, 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. The source of the supply is a bored well located in the Cineal Feicin housing estate. b. The surrounding land is the housing estate on one side and agricultural land (grazing). c. There is a farm shed housing cattle and a slatted shed less than 20 m from the borehole. This was in place prior to the borehole as Galway County Council reported that the land on which the housing estate was built was originally owned by the farmer. d. No assessment of compliance with the Good Agricultural Practice Regulations had been carried out. Galway County Council reported that some landspreading did take place in the field adjacent to the borehole which is approximately 30 m from the borehole. e. No groundwater vulnerability assessment or groundwater flow direction assessment has been carried out. f. Neither Irish Water nor Galway County Council had any borehole logs and could not confirm the depth of the borehole or how it was constructed. g. A visual examination of the top of the borehole indicated that there was no cap (Photo 1). h. One raw water monitoring sample had been taken on 24 March 2014 which found the source to be free of microbiological contamination but did contain elevated turbidity (3.5 NTU).
2.	**Chlorination and Disinfection**

	a. The disinfection system consists of duty/standby dosing of sodium hypochlorite. There was no flow meter on the supply and dosing is based on the residual chlorine on the final water. Galway County Council stated that there is five days storage in the reservoirs and therefore it is very difficult to control the chlorine residual as the feedback time between dosing and monitoring is long. b. A chlorine monitor has been installed as required in the Direction, however, the alarm procedure has not been put in place due to the difficulties with achieving a stable chlorine reading on the final water. c. The chlorine residual monitor was reading 0.05 mg/l at the time of the audit which is below the level recommended by the EPA. d. There is no written procedure documenting the response procedures in the event of an alarm. Therefore, compliance with the second part of the Direction could not be confirmed on the day of the audit. e. A 50 L chlorine day tank that doses neat sodium hypochlorite (11%) has recently been installed. Irish Water has not assessed the residence time of the sodium hypochlorite that this arrangement will provide to ensure there is adequate turnover of chlorine. f. The levels of chlorine in the final water fluctuate significantly and the chlorine monitor on the final water at the time of the audit was reading 0.05 m g/l which is below the minimum recommended by the EPA.
3.	**Treated Water Storage** a. The treated water is stored in a reservoir close to the dosing house. This consists of a mixing chamber followed by two concrete reservoirs in series. b. Galway County Council reported that there is five days storage in this reservoir. c. The sample point for the chlorine residual was the outlet of the second tank. d. The possibility of moving the chlorine monitor sampling point was discussed and several possible new locations were discussed including the inlet to the first reservoir as this would improve the chlorine dose control. e. The possibility of reducing the volume of water stored was also discussed and would appear to be possible.
4.	**Monitoring and Sampling Programme for treated water** a. A review of the 2013 monitoring results indicate that elevated turbidity is a problem with levels ranging from 0.87 to 1.6 NTU in 2013 while the raw water sample of 24 March 2014 found 3.5 NTU. b. These levels indicate that the disinfection system as it currently exists may not be secure as the disinfection cannot be guaranteed when turbidity exceeds 1 NTU. c. No assessment of the cause of the elevated turbidity has been carried out. d. No actions were proposed at the time of the audit to remove turbidity. e. These levels of turbidity may indicate vulnerability to surface water contamination and possibly *Cryptosporidium* particularly in light of the potential source immediately adjacent to the source.

3. AUDITORS COMMENTS

The source of the Cineal Feicin PWS is in a poor location as it was constructed too close to a pre-existing farmyard and slatted slurry tank and therefore there is a risk of contamination. Very little information was known about the well construction or the geology/hydrogeology by either Galway County Council or Irish Water. No assessment of the vulnerability of the source has been carried out. In the absence of this assessment and given the historical results (intermittent high turbidity and microbiological failures) it would appear that the treatment in place provides no barrier against *Cryptosporidium*, however further assessment of the borehole construction is necessary.

The management of the chlorination system was also poor and the feedback control over the chlorine dosing was inappropriate and difficult to manage as it currently stands. This leads to the levels of chlorine in the final water regularly going too low as was observed on the day of the audit.

While the chlorine monitor was installed as required by the Direction the alarm procedure was not in place at the time of the audit and must be submitted to enable this Direction to be closed out.

4. RECOMMENDATIONS

1. Irish Water should replace the supply with an alternative source of clean and wholesome drinking water or implement the recommendations numbers 2 to 12 at the existing water treatment plant.

Source Protection

2. Irish Water should implement the requirements of the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014)* to ensure, unless an alternative setback distance has been set as per Article 17, that:

    i. Organic fertiliser or soiled water is not applied to land within 25 m of the abstraction point; and
    ii. Farmyard manure held in a field prior to landspreading is not placed within 50 m of the abstraction point.

3. Irish Water should carry out regular monitoring on the raw water source and should include monitoring for *E .coli* bacteria, as an indicator of trends in assessing water quality and to determine the degree of treatment and controls required in the supply.

4. Irish Water should ensure that a cap is placed on the borehole to prevent ingress.

5. Irish Water should assess the borehole to determine if it is secure against surface water and shallow groundwater contamination.

Disinfection

6. Irish Water should ensure that the supply is adequately disinfected and that a minimum of 0.1 mg/l free residual chlorine is present in the water supplied to consumers in the Cineal Feicing PWS at all times.

7. Irish Water should ensure that the chlorine residual monitor is alarmed and linked to a recording device to ensure that either a sudden increase in chlorine demand or a failure of the chlorine dosing system is immediately detected.

8. Irish Water should record the results of the residual chlorine readings on the chlorine monitor and the results of the manual residual chlorine test carried out daily at the plant and regularly check these results to ensure that the monitor is recording correctly.

9. Irish Water should assess the retention time of the sodium hypochlorite in the 50 L drum at the Cineal Feicin PWS and ensure that the chemicals are not stored on site in excess of the manufacturers recommendations.

Treated Water Storage

10. Irish Water should review the storage arrangements in the reservoir to determine if the storage time can be reduced from 5 days. In carrying out this assessment Irish Water should ensure that there is no impact to consumers' continuity of supply.

11. Irish Water should review the monitoring location of the chlorine monitor to determine if the location can be moved closer to the dosing point but after adequate CT of 15 mg.min/l has been achieved.

Exceedences of the Parametric Values

12. Irish Water should investigate the cause of the excessive levels of turbidity in the raw water at the Cineal Feicin PWS. If it is not possible to reduce these intermittent occurrences of turbidity in excess of 1.0 NTU Irish Water should ensure that adequate treatment is put in place to remove turbidity.

FOLLOW-UP ACTIONS REQUIRED BY THE LOCAL AUTHORITY

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. Brendan Wall, Manager (Environmental Enforcement).

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 in any future correspondence in relation to this Report.

Report prepared by: _____ **Date:** 23/5/14

Darragh Page

Inspector

Photo 1. Borehole of the Cineal Feicin PWS (note no cover on borehole).