

How to Take a Routine Bac-T Sample



www.map-inc.org



Midwest Assistance Program Inc.

PO Box 81 – 212 Lady Slipper Avenue NE
New Prague, MN 56071
952.758.4334
Fax: 952.758.4336
map@map-inc.org
www.map-inc.org

Midwest Assistance Program provides technical assistance and training to small, rural communities. Our goal is to facilitate improvements in water, wastewater, solid waste management and community development to improve the health, welfare and well-being of residents in small communities.

Why Take a Water Sample?

A water system operator's first priority is to provide safe drinking water to the public that system is serving. The easiest way to ensure that the water is safe for consumption is through bacteriological testing. A good bacteriological testing program will accomplish three things:

- 1) Prevent the spread of water borne diseases
- 2) Limit the liability exposure for the water system
- 3) Help identify system problems

Water testing may appear to be rather unimportant and boring. This is far from the truth, water testing is extremely important. If sampling is done correctly, it will prevent illness or even death. IT'S ALSO THE LAW.

The Environmental Protection Agency (EPA) and your state drinking water regulatory agency require that all public water supply systems sample the water that is provided to the public on a regular basis.

When to Sample

EPA and state drinking water agencies require that all public water supply systems sample their water on a regular basis for bacteriological growth. The number of samples that are required each month is determined by the population served.

Regardless of the system size, there are certain general principles that should be applied.

- 1) It is best to take the samples at the same time each month
- 2) Select a time that is early in the month (First two weeks)
- 3) Select a sampling day early in the week (Monday or Tuesday)

Why take the sample the same time each month?

Sampling the same time each month assists in long-term planning and ensures that enough time is allotted to perform the sampling properly. It will also help other operators keep your sampling schedule up-to-date in case you are not available to take the sample.

Why select a time that is early in the month?

Sampling early in the month ensures the operator enough time to resample if a sampling error occurred or a bad sample was detected. The operator would have time to be notified by the laboratory and ship a new sample or samples for testing. Sampling is recommended within the first two weeks of a month.

Why select a day early in the week?

Sampling early in the week ensures that the sample, when shipped, will arrive at the laboratory during the mid part of the week. If a sample were shipped later in the week it may arrive over the weekend when there may not be anyone to begin the analysis. Do not sample when a holiday occurs during that week. Samples must begin the analysis process

within 30 hours of being collected. Samples over 30 hours old cannot be used for compliance purposes.

Shipping the Sample to the Laboratory

Talk with your local postmaster when determining the best way to send the sample to the laboratory. In some small communities, the public mail service may not be fast enough. Ensure that the sample will reach the laboratory within 30 hours from time of collection. Ask the postmaster when the mail leaves the post office. An operator may not want to collect the sample at 8:00 in the morning if the mail does not leave the post office until 4:30 in the afternoon. Private shipping services may be an effective alternative.

It may be best for the system operator to personally deliver the samples to the laboratory or to the nearest shipping service that will ensure 30-hour delivery to the laboratory.

Where to Sample

The Coliform Rule requires that each water supply system develop and follow a written sampling site plan. Each plan must specifically identify sampling points throughout the distribution system. Sampling plans must be approved by the regulatory agency and it will be necessary to check with the regulatory agency to determine if any additional information is needed before submitting the plan. The sampling plan can only be changed with permission from the regulatory agency.

The owner or operator of the water system prepares the sample site plan. A sample site plan shows, in detail, the water source, treatment, storage, distribution system and pressure zones. The site plans are used to identify where the routine and repeat samples will be collected. Specified numbers are assigned to each site and used on the monitoring report forms sent in with water samples.

Most sampling sites are rotated every month. This ensures that the entire distribution system is being monitored on a rotating basis. Each sampling site should be marked on the map. The address and the number of the sampling point should be labeled on the map. If repeat samples are necessary, the sample sites should also be marked on the map and labeled repeat sample locations. The map should also show three alternative sampling sites, in case of emergencies.

Example 1:

If a water system were required to submit one bacteriological sample per month, the sample site plan would have a total of three routine sampling sites indicated by a number and repeat sample sites for all three sampling sites. There would also be three alternative sampling sites labeled on the site plan.

Example 2:

If a water system is required to submit three bacteriological samples a month, the site plan would have a total of fifteen routine sampling sites indicated by a number and repeat sample sites for all fifteen sampling sites. There would also be three alternate sampling sites labeled on the site plan.

Sampling site plans are extremely helpful when discussing monitoring results with the regulatory agency, identifying monitoring problem areas, and conducting sanitary surveys and other inspections.

The Sampling Site

Distribution System-Wide Selection

Sampling locations should be chosen to systematically cover the entire distribution system. Trouble spots, such as dead ends or low flow areas, **SHOULD NOT** be avoided. This can reveal localized contamination.

Indoor Faucets

Indoor faucets in a clean area are the best sites for sampling. Ideally, the faucet is not connected to a water softener, in-line filtration units, or hot water heater. These types of connections would not supply the water that is representative of the water in the distribution system. Avoid sampling from faucets that have swiveling heads, faucets with the hot and cold water under the same valve, or faucets with leaking valves. Faucets with aeration can be used if the aerators are removed.



Systems should be disinfected after repairs or new plumbing has been installed prior to collecting bacterial samples. Samples may not be collected from a disinfected system until 72 hours have elapsed since the disinfectant was flushed from the system.

Some circumstances may require that the water system install a separate faucet that would be used only for water sampling needs.

Other Types of Faucets



A representative sample may be taken from other types of faucets if a good sampling technique is used. Chances of contamination are greatly increased because they can introduce contamination into the sample.

Mixing faucets (faucets where hot and cold water come through same tap) should not be used because water passing through the “hot” water side may not be representative of the water in the distribution system.

Water in the hot water tank is more likely to grow bacteria because the warm water may promote growth.

Threaded taps should be avoided as a sampling site. Bacteria can grow in the grooves of the threads. NEVER take a sample from taps that are clearly contaminated (scum or build-up around tap and base of faucet).

Avoid collecting samples from the following faucets:



1) Faucets supplying dishwater in cafes, coffee shops and other eating establishments are higher-than-usual possibilities for bacterial growth.

2) Swing spouts - bacteria can grow where the faucet pivots.

3) Faucets positioned close to the bottom of the sink or the ground.

4) Leaky faucets or faucets that allow water to seep around the valve stem.

Outdoor Faucets

Try not to use outdoor faucets because of the possibility of contamination on the surface and interior of the faucets. Frost-free hydrants should not be used either. The chance of contamination is **greatly** increased by the elements of Mother Nature, animals, children and dust coming into contact with the faucets.

If a sample must be taken from an outdoor faucet, use extreme caution. Avoid dust, splashing, rain, snow and other sources of contamination. The faucet should be disinfected and flushed for a period of time to ensure disinfectant has been removed.

It is becoming extremely difficult to locate the ideal faucet and conditions. A representative sample may be taken from other types mentioned above, if a good

sampling technique is used. Remember that if one is used, your chances of contamination are greatly increased.

The Sample Container

Most laboratories supply sterilized and chemically pretreated containers to be used for taking water sample, along with an approved mailing carton, forms and a cold pack to keep samples cool.

Use only containers and caps that have been supplied by the laboratory that will be conducting the water testing. And use only sample containers that were recently sent to the water system. Containers that have been stored for a period of time could have increased chances of being contaminated.

The container should have a wide mouth and capacity of at least 125 ml. Be careful handing the caps as they must be sterilized just as the containers are. Always examine sample containers when they are received from the laboratory. If any of the caps are loose, off or cracked discard the container and cap and call the laboratory for additional sample containers.

Be sure that all sample containers have labels or lab forms. Each container should have a label to write the date, time, location, sampler's name, water systems name and PWSID. Also send the necessary forms with the samples to the laboratory to ensure proper analysis of the sample.

Disinfecting the Sampling Site

It is always necessary to disinfect the sample site before the sample is taken. The preferred disinfection technique is to wipe the surface of the fixture with alcohol or bleach, or spraying alcohol or bleach onto and into the faucet opening. Allow alcohol or bleach to air dry before flushing the faucet. Remember when using alcohol or bleach; ensure that the fixture has adequate time to flush. Any residual from the alcohol or bleach will give an invalid sample result.

Heat is another disinfecting method although not recommended. The sampling fixture can be heated with a torch to disinfect it. This technique may remove any local contamination so that the operator may get a representative sample of the water in the distribution. If heating or flaming the fixture is done, remember that this may create a fire hazard. Also, the heat from this process could melt any plastic fixtures, mar the finish of the fixture, or damage the valves and seats. If this happens the utility department may be liable for damages.

Water Sampling Procedure

Step 1

Remove any attachments on the faucet. Look for aeration devices, hoses, water purification devices and screens.

Step 2

Disinfect the inside and outside of the faucet to remove unwanted bacteria before turning on the water.

Step 3

Turn on the water and allow it to run in a steady stream for 5 to 6 minutes. This will ensure that the line is flushed sufficiently to get a representative sample of the water from the distribution system. Additional time might be needed if the water tap is located a long distance from the main distribution line.



Always sample the cold water, never sample hot water.

Step 4 (USE EXTREME CAUTION)



After the lines have been flushed, open the container. Wearing latex gloves

will reduce the chance of contamination from the sampler.



Do not set the container cap down! Hold it with fingers away from the edge and away from splashing water. DO NOT hold the lid upside down.

Do not rinse the container, and do not allow the container to overflow. This may wash out any de-chlorinating agent provided by the lab. If this happens, discard the container and take a new sample using a fresh container.

Step 5

Grasp the container near the bottom (see picture above). NEVER touch the inside of the cap and the container.



Quickly position the container under the flowing stream of water. Ensure that the water stream is maintaining a constant stream. Also, be sure water from the outside of the faucet is not dripping into the bottle during collection. **DO NOT** allow the container or cap to touch the faucet or tap.

Step 6

Fill the container to the neck or indicated fill line. This will ensure that the proper amount of water has been collected. 100 ml is the minimum the laboratory must have to conduct a test. **DO NOT** over fill the container. Never allow container to overflow!



Step 7

Affix the cap on the container as soon as it is filled and removed from the flow. Check to make sure that your container is properly sealed, as the sample will leak if not properly sealed.

Step 8

Turn off water and re-attach any fixtures or attachments that were removed.



Step 9

Using a waterproof ink pen, label the sample container. The label should have the date and time when sample was taken, location of sample site and sampler's name and PWS number. Some samples also need to have the chlorine residual and any preservatives that were added to sample.

Complete the required sampling forms and chain of custody forms that the laboratory sent with the sample containers. These sampling forms require a public water supply identification number, the time and date the sample was taken, the location, sample container size, the samplers name, address and telephone number. Plus the results of any field-testing completed on the sample, such as pH, chlorine residual and temperature. The sampling forms must indicate what type of testing (monthly Bac-T, VOC's, Lead and Copper.) is needed for each sample container. Take note of anything unusual about the sample (strong odors or color) and write it down on the form, also.

Step 10



Place the filled container, cold pack and completed forms into the shipping container that the laboratory sent.

Make sure your address and the laboratory's address is correctly labeled on the shipping container.

Samples must begin the analysis process, at the laboratory, within 30 hours from the sampling collection time.

Step 11

CLEAN THE SAMPLING SITE!

It's important to leave the sampling site clean for reducing contamination of future samples and maintaining good public relations with your customers.

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