Appendix 1: Water sampling program

Drinking Water - Safe Drinking Water Regulations 2015 – Regulation 8(1)(d)

Purpose

This document is an appendix to *Guidance – Risk Management Plans.*

This guidance describes the water sampling program details that must be included in a risk management plan and should be read in conjunction with Regulation 8(1)(d)(i)-(vi).

Introduction

A water sampling program relates to routine monitoring of all water, not just drinking water. The hazards identified during the risk assessment that underpins the development of the risk management plan should be covered by the water sampling program. Therefore, a water sampling program is a fundamental part of a water agency's risk management plan.

Being an integral part of a water agency's overall strategy to manage hazards and risks to its water supply systems, operational staff with relevant knowledge should be involved in the development of a water sampling program.

The requirements for a water sampling program outlined in Regulation 8(1)(d)(i)(ii)(iii)and(vi) are relevant to all water agencies and relate to the routine monitoring of all water.

Regulation 8(1)(d)(iv)(v)and(vi)(A)(B) are water sampling program obligations specific to a water supplier and relate only to drinking water samples.

Sampling related to plant operation, barrier performance monitoring and other non-routine monitoring are excluded from the obligations of Regulation 8(1)(d). Non-routine monitoring includes additional sampling as a result of customer complaint, incidents or emergencies. Validation and project based monitoring are also excluded.

In addition to this guidance, the Australian Drinking Water Guidelines (ADWG) also provides information on monitoring that can support the development and ongoing revision of a water sampling program (ADWG 2011, p.115).

Guidance

Location identification: r. 8(1)(d)(i)

A water agency must include in its water sampling program a comprehensive list of locations where routine water samples are to be collected.

Each location where water samples are to be collected should be easily identifiable so as not to be mistaken for another sample location. Therefore, a water agency should have for each sample location a unique site identifier or site code.

The list of locations may be separated into location categories where relevant such as catchment/source water, transfer pipe-lines, drinking water treatment processes, water storage tanks, distribution system, customer taps.

Location selection: r. 8(1)(d)(ii)

A water agency must outline in its water sampling program how each identified location has been selected.

In selecting sample locations, the department recommends consideration of the following locations, where relevant, but not limited to:

- Off-takes
- Extent of the water supply system which a water agency has responsibility (i.e. catchment to tap)
- Seasonal changes in water supply demand or water age
- Water supply system hydraulics, entry points and pressure zones
- Drinking water treatment processes, clear water storages and water storage tanks
- The extremities of a water system network
- Monitoring for any specific residual risk identified in a water agency's risk management plan
- Historical results and trends
- Water supply system specific issues

Sampling frequency: r. 8(1)(d)(iii)

A water agency must specify in its water sampling program the frequency with which routine water samples are to be collected from the identified locations. Any changes to the sampling frequency as a result of annual reviews of a water sampling program must also be documented.

In determining the selected frequency for water sample collection, the department recommends the following where relevant, but not limited to:

- Variability in source water
- Risk characteristics of drinking water
- Historical results and trends (long term evaluation)
- Current understanding of the water supply system
- Individual water supply system specific issues
- Treatment barrier performance

Water supplier matters related to location and frequency of samples: r. 8(1)(d)(iv)

The intent of this regulation is to ensure a water supplier is collecting a sufficient number of drinking water samples at appropriate locations across a water sampling locality that can monitor changes in drinking water quality.

The water samples collected must be representative of the drinking water supplied and should consider the characteristics of the distribution system within a water sampling locality. Sample locations should consider any infrastructure features in the distribution system downstream from the water treatment plant that could impact on the drinking water to be supplied.

The water samples collected must also be taken at a sufficient frequency to monitor any changes. Frequency considerations can include local population changes, identified high level risk characteristics or where previous results have indicated potential problems.

Water supplier matters related to the routine sampling schedule: r. 8(1)(d)(v)

A water supplier must specify the rationale for determining the pattern of collection of drinking water samples from all water sampling points (e.g. water entry points and customer taps). The rationale must ensure that samples from the same customer tap within a water sampling locality are not taken on two consecutive occasions.

Selection of parameters and frequency for testing by a water agency: r. 8(1)(d)(vi)

This Regulation requires the water sampling program to specify *"…the parameters for which samples will be tested and the frequency at which tests will be conducted for each parameter".*

It requires a risk based determination of the parameters and related frequencies that will be applied to the testing of raw water and drinking water samples.

The selection of the parameters and frequency of testing of collected water samples may take into consideration, where relevant, but not limited to the following:

- Hazards and residual risk identified from risk assessments conducted

- Availability of alternative surrogates and indicators
- Variability in water quality

For example: The risk assessment identified seasonal cyanobacteria (blue-green algae) blooms. Monitoring at the reservoir for cyanobacteria is increased from monthly to weekly samples from September to April.

Selection of parameters and frequency for testing by a water supplier: r. 8(1)(d)(vi)(A)&(B)

Regulation 8(1)(d)(vi)(A)&(B) is applicable to water suppliers and applies to the collection of drinking water samples.

Regulation 8(1)(d)(vi)(A) states *"….in a risk management plan developed by a water supplier, identifies – how the selection of the parameters and the frequency of testing for each parameter will assist the water supplier to monitor its compliance with the drinking water quality standards;"*

Regulation 8(1)(d)(vi)(A) requires a water supplier to specify how it has determined the parameters and frequency of testing to assist its monitoring of compliance with the drinking water quality standards. This must include the reasons for selecting the parameters and the frequency of testing for each parameter in each water sampling locality. Any changes to sampling frequency should be based on risk and must be justified in the water sampling program.

The selection of parameters required to be monitored must include schedule 2 parameters and any other parameters based on the hazards and risks identified in the risk management plan. The frequency of sampling for schedule 2 parameters must be at least as frequent as specified in the regulations. The frequency of other parameters should be determined by the identified risk.

For example: The risk assessment identified a high likelihood for the production of haloacetic acids. The water supplier has included in its water sampling program fortnightly monitoring of chloroacetic acids.

Regulation 8(1)(d)(vi)(B) states *"…in a risk management plan developed by a water supplier, identifies how the chemicals and other substances used to disinfect or treat the drinking water being supplied to the relevant water sampling locality have been considered when selecting the parameters and the frequency for testing the parameters;"*

This requires a water supplier to identify in the water sampling program how the chemicals and other substances added from drinking water treatment processes have been considered when selecting the parameters. Determining the testing frequency of these parameters is also required which may take into consideration water age.

For example: To determine effective disinfection in a chloraminated system a water supplier implements monitoring of the following:

- Weekly testing for monochloramines – to ensure adequate disinfection residual is maintained throughout the water sampling locality.
- Weekly testing of total chlorine – to monitor monochloramine and total chlorine ratio to address risks of formation of undesirable taste and odour chloramine compounds.
- Weekly testing for free ammonia – to assist with the amount of free ammonia to be dosed during chloramination to minimise free ammonia levels in the water sampling locality and the risk of nitrification.
- Monthly testing for nitrates and nitrites – to address the risk of nitrification

Related information

DHHS, Guidance – Risk Management Plans: Regulation 8

DHHS, Guidance – Drinking Water Quality Standards: Regulations 12,13,14,15

NHMRC, NRMMC (2011) *Australian Drinking Water Guidelines* Paper 6 National Water Quality Management Strategy. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

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