

Appendix 1: Guidelines for the investigation and reporting of *E. coli* detections

Drinking Water - Safe Drinking Water Regulations 2015 – Schedule 2

Purpose

This document is an appendix to *Guidance – Drinking Water Quality Standards*.

The Escherichia coli (*E. coli*) standard in Schedule 2 of the Regulations requires “all samples of drinking water collected to contain no *E. coli* per 100mL of drinking water with the exception of any false positive sample.”

Following an *E.coli* detection the drinking water quality standard requires a water supplier to undertake an investigation and report the results of the investigation in accordance with guidelines issued by the Secretary. The guidelines must be followed to ascertain whether the initial results of the analysis are representative of the water in the water sampling locality.

Guidelines

The guidelines contain two parts, which must be followed for the purposes of determining whether the water quality standard has been met or not, and if a Section 18 notification is required. Where these guidelines describe actions that ‘should’ be taken these may be excluded where it is determined it is not appropriate to the investigation. The reasoning for not taking any such actions outlined in the guidelines must be explained in the report to the department.

Part 1 - Investigation explains the elements to an investigation that must be considered and the timeframe for commencement and completion. *Part 2 - Reporting* outlines the requirements of the investigation report and the timeframe for the provision of the report to the Secretary.

Part 1 – Investigation

All detections must be assumed to be true events and an investigation pursued until all possible sources of contamination have been explored. For the purposes of part (a) of Schedule 2 an investigation commences as soon as the laboratory informs the water supplier of a positive *E.coli* result. The investigation to ascertain whether the results of analysis are representative of the water in the water sampling locality must be completed within 10 days of the initial positive result.

These guidelines for investigating *E.coli* detections are based on the principles outlined in chapter 10 of the Australian Drinking Water Guidelines. It is important that water suppliers record observations, lab results and other water quality data to provide evidence of actions taken during the investigation. There are four key elements to an investigation, noting if other factors are identified they should also be included:

- Field assessment
- Sampling
- Investigation of treatment plant performance and operation
- Investigation of network and asset condition/performance

Field assessment

A water supplier must investigate the sample location and the relevant surrounding infrastructure to ensure that all actions to manage microbial hazards, as identified in the risk management plan are in place and identify any degradation of infrastructure. The field assessment should include but is not limited to:

- Reticulation - assessment of sample site, sample tap, hydrant location and hydrant use
- Tank condition – roof, vents, access, hatch, potential entry points for birds/vermin, taps, pipes
- Chlorine residual patterns across reticulation including tanks (minimum, maximum, normal range)
- Other water quality parameters – turbidity, electrical conductivity or total dissolved solids, pH
- Observations of works in the area
- Operational knowledge from staff of any operational abnormalities over the previous few days/week

Sampling

Appropriate sampling must be undertaken to determine the extent of the problem. Resampling must be designed to verify corrective actions and to confirm effective resolution.

(a) Prior to the disposal of water, the water supplier should:

- Resample from the original sample site
- Extend sampling to determine the extent of the problem by considering water age or expected water system flows, including sites upstream and downstream of the original sample site

(b) After corrective actions have been implemented, the water supplier must:

- Resample from the original sample site and other sampling sites selected for investigation purposes as indicated by extended sampling in part (a).

Investigation of treatment plant and performance

A water supplier must investigate the previous performance of the treatment plant and identify any periods of ineffective treatment. Investigation should include but is not limited to:

- Online monitoring data related to barrier performance (critical limit and critical control point breaches) to determine if control/corrective actions operated as expected
- Online monitoring data for any unusual trends (water treatment plant operation, tank levels, flow rates/pressures, disinfection analysers, filter performance)
- Review of any hydraulic monitoring and flows through the plant
- Review of maintenance/calibrations of instruments at the treatment plant
- Changes to raw water/water sources that may have affected the treatment process (including selective harvesting of raw water)
- Disinfection process performance (UV, chlorination, chloramination systems)
- Site and delivery impacts on disinfection chemicals (chemical strength, quantity on site)
- Planned or unplanned maintenance work at the treatment plant

Investigation of network and asset condition/performance

A water supplier must investigate the network, asset integrity and identify any related works or events which may have contributed to an *E.coli* detection. Investigation should include but is not limited to:

- Water age (e.g. mapping of water system, measuring chlorine residuals in locality extremities)
- Other sample results taken on the same day in the same locality
- Out of service assets/assets in periodic service (e.g. pumps, tanks)
- Recent significant network changes (such as high flows, valve changes, change flow direction)
- Historic water quality data for locality (e.g. minimum & maximum chlorine residual and turbidity variations)
- Customer query, complaints or concerns
- Recent planned/unplanned maintenance work
- Potential contamination / cross contamination of sources (such as backflow prevention/recycled water/raw water, air valves, domestic rain water tanks)

Part 2 – Reporting

In accordance with these guidelines, a water supplier must report the results of the investigation. For the purposes of part (b) of Schedule 2 the report must be provided to the Secretary within 10 days of receiving the initial *E.coli* detection from the accredited laboratory.

Investigation Report

The information provided in the investigation report is to be presented clearly and with sufficient detail to inform the department of the investigation findings. The investigation report must include the details and results of a water supplier's investigation activities in the following format:

1. Background

The report should contain information that provides the relevant background to the investigation. It must reference the Section 22 notification and should contain any additional information to provide the context of the investigation that is not included in the Section 22 notification. A schematic diagram or written description of the relevant features of the drinking water system related to the investigation should also be included. Features may include sample point(s), water treatment plants, storage tanks, pressure zones, booster chlorinators and critical control points.

2. Investigation

A summary of the results from the investigation elements must be provided. Where applicable, the use of result tables, graphs and illustrations to summarise the results is encouraged. It is the department's expectation that only relevant information supporting the investigation is provided in the report. Detailed information that a water supplier may include such as original water quality testing laboratory reports or supervisory control and data acquisition (SCADA) screen shots of trends and settings can be provided as an appendix to the report.

3. Outcomes

The outcomes from the investigation results must summarise the following:

- (i) The water quality analysis conducted during the investigation period of all other substances that would indicate the presence or non-presence of *E.coli* in the initial water sample taken.
- (ii) The drinking water treatment process applied or other specified actions taken by the water supplier for the relevant time period prior to the detection which should have prevented the presence of *E.coli*. This should also detail the associated aspects of the risk management plan.
- (iii) The operational performance of water treatment processes during the relevant time period. This should also detail the associated aspects of the risk management plan.
- (iv) Any issues from degradation of plant or infrastructure in or around the relevant water sampling locality.

If the water supplier identifies any other relevant information or contributing factors, this must also be included in the report.

4. Conclusion

The report requires a conclusion that considers whether the investigation identified any contributing factors in accordance with (c)(i)(ii)(iii) or (iv) in Schedule 2 of the Regulations. If there is any doubt whether any findings from the investigation may have contributed to the *E.coli* detection, a water supplier must provide a conclusion that there was an issue which has the potential to lead to a contamination event and the standard was not met.

The department will acknowledge receipt of the report. Where the investigation and report has determined that the water quality standard has not been met, lodgement of a Section 18 notification is also required at the time of submitting the report.

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