

Document Owner: Manager Customer Planning

WWA-PM.002.24 Water Sampling and Maintenance of the Chain of Custody

Scope/Purpose: Sampling may be undertaken as part of an investigation or routinely to demonstrate compliance. Correct sampling techniques are key to ensuring that the water does not become contaminated.

Hazard Indicators



Personal Protection



Health and Safety Information

- Health and Safety documentation.
- Generic Traffic Management Plans or site-specific Traffic Management plan.
- Hazardous Waste

Operation's & Maintenance Documentation

- Corridor Access Requests (CAR) and WIP Permits (site specific or generic/global)
- Service plans (B4uDig)
- Design drawings
- Site plans
- Notification Calling Cards

Customer Information (Confidential)

Blowback Customer List
Priority Customer List

Priority Customer Categories

- Schools and Childcare
- Commercial premises
- Hospitals
- Aged Care Facilities
- Correction Facilities
- Military Installations
- Oil and Gas Refineries

Emergency Procedure / Escalation

- Make "Site Safe" and isolate risks to people or property with resources at hand

Escalate if extra resources required or problems occur!

- Escalate to Team Leader and inform of the issues faced and/or expected resources required if necessary.

Additional Documentation

- Specialised equipment needed – Sampling containers
- Fulton Hogan Work Instruction for Disinfection of Water Systems
- NZQA Unit Std 17890 Understanding Sampling and Site Analysis for water treatment

Required Skills, Competencies (Qualifications and/or Certifications)

Competent persons only, trained in sampling

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Standard Operating Procedure

Required Equipment

Equipment and Information	Details
Fully Equipped Vehicle	Ensure vehicle, plant, equipment and materials appropriate to the day's work schedule are available.
Vulnerable & Priority List	Check Vulnerable and Priority List for customers in affected area.
Specialist Equipment	Specialised equipment needed – Sampling equipment including cool storage, laboratory forms, bottles (ensure have sodium thiosulphate added), disinfection equipment, portable FAC meter. Sampling plan (see notes below if designing a sampling plan). Ensure specific site access requirements (site keys etc).

Prepare to do the work

Action	Action Details
Pre Start Process	Complete the Daily Pre Start: <ul style="list-style-type: none"> - Include Hazard ID - Include Pre-Start Tailgate Meeting Undertake all tasks required in the Generic Planned Maintenance SOP
Compliance	Traffic Management Plan - Where required, TMP to be in place prior to work starting. TMP to be accessible on site
Notification	If required to access sampling sites
Laboratory notification	Notify laboratory (number of samples and likely time of delivery) Check delivery times required for test samples and conditions for storage and delivery.

Perform the work

Action	Trade	Action Details
Bacteria Sampling Tap Selection - Sampling may be from dedicated installed taps (attached directly to street mains and contained in locked cabinets) or from suitably selected consumer taps	Serviceperson	Tap selection: Choose a tap close to the main – is it suitable? <ul style="list-style-type: none"> • Look above – clear from overhanging trees, dripping gutters etc • Look for evidence of animal activity around tap • No obvious sources of contamination (eg. not public toilets) • Check for overgrown vegetation around the tap • Tap is 1- 1.2m above the ground – out of the splash zone • Remove any hoses, fittings Select a tap close to the point of supply (eg front garden tap), not post any onsite storage, unless specific reason to sample there. Flush tap for 2-3mins (this ensures you are sampling water from the mains rather than what has been sitting in the pipe)
Sterilise Tap	Serviceperson	Metal taps <ul style="list-style-type: none"> • Check area immediately surrounding tap to ensure no danger of setting flammable material alight. • If sample tap is in a pit or chamber check there are no gas mains in the vicinity • Light gas burner or gas torch. • Directly flame the area around and inside the tap – continue to flame for 15 to 20 seconds • Run tap for approx. 1 minute before taking sample

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Action	Trade	Action Details
	Serviceperson	<p>Plastic taps (or other material likely to be adversely affected by heat)</p> <ul style="list-style-type: none"> Spray disinfectant solution (should comprise of 70% methylated spirits, 30% water and not more than 6 months old) on the area immediately around and inside the outlet of the tap. Alternatively use alcohol wipes. Leave disinfectant solution on tap for 1 to 2 minutes. Turn tap on and run to ensure residual disinfectant is washed away.
Labelling sample bottle/ chain of custody	<ul style="list-style-type: none"> Serviceperson 	<ul style="list-style-type: none"> Label sample bottle prior to filling, include on the label a unique field sample number that is traceable back to you as the sampler, The following details should be recorded on the Chain of Custody from the laboratory: Name of sample collector, Date and time of collection, Location of site, Type of sample (e.g. potable water, groundwater, surface water), Drinking Water Online (DWO) Registration codes
Fill Sample Bottle	<ul style="list-style-type: none"> Serviceperson 	<ul style="list-style-type: none"> Set tap to a flow rate suitable to fill the bottle without splashing Remove the lid of the sample bottle, holding the lid facing downwards. Keep the lid in your hand in this position. Do not invert the lid or place it on another surface. Fill the sample bottle by running water directly into the bottle, avoiding contact between the tap and the mouth of the bottle. Fill to the level indicated or ensure you leave head space to allow for sample mixing in the laboratory. DO NOT OVERFILL. (If the bottle is overfilled, the sample must be taken again using another sterilised sample bottle). Firmly replace the lid on the bottle. Place the sample bottle directly into the chilly bin or portable refrigerator. Do not freeze samples. If Temperature blank required – Fill at the first sampling site. Place temperature blank in the centre of the chilly bin so it will sit between sample bottles. Alternatively a temperature data logger from the lab may be used. Turn off tap and secure site before leaving (Note any requirements to drain sampling points during cold winter months) If at any point during sample collection you believe the sample may have been exposed to potential contamination, another sample must be taken using another sterilised sample bottle
Treatment plant sampling	Serviceperson	Complete as above - sample from inlet/outlet pipes as close as possible to treatment plant. If contact time required for disinfection treatment, sample after reservoir.
Sample Delivery	Serviceperson	Deliver samples to laboratory or courier. Testing should ideally start within six hours of sample collection or at the outset within 24hrs.

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Action	Trade	Action Details
Sample Preservation	Serviceperson	Sample bottles must be kept in a dark container, not be frozen (can be placed in fridge overnight at a temperature not exceeding 5 degrees C) and must arrive at the laboratory at a temperature not >10 degrees C or not higher than the temperature of water at time of collection.
Chain of custody	Serviceperson	Ensure Chain of Custody form has details of all the samples collected, sign. The laboratory will complete and retain the Chain of Custody form confirming the condition of the samples on receipt.
Sampling for specific pathogens (eg. protozoa, campylobacter)	Serviceperson	Specific bottles and larger quantities of water may be required. Sampling requirements should be determined with the water supplier and the analysing laboratory prior to sampling.
Close Out	Serviceperson	Confirm laboratory notification process if a transgression.
		Highlight any problems with sampling points that need to be addressed
Review results	Serviceperson	Review results when available (including total coliforms) and compare with past results for trends. Action if required.

Useful Information	
Confirming registration codes	Ensure that sampling forms have correct Registration/Drinking Water Online (DWO) codes for source, treatment plants and distribution zones (currently available on https://www.drinkingwater.esr.cri.nz/)
'False Positives'	Any occurrence of E.Coli counts, with respect to compliance with the DWSNZ, cannot be discounted and blamed on sampling just because an initial investigation finds no likely cause within the distribution or treatment systems. Taking care in sampling is therefore paramount, if there is any doubt or concern that a sample may have been contaminated – take another sample!
Total coliforms	DWSNZ require that E.coli and total coliforms are both reported. There is no compliance criteria for total coliforms but they are a useful tool and can be used as an indicator of both treatment efficacy and the integrity of the distribution system. Generally total coliforms are environmental in origin associated with water, soil and vegetation. Total coliforms would not be expected in 'Secure' groundwater sources. In samples from a treatment plant the treatment steps should eliminate all coliforms and the presence of any total coliform bacteria in water leaving a treatment plant shows inadequate treatment and should be investigated immediately. In the absence of E.coli, the presence of total coliforms within the distribution are probably not of direct public health concern. However their presence may indicate a potential route of entry and therefore issues with the integrity of the network. Any sudden change in coliform levels within the distribution might indicate problems in either the treatment plant or within the distribution network and should be investigated.
Responding to notification of microbiologically contaminated water	The water supplier should have a contingency/incident plan for responding when a transgression (presence of E.coli) is found (this should be included in the WSP). Ideally there should also be a contingency/incident plan for responding to total coliforms at a level considered unusual. Prior training should have been given in response plans and ideally exercising of the planned responses.
	In broad terms the transgression response flow charts in the DWSNZ should be used (Figure 4.1 for a treatment plant transgression and Figure 4.2 for a transgression in the distribution zone).

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	<p>In general terms the following should be undertaken:</p> <ul style="list-style-type: none"> • Immediately investigate the treatment plant operation and confirm that the plant is operating within the target limits assigned by the Critical Control Points (CCPs). Has anything unusual occurred? Has source water quality changed, inspect intake? Weather? Any other servicing/maintenance undertaken? • If distribution failure only and clear sampling at the TP - Review any activities you are aware of in the distribution. Inspect any reservoirs/tanks and any 'high risk' back flow preventers. Check FAC levels across the distribution. With your initial findings, in conjunction with council/water supplier, consider flushing or additional chlorination. • Ensure all steps in the investigation and actions taken are well documented (including times). • Resample as required by DWSNZ, widen sampling locations depending on initial pattern of results. • If initial results are across all of the supply or >10MPN then a Boil Water Notice will probably be issued immediately.
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Considerations in Designing a Sampling Plan

Sampling frequencies for bacterial compliance are based on the population served. Using the DWSNZ and selected compliance criteria determine the minimum number of samples required to be taken. Ideally suppliers should aim to be sampling above the minimum requirements. Take special note of the requirements for 'days of the week' and maximum interval between samples. DWAs will potentially give an exemption for small isolated supplies where travel times and location of laboratories may present difficulties in covering the required range of days. Drinking Water on Line includes a sampling scheduler to assist in determining sampling schedules. If changes are made (e.g. to lessen sampling over a holiday period) ensure that minimum days of week and interval are maintained.

In selecting sampling points for the monitoring of a distribution system it is important that the points chosen represent the water being supplied to the consumer and give a comprehensive coverage of the network. Points of high draw off should be featured, as should extremities of the system, where dead-ends occur, and areas where breaches are more likely, e.g. reservoirs, low usage areas where the FAC may have dissipated, old pipework and areas of low pressure.

Water suppliers should consider installing special sample taps off a short link from a watermain, rather than using consumers' taps. This will overcome problems such as accidents while flaming, problems with access or obtaining a positive result because the (perhaps dirty) tap was not flamed adequately. It is recommended that there be 2–4 times as many sites as the minimum number required, and that these are rotated on a regular basis. At least one site should be sampled every sample round in order to indicate trends, especially if FAC is measured at that site as well. The extra sites will allow good coverage of the distribution system. Ideally, sample sites should be shown on a sample map, with instructions about how to find them, and must be able to be recognised unambiguously. If the sample is collected from a house or other situation where there is more than one tap, the tap to be used must be indicated clearly and should be the tap closest to the point of supply (toby).

Reservoirs should also have dedicated sampling taps or it may be acceptable to sample the nearest consumer tap. If samples have to be collected by dipping (reservoir), special sampling equipment that can be sterilised must be used. In choosing taps to sample from, avoid those that are leaking or have attachments or a hose that can't be easily removed (see tap selection above).