Drinking Water Audit Report

County:	Galway	**Date of Audit:**	19th August 2015
Plant(s) visited:	Spiddal PWS Scheme Code 1200PUB1045	**Date of issue of Audit Report:**	1st September 2015
		File Reference:	DW2015/127
		Auditors:	Ms Aoife Loughnane
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 *Drinking Water Report*.		

MAIN FINDINGS

i. **Spiddal water treatment plant was found to be operating at approximately 500 m^3/day above its design capacity (3,400 m^3/day) so the plant is under significant pressure. This also has implications for Irish Water's proposal to extend the Spiddal supply to serve Carraroe (in order to address the THM issues in the Carraroe supply). Irish Water must ensure that Spiddal water treatment plant is operated within its design capacity and confirm that the proposal to extend the supply to Carraroe will not put the plant at an unacceptable risk.**

ii. **Improvements are required to the management and control of the coagulation and filtration process at Spiddal water treatment plant. The current deficiencies include:**

   (a) A fixed coagulant dose regardless of fluctuations in raw water quality;

   (b) No routine jar testing to determine the optimum coagulant dose;

   (c) No backwash of the filters in response to elevated turbidity.

iii. **There was evidence of a failure to ensure adequate chlorine residual in parts of the network. Irish Water must take immediate action to ensure that the minimum recommended residual chlorine concentration of 0.1 mg/l is maintained in the distribution network to ensure adequate disinfection of the water supply.**

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.

Spiddal water treatment plant serves a population of approximately 7,000 people. The source of the water supply is Lough Boliska. The treatment plant was built in the late 1970s and produces approximately 3,800 m^3/day of treated water. Treatment consists of coagulation, rapid gravity filtration, disinfection and fluoridation.

The opening meeting commenced at 2.00 pm at Spiddal 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:

Anne Bonner, Drinking Water Compliance Specialist, Irish Water

Tony Kelly, Senior Executive Engineer, Galway County Council

Eoin Curran, Assistant Engineer, Galway County Council

Jim O'Connell, Water Services Supervisor, Galway County Council

Fintan Donnelly, Environmental Technician, Galway County Council

Tom McDonagh, Assistant Caretaker, Galway County Council

Representing the Health Service Executive:

Seamus Mitchell, Senior Environmental Health Officer, HSE West

Eoghan Flanagan, Student Environmental Health Officer, HSE West

Representing the Environmental Protection Agency:

Aoife Loughnane, 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. Water is abstracted from Lough Boliska approximately 1 km north-west of Spiddal water treatment plant. Galway County Council (GCC) has responsibility over the catchment. The catchment pressures are agriculture and septic tanks. b. The most recent drinking water returns data identifies a moderate *Cryptosporidium* risk for the catchment (risk score 70). However, GCC considers that the actual risk is high. The revised risk score was not available during the audit. c. The following parameters are monitored continuously in the raw water (the results at the time of the audit are also shown); pH 5.68, turbidity 1.014 NTU, ammonia 0.0 mg/l temperature 16.4^{o}C. Colour is not monitored continuously and GCC stated that it can rise to 300 Hazen. d. The raw water high turbidity alarm is set at 5 NTU. There is no automatic shutdown of the treatment plant when this alarm is activated. Instead, manual adjustments are made to the treatment processes to cope with the changes in raw water quality.
2.	**Coagulation, Flocculation and Clarification** a. Chemicals added to the raw water during the coagulation process include soda ash (to increase alkalinity), aluminium sulphate 8% (coagulant) and 0.1% polyelectrolyte (coagulant aid). b. The coagulant dose is fixed regardless of changes in raw water quality. Jar testing is not carried out routinely in order to determine the optimum coagulant dose and pH when the raw water quality changes. c. There is no online monitoring of the treated water for aluminium. Daily aluminium bench testing is carried out by the caretaker and the results are recorded in the daily log book. An examination of the monitoring records showed compliant results. d. The polyelectrolyte is injected through a single injection point which does not allow for optimum dispersion.

3.	**Filtration** a. Backwashing of the 3 rapid gravity filters is initiated based on time or head loss, but not on elevated turbidity. b. A backwash of filter no. 3 was observed during the audit and some loss of sand into the decant channel was observed. c. There are individual turbidity monitors after each filter and a combined turbidity monitor on the final water. The monitors have an alarm set point of 0.2 NTU. During the audit the monitors were reading; Filter No. 1: 0.053 NTU, Filter No. 2: 0.058 NTU, Filter No. 3 – stabilising after backwash, Combined final water turbidity: 0.059 NTU.
4.	**Chlorination and Disinfection** a. Chlorine (sodium hypochlorite 14/15%) is dosed via duty and standby pumps with auto-switchover facilities. The dose is flow proportional and linked to the residual chlorine monitor. The chlorine set point is 1.03 mg/l. b. The chlorine monitor was reading 0.89 mg/l at the time of the audit. The low chlorine alarm setting is 0.7 mg/l and the high alarm setting is 1.5 mg/l. c. The clear water tank on site provides a chlorine contact time of 101.65 mg.min/l.
5.	**Distribution Network** a. GCC acknowledged that they experience difficulties in maintaining the required minimum chlorine residual of 0.1 mg/l at the extremities of the distribution network. b. An examination of the monitoring records showed inadequate chlorine levels measured at Camus church (during the period September to December 2014 and July to August 2015) and Glean Trasna Pump (during May to August 2015). c. GCC stated that flushing of the network is carried out during the off-season and there can be manganese issues in the network.
6.	**Monitoring and Sampling Programme for treated water** a. The following parameters are monitored continuously in the treated water (the results at the time of the audit are also shown); pH 6.45, turbidity (combined) 0.06 NTU, free residual chlorine 0.91 mg/l. b. The treated water high turbidity alarm is set at 0.6 NTU. c. GCC identified a discrepancy between the reading on the treated water continuous pH monitor (6.45 pH) and the handheld pH analyser (6.8 pH).
7.	**Management and Control** a. The caretaker does not have access to SCADA on-site to assist in the management of the plant and the investigation of alarms. b. A documented alarm response procedure was not available for review during the audit.
8.	**Sludge Management** a. GCC could not confirm the discharge location for the supernatant from the sludge treatment plant.

3. AUDITORS COMMENTS

Spiddal water treatment plant was found to be operating at approximately 500 m^3/day above its design capacity (3,400 m^3/day) so the plant is under significant pressure. This also has implications for Irish Water's proposal to extend the Spiddal supply to serve Carraroe (in order to address the THM issues in the Carraroe supply). For this to happen, Irish Water must ensure that Spiddal water treatment plant is operated within its design capacity.

Overall, the treatment plant is well maintained however improvements are required to the management and control of the coagulation and filtration processes which provide a barrier to *Cryptosporidium* entering the public water supply.

The plant operator does not have access to the SCADA system at the plant, which would assist in the management of the plant and investigation of alarms. A documented alarm response procedure should be in place for all alarms.

The audit found that there are areas of the distribution network where the chlorine levels are below the recommended minimum 0.1 mg/l free residual chlorine. Irish Water must take immediate action to ensure that water supplied to consumers is adequately disinfected.

4. RECOMMENDATIONS

Treatment Capacity

1. Irish Water should ensure that Spiddal water treatment plant is operated within its design capacity and confirm that the proposal to extend the supply to Carraroe will not put the plant at an unacceptable risk.

Source Protection

2. Irish Water should revise the *Cryptosporidium* risk score for the Spiddal public water supply.

Coagulation, Flocculation and Clarification

3. Jar testing of the raw and coagulated waters should be undertaken as outlined in Section 3.3.1 and Appendix C of the EPA publication "*Water Treatment Manual: Coagulation, Flocculation and Clarification*" to determine the optimum chemical coagulant dose and pH for the treatment of the water. The frequency of checks should be appropriate to the nature of supply and changing condition. Results should be recorded at the treatment works and used for control of the treatment plant.

4. Irish Water should investigate the setting up of automated coagulant dosing controls at the treatment plant, having regard to *EPA Drinking Water Advice Note 15: Optimisation of Chemical Coagulation Dosing at Water Treatment Works* available online at http://www.epa.ie/pubs/advice/drinkingwater/dwadvicenote15.html.

5. Irish Water should review the coagulation dosing points and mixing arrangements to ensure that there is adequate mixing and contact time of the coagulant/coagulant aids prior to entry into the clarifier. The polyelectrolyte injection method should be reconfigured in order to achieve optimum dispersion.

Filtration

6. Irish Water should set up an automatic filter backwash when post-filter turbidity levels increase above an appropriate set point.

7. Irish Water should investigate the backwash rate and cause of the loss of filter media from the filters into the filter channel and take appropriate action to prevent this loss of media.

Disinfection

8. Irish Water should ensure that that there is at least 0.1 mg/l free residual chlorine in the distribution network at all times. Irish Water should take immediate action in the areas of Camus Church and Glean Trasna Pump to ensure that the water supply is adequately disinfected.

Management and Control

9. Irish Water should install a continuous aluminium residual monitor on the final water. The monitor should be alarmed and linked to a recording device.

10. Irish Water should ensure that caretakers and/or plant operator have full access to the data pertaining to the performance of the plant. Specifically, access should be provided to raw and treated water quality trends.

11. Irish Water should ensure there is a documented procedure in place defining the responsibilities and actions to be taken in response to different levels of alarms.

12. Irish Water should ensure that all online/continuous monitors and handheld analysers are regularly maintained and calibrated in accordance with the manufacturer's instructions.

13. Irish Water should ensure there is a regular programme of flushing and scouring of the distribution network.

14. Irish Water should investigate the discharge route for sludge supernatant from Spiddal water treatment plant, and assess the impact of the discharge on receiving waters.

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 Mr Darragh Page, Senior Inspector, Drinking Water Team.

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 DW2015/127 in any future correspondence in relation to this Report.

Report prepared by: Aoife Loughnane **Date:** 1st September 2015

Aoife Loughnane

Inspector