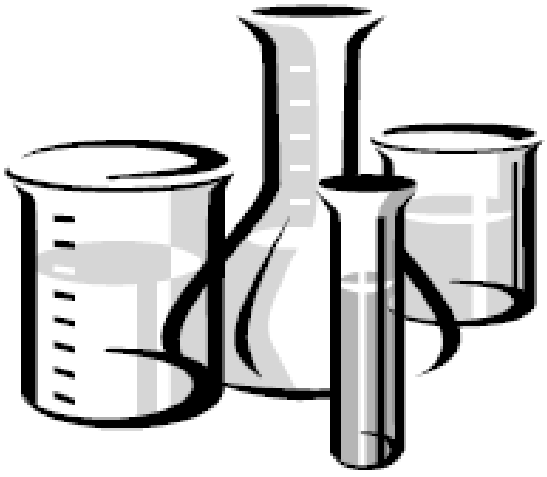
Sample Collection Manual Distribution System

For Drinking Water

2012



Kentucky Rural Water Association

Water System Responsibilities

In general, the water system is responsible for the following tasks in terms of monitoring:
• performing field tests (if applicable),
• properly collecting all necessary samples in compliance with state and federal regulations,
• completing sample paperwork,
• submitting samples to certified or accredited laboratories within allowed holding times,
• collecting samples for confirmation (if necessary) and
• providing payment for analyses,
• keeping records of sampling results.
Although the water system may designate another party (such as the certified operator) to submit samples, it is ultimately the responsibility of the system owner to make sure the samples are taken properly and the results are submitted to the state program.

If samples are incorrectly taken or preserved, analyzed by uncertified (or unaccredited) laboratories, submitted beyond appropriate holding times, submitted with incomplete or inappropriate paperwork, or taken from inappropriate sampling sites, then the samples will be deemed unacceptable and rejected. Failure to submit valid test results to the state program within the required compliance period (because samples have been rejected by the laboratory and not analyzed) may result in a monitoring violation.

General Sampling Requirements

Before collecting any samples, all samplers should receive thorough training in proper sampling protocol. This training should include segments on proper procedures for storage and filling of sample containers, handling of preservatives, safety protocols, cleaning of sampling and field equipment, disposal of excess preservatives, and packaging and shipping requirements.

Measuring devices, such as pH or conductivity meters, used for field monitoring must be maintained and calibrated daily following the EPA-approved analytical methods and the manufacturers' instructions. The calibration standards used must be within their expiration dates and free of suspended matter. Probes must be washed with deionized water after each use and stored according to instructions. Other equipment items used to collect samples also must be rinsed with deionized water and kept clean between sampling events to prevent contamination of the samples.

Appropriate sample containers must be used. Generally, your laboratory will provide sample containers that have been specially prepared, depending on the end use (e.g., bacteria bottles are sterilized, metals containers are acid washed, glass vials used for VOCs are washed and oven-dried, and bottles used for SOCs are washed and triple-rinsed with organic solvents). These containers should not be opened until the actual sampling event. Sampling containers that have been compromised in any way, e.g., by being touched on the threads or the interior surfaces, must not be used.

Standard Operating Procedures (SOPs) for collection of water samples including sample container types, preservation methods, holding times, and shipping procedures.

Laboratory Requirements

Only laboratories certified (accredited) by their resident state's laboratory certification (accreditation) program or state/federal laboratories certified (accredited) by EPA are allowed to perform compliance

testing for microbiology, inorganic, organic, and radiochemistry parameters. Prospective clients should make sure that the laboratory, which will analyze their samples, is certified (accredited) for the specific parameters involved. Turbidity, chlorine residual, and pH monitoring are some of the exceptions to the laboratory certification (accreditation) requirements for performing analyses. These tests can be performed by any person acceptable to the state.

State principal laboratories or laboratories certified (accredited) by the state should supply containers, preservatives, and any trip blanks (field reagent blanks) for sampling. The containers, blanks, and preservatives used must be free of contaminants at the detection levels of each parameter of interest.

Number and Frequency of Drinking Water Samples

The number of drinking water samples to be collected is determined by the federal agencies and state drinking water programs. Other considerations when establishing a sampling schedule include: contract laboratory location, staffing, routing, and workload. Regulations require a minimum number of samples for each parameter but additional samples may be considered to help meet compliance values.

Sampling Locations

The location for sample collection depends on:
- the water source,
- the analyses to be performed,
- the purpose for the testing and
- regulatory requirements.

Samples may be collected from the source prior to treatment, at the point of entry (before or after treatment), at the point of use (at the tap), or within the distribution system. For example, volatile organic compound (VOC) samples are usually taken at the entry point of the distribution system. (Total trihalomethane samples are taken at points within the system as determined by the Stage 2 Disinfectants and Disinfectant Byproducts Rule.) Lead and copper samples are taken at the point of use.

Paperwork Submitted with Samples

Appropriate paperwork must accompany all samples to the laboratory. Each state requires specific information to identify the sample, the sampling time, and the sampling location. Forms for providing this information can be obtained from your state program. As a reminder, the submittal of any paperwork that is incomplete or inaccurate will result in the rejection of the sample by either the laboratory or the state program.

Analytical Methods

When samples are submitted to certified laboratories for analysis, the water system must notify the lab that the samples are for drinking water compliance purposes to ensure that appropriate methods are used and that the data are transmitted to the state drinking water program. (Only EPA-approved methods of analysis can be used.)

Quality Control Measures

Field duplicates. It is important for samplers to demonstrate proper sampling techniques by taking field duplicate samples on a regular basis. Field duplicates are two samples taken immediately one after the other from the same source in separate sample containers. Both will be analyzed by the laboratory, which will calculate the Relative Percent Difference between the results. This is a measure of the overall precision of analysis. Field duplicates should be collected for least 10% of all samples and more often when only small batches of samples are taken per sampling event.

Extra volumes for lab QC measures. Laboratories routinely perform quality control procedures, such as the analysis of spiked samples and the analysis of laboratory duplicates, which require extra volumes of samples. For this reason samplers are encouraged to take extra sample volumes for at least 10% of their sampling activities so that the laboratories can perform these vital QC procedures. (These extra volumes should be provided in addition to the field duplicates mentioned in the previous paragraph.)

Sampling and Safety Tips to Help Meet Requirements

Faucet aerators and screens should be removed before taking samples (except when taking lead and copper samples). Anything attached to the end of the faucet, e.g., hoses or filters, should be removed before taking samples.

Ice is not a packing material. Glass sample bottles should be wrapped in bubble wrap or other protective material to prevent breakage during shipping.

Chemical fumes from any source can potentially contaminate samples. Whenever sampling, the sampler should be conscious of his/her surroundings. For example, samples should not be taken near motor exhaust from any pump or vehicle because it will contaminate them. In addition, if sampling for volatile organic compounds (VOCs), it is not advisable to refuel vehicles either on the way to the site or while the samples are being transported to the lab. Smoking and smoking areas should be avoided because tobacco smoke contains VOCs that can be absorbed by water. Other things to avoid include hairspray/mousse, cologne/perfume, or breath spray/mouthwash for the same reason as tobacco smoke.

Sample containers will be contaminated if the inside of the cap is touched or if the septum of a radon or VOC vial is reversed. If this should occur, the container must not be used. All containers must be kept closed until ready for use.

It is highly recommended that safety eye protection and gloves be worn while collecting samples. Such protective devices are readily available. **Many of the chemicals used to preserve samples are highly acidic or caustic. They can cause severe burns to eyes, skin, and clothing if they are splashed or spilled.** Sometimes these chemicals are added to the samples in the field. However, they may already be in the empty containers when they are obtained from the container provider.

The gloves of choice should be phthalate-free made of nitrile. Nitrile gloves provide the best overall protection from most chemicals while still allowing dexterity. Many other types of gloves, including some latex gloves, contain phthalates, which can contaminate samples for synthetic organic compounds (SOCs). Only phthalate-free gloves should be worn when collecting samples for SOCs. If

such gloves are not available, the sampler must remove all gloves and wash his/her hands before collecting the samples (without gloves).

The sampling point(s) of each water system should be evaluated to determine the actual flushing time needed to remove the stagnant water before samples are taken. This is determined by measuring the temperature with a thermometer. Samples should not be taken until the temperature has stabilized.

A ballpoint pen or waterproof marker should be used when writing on sample tags to reduce bleeding of ink. If icing is required, samples should be placed on ice immediately after collection. When the weather is very warm, it may be advisable to pre-chill the samples in a refrigerator prior to packing on ice, this avoids depleting the ice to drop the temperature so it lasts longer. Placing filled sample containers in zip lock plastic bags prior to icing helps with sample organization, avoids wet sample tags, and results in less confusion when the samples reach the laboratory.

Well pits, ditches, and below-ground pumping stations, pipe raceways and vault systems are extremely dangerous sources from which to collect samples. Before entering confined spaces of any type, samplers must comply with the requirements of 29 CFR 1910.146, Permit Required Confined Space. Specially trained samplers and backup teams are required.

In general, preserved water samples are known environmental samples and are typically exempt from DOT and IATA (aircraft) shipping requirements. However, these regulations must be observed when shipping the preservatives or pre-preserved bottles via ground or air.

Sample containers that have preservatives in them should be labeled accordingly. The specific chemicals should be identified. This applies to empty containers to which preservatives are added before use as well as containers filled with sample.

Additional containers are required when sample aliquots are collected for Matrix Spike and Duplicates.

MICROBIOLOGY (Bac-T) - SOP

READ INSTRUCTIONS CAREFULLY. LAB MAY REJECT SAMPLES IF ALL INSTRUCTIONS ARE NOT FOLLOWED. CONFIRM SCHEDULING AND INSTRUCTIONS WITH LAB BEFORE SAMPLING. WASH HANDS, WEAR SAFETY GLASSES, AND CLEAN NITRILE GLOVES.

1. **Applicable Parameters:** Total Coliforms, Fecal Coliforms, Escherichia coli, Enterococci, Heterotrophic Bacteria (HPC), Male-Specific and Somatic Coliphage (See 40 CFR Part 141 for the most up to date list of approved methods.)

2. **Sample Location:** A state-approved location. If one has not been designated, select an appropriate location that is representative of the distribution system. Avoid threaded faucets.

3. **Sampling materials:**
   (a) Containers**:** Sterile glass or plastic bottles with a minimum capacity of 125mL.
   (b) Preservative: Sodium thiosulfate in powder or tablet; ice
   (c) Other: Labels, marker, safety glasses, and clean disposable nitrile gloves.

4. **Safety Concerns:**
   (a) Before collecting samples, all samplers must receive thorough training in proper handling of chemical preservatives and safety protocols so they are aware of the associated dangers and to determine appropriate safety precautions and first aid, should it be necessary.
   (b) Sample bottles that have preservatives in them should be labeled accordingly. The specific chemicals should be identified.

5. **General Sample Collection Procedure:**
   All microbiological parameters:
   (a) Complete sample tag and sample collection form, using waterproof ink. Proper identification, including the date and time of collection must be submitted.
   (b) Avoid undesirable faucets such as swivel-type, or with leaky packing, on janitorial sinks, or near ground level. Remove aerator, screen, and all attachments from the faucet.
   (c) If necessary, a lint free cloth dampened with bleach and water may be used to clean the faucet rim.
   (d) Turn on cold water tap and run for 4 to 5 minutes or until the water temperature has stabilized, whichever is longer. Then reduce flow so that stream of water is no greater than 1/8 inch in diameter.
   (e) Remove container cap. Do not put cap face down or in pocket. Do not allow inside of cap, inside of container or bottle threads to be touched by any object.
   (f) **DO NOT** rinse the bottle or remove any liquid or tablets in the bottom of the container. This may be the preservative.
   (g) Fill container, ensuring that at least 100mL of sample are collected. Many bottles have a fill line. Leave an airspace above the fill line. Do not let water drip from hand into the bottle.
   (h) Carefully replace cap on container and tighten securely. Replace dust cover if applicable.

6. **Shipping and handling:**
   (a) Complete chain-of-custody form if requested by lab or water supply program.
   (b) Keep sample in closed chest.
   (c) Samples should be kept between 0º C and 10º C (**do not freeze**).

(d) If using wet ice to maintain temperature, it is best to contain the ice in plastic zipper locking bags so as not to contaminate the sample with the melting ice.
(e) Deliver samples to lab the same day if possible.

Microbiological holding times.

Parameters	Holding Time
Total Coliforms, Fecal Coliforms, Escherichia coli, Enterococci	30 hours
Male-Specific and Somatic Coliphage	48 hours
SWTR Total Coliforms, Fecal Coliforms, HPC	8 hours
Heterotrophic Bacteria (HPC)	8 hours

Water systems must strive to keep their drinking water free of disease causing organisms known as pathogens. Diseases caused by waterborne pathogens that can be found in all water supplies include: typhoid, paratyphoid (types A and B), cholera, dysentery, and hepatitis. The two protozoa that are found only in surface water supplies (*Giardia* and *Cryptosporidium*) form cysts and spores that protect them from cold temperatures. Because of this protection, they are much more difficult to kill with disinfectant chemicals.

Most of these diseases are caused by pathogenic bacteria. The exceptions are Hepatitis, Giardia and Cryptosporidium. Hepatitis is a virus. Giardia and Cryptosporidium are both protozoa. It is very difficult to identify any one particular pathogen by laboratory testing. To make testing more reliable and economical, the lab tests are designed to identify a large family of bacteria that are related to the disease causing bacteria, rather than identifying each type of pathogen.

Coliform bacteria are enteric bacteria. This means that they are found in the intestinal tract of warm-blooded animals, including humans. These bacteria do not cause disease but are necessary for the digestion of food. The waterborne pathogens are also enteric organisms. Some of the bacterial pathogens are part of the coliform family.

If coliform bacteria are present in the water supply, pathogens may also be present. The coliform bacteria live longer in water and are easier to detect by laboratory testing. This is the reason the coliform group has been chosen as the indicator organism for waterborne pathogens. If coliform bacteria are not present it is assumed there are no pathogens present either.

The coliform family has been divided into two groups. Results may come back as either total coliform positive (TC positive) or fecal coliform positive, or (FC positive or *E. coli* positive.) Total coliform positive means that no human coliform are present. Fecal coliform positive indicates the presence of *E. coli*, which means there is a greater chance of pathogens being present. The laboratory tests for coliform include the MPN method, the Membrane Filter test, the Colilert test, and the presence-absence test.

There are times when water systems need to collect microbiological samples for reasons other than monitoring compliance. New water lines and lines that have been repaired should be tested. Wells that have been disinfected should be tested. These samples must be identified as something other than a routine or compliance sample so they will not count as a violation against the system if they are found to be positive. This is done by checking “Special Sample” on the form.

Lead and Copper (in Residential Housing) - SOP

READ INSTRUCTIONS CAREFULLY. LAB MAY REJECT SAMPLES IF ALL INSTRUCTIONS ARE NOT FOLLOWED. CONFIRM SCHEDULING AND INSTRUCTIONS WITH LAB BEFORE SAMPLING. WASH HANDS, WEAR SAFETY GLASSES, AND CLEAN NITRILE GLOVES.

1. Applicable Parameters: Lead and Copper

2. Sample Location: All lead and copper tap samples should be first draw samples. The water in the plumbing system should have remained motionless for at least six hours before collecting the first-draw sample. Sample should be taken from a kitchen or bathroom sink cold water tap.

3. Sampling materials:

(a) Containers**:** Acid-washed plastic or glass **1 liter bottles** with plastic or teflon cap liners.
(b) Preservative: 1 mL 1:1 nitric acid per liter.
(c) Other: Labels, marker.

4. Safety Concerns: None.

5. General Sample Collection Procedure:

(a) Prior arrangements will be made with the customer to coordinate the sample collection event. Dates will be set for sample kit delivery and pick-up by water department staff.
(b) There must be a minimum of six hours during which there is no water used from the tap the sample is taken from and any taps adjacent or close to that tap. The water department recommends that either early mornings or evenings upon returning home are the best sampling times to ensure that the necessary stagnant water conditions exist.
(c) A **kitchen or bathroom cold water faucet** is to be used for sampling. If water softeners or other treatment devices are used on kitchen taps, the sample should be collected from a bathroom tap that is not attached to a water softener or other treatment device if possible. **Aerators should not be removed prior to sampling.** The opened sampling container should be placed below the faucet and the cold water tap gently opened. The container should be filled to the line marked "1000 mL" or "one liter", and the water turned off.
(d) The sampling container should be tightly capped and placed in the sampling kit provided. The sample kit label should be reviewed at this time to ensure that all information on the label is correct.
(e) If any plumbing repairs or replacements have been done in this home since the previous sampling event, this information should be noted on the label in the space provided. In addition, if the sample was collected from a tap with a water softener or other treatment device, this should be noted as well.

6. Shipping and Handling:

(a) If sample is to be picked up by the local water department personnel, pre-arrange same-day pick up. The sample kit should be placed outside the residence in the location agreed upon so that the water department staff may pick it up.
(b) If homeowner is delivering the sample to the lab, deliver sample to the lab the same day.
(c) All samples should be delivered to the lab as soon as possible after they are collected.

Parameters	Holding Time
Lead & Copper	6 months (14 days is the maximum time allowed before adding the preservative. Must be acidified a minimum of 16 hours before analysis.)

INORGANIC DISINFECTION BY-PRODUCTS & COMMON ANIONS - SOP


READ INSTRUCTIONS CAREFULLY. LAB MAY REJECT SAMPLES IF ALL INSTRUCTIONS ARE NOT FOLLOWED. CONFIRM SCHEDULING AND INSTRUCTIONS WITH LAB BEFORE SAMPLING. WASH HANDS, WEAR SAFETY GLASSES, AND CLEAN NITRILE GLOVES.

1. **Applicable Parameters:** Bromate, Chlorite, Chloride, Fluoride, Nitrate-N, Nitrite-N, Combined Nitrate-plus-Nitrite-N, ortho-Phosphate-P, Sulfate (See 40 CFR Part 141 for the most up to date list of approved methods.)

2. **Sample Location:** A state-approved location. If one has not been designated, select an appropriate location, which is representative of the distribution system. Avoid threaded faucets.

3. **Sampling materials:**
   (a) Containers**:** Pre-cleaned 250 mL plastic or glass bottles (opaque for chlorite).
   (b) Preservative: The anion of interest that requires the most preservation treatment and the shortest holding time will determine the preservation treatment.
   (c) Use sulfuric acid (H_2SO_4 to pH < 2) for combined analysis of Nitrate-plus-Nitrite.
   (d) Use 0.1 mL of 5% EDA solution per 100 ml for bromate (not required for EPA Method 300.0) and chlorite. In general, cool samples to <6^{o}C on ice.
   (e) Other: Labels, marker, pH test strip paper, safety glasses, and clean nitrile gloves.

4. **Safety Concerns:**
   (a) Before collecting samples, all samplers must receive thorough training in proper handling of chemical preservatives and safety protocols so they are aware of the associated dangers and to determine appropriate safety precautions and first aid, should it be necessary.
   (b) "Empty" containers for "nitrate-plus-nitrite" may contain sulfuric acid, which is a very strong acid that causes burns.
   (c) Sample bottles that have preservatives in them should be labeled accordingly. The specific chemicals should be identified.

5. **General Sample Collection Procedure**:
   All Common Anions and Inorganic Disinfection By-Products:
   (a) Complete sample tag and sample collection form, using waterproof ink. Proper identification, including the date and time of collection must be submitted.
   (b) Complete sample tag and sample collection form, using waterproof ink. Proper identification, including the date and time of collection must be submitted.
   (c) Remove aerator, screen, and all attachments from the faucet.
   (d) Turn on cold water tap and run for 4 to 5 minutes or until the water temperature has stabilized, whichever is longer. Then reduce flow so that stream of water is no greater than 1/8 inch in diameter.
   (e) Remove container cap. Do not put cap face down or in pocket. Do not allow inside of cap, inside of container or bottle threads to be touched by any object.
   (f) Follow specific instructions below to collect the parameters of interest.

6. **Bromide, Chloride, Fluoride, Nitrate-N, Nitrite-N, ortho-Phosphate-P, Sulfate**
   (a) No preservation is added.
   (b) Hold bottle at an angle. Fill bottle to shoulder.
   (c) Screw cap on securely.

7. Combined Nitrate-plus-Nitrite

(a) Hold bottle at an angle. Fill bottle to shoulder.
(b) Add 3 mL sulfuric acid to sample.
(c) Screw cap on securely and shake sample.
(d) Remove cap and pour a few drops of sample from bottle into it.
(e) Pour a drop of sample from cap on a pH test strip. If a red color appears, the pH is ≤ 2 and screw cap on securely.
(f) If a red color does not appear, repeat the steps of adding sulfuric acid, shaking and testing the sample by pouring it from the cap on a pH test strip until the pH ≤2.
(g) Do not dip pH paper into sample.
(h) Do not let pH paper touch the inside of the sample container or the cap.
(i) Screw the cap on securely after the pH of the sample has been adjusted to pH ≤ 2.

8. Bromate, Chlorate, Chlorite

(a) Hold bottle at an angle. Fill bottle to shoulder, leaving room for preservatives and mixing. Do not rinse bottle if preservatives have been added prior to collecting the sample.
(b) Add 0.1 mL of 5% EDA solution per 100 mL sample.
(c) If the sample is collected from a treatment plant employing chlorine dioxide, the sample must be sparged with an inert gas (helium, argon, nitrogen) prior to addition of the EDA preservative at time of sample collection
(d) Screw cap on securely.

9. Shipping and Handling:

(a) Complete chain-of-custody form if requested by lab or water supply program.
(b) Keep samples stored at temperatures above 0ºC and less than 6ºC.
(c) Deliver samples to lab the same day if possible.

Parameters	Holding Time
Bromate, Bromide, Chloride, Fluoride, Sulfate, Combined Nitrate-plus-Nitrite-N	28 days
Chlorite, Nitrate-N (chlorinated)	14 days
Nitrate-N (non-chlorinated), Nitrite-N, ortho-Phosphate-P	48 hours

ASBESTOS - SOP

READ INSTRUCTIONS CAREFULLY. LAB MAY REJECT SAMPLES IF ALL INSTRUCTIONS ARE NOT FOLLOWED. CONFIRM SCHEDULING AND INSTRUCTIONS WITH LAB BEFORE SAMPLING. WASH HANDS, WEAR SAFETY GLASSES, AND CLEAN NITRILE GLOVES.

1. **Applicable Parameters**: Asbestos in water (See 40 CFR Part 141 for the most up to date list of approved methods.)

2. **Sample Location:** A state-approved location. If one has not been designated, select an appropriate location, which is representative of the distribution system. Avoid threaded faucets.

3. **Sampling Materials:**
   (a) Container:
   (b) Two Pre-cleaned 1-liter polyethylene or glass bottles.
   (c) Preservatives**:** Keep samples stored at temperatures above 0º C and less than 6º C
   (d) Other: Labels, marker, pH test strip paper, safety glasses, and gloves.

4. **Safety Concerns**:
   (a) Before collecting samples, all samplers must receive thorough training in proper handling of chemical preservatives and safety protocols so they are aware of the associated dangers and to determine appropriate safety precautions and first aid, should it be necessary.
   (b) "Empty" containers for chemistry parameters may contain corrosive or caustic preservatives that cause burns.
   (c) Sample bottles that have preservatives in them should be labeled accordingly. The specific chemicals should be identified.

5. **Sample Collection Procedure:**
   (a) Complete sample tag and sample collection form, using waterproof ink. Proper identification, including the project number and location, and date and time of collection must be submitted.
   (b) Remove the aerator and screen from faucet.
   (c) Turn on the cold water tap and run the water for 4 to 5 minutes or until the water temperature has stabilized, whichever is longer. Then reduce flow so that stream of water is no greater than 1/8 inch in diameter.
   (d) Remove first bottle cap. Do not put cap face down or in pocket. Do not allow inside of cap, inside of container or bottle threads to be touched by any object.
   (e) Hold bottle at an angle. Fill both bottles approximately to the shoulder.
   (f) Replace container cap securely.

6. **Shipping and Handling:**
   (a) Complete chain-of-custody form if requested by lab or water supply program.
   (b) Keep samples stored at temperatures above 0º C and less than 6º C to avoid excessive bacterial or algal growth.
   (c) Deliver samples to lab the same day if possible.

   The following table lists the maximum holding time for the applicable parameters.

Parameter	Holding Time
Asbestos	48 hours

VOLATILE ORGANIC COMPOUNDS (VOCs) and TRIHALOMETHANES (THMs) - SOP

READ INSTRUCTIONS CAREFULLY. LAB MAY REJECT SAMPLES IF ALL INSTRUCTIONS ARE NOT FOLLOWED. CONFIRM SCHEDULING AND INSTRUCTIONS WITH LAB BEFORE SAMPLING. WASH HANDS, WEAR SAFETY GLASSES, AND CLEAN NITRILE GLOVES.

1. Applicable Parameters: Volatile organic compounds, including Trihalomethanes (See 40 CFR Part 141 for the most up to date list of approved methods.)

2. Sample Location: A state-approved location. If one has not been designated, select an appropriate location that is representative of the distribution system. Avoid threaded faucets.

3. Sampling Materials:

(a) Containers: Three pre-cleaned 40-mL glass vials with Teflon septa per sampling location.
(b) Preservatives: 1:1 hydrochloric acid, ascorbic acid, ice or refrigeration. 3 mg sodium thiosulfate for THMs.
(c) Field reagent blanks: The laboratory must provide a pair of field reagent blanks, to accompany collectors, on each compliance monitoring sampling event. **Do not open trip blanks**.
(d) Other: Labels, marker, pH test strip paper, and DPD chlorine field test kit (if water has been chlorinated).

4. Safety Concerns: Caution! Hydrochloric acid is a strong acid, and will cause burns. Caution! "Empty" sample vials may contain acid. Open them slowly and carefully.

5. Sample Collection Procedure: All samples – **Fill three vials** as follows:
(a) Complete sample tag and sample collection form, using waterproof ink Proper identification, including the date and time of collection must be submitted.
(b) Remove aerator, screen, and all attachments from the faucet.
(c) Turn on the cold water tap and run it for 4 to 5 minutes or until water temperature has stabilized, whichever is longer. Then reduce flow so that stream of water is no greater than 1/8 inch in diameter.
(d) Remove container cap. Do not put cap face down or in pocket. Do not allow inside of cap, inside of bottle or bottle threads to be touched by any object.
(e) Follow specific instructions provided in sections 6 or 7 to collect the parameters of interest.

6. Chlorinated Water Supplies
(a) Use vials that have 25 mg of powdered ascorbic acid added to vial by the bottle supplier.
(b) Hold vial at an angle. Fill vial carefully until water is above the vial rim. (This will prevent the formation of an air pocket in the vial). Gently tap the vial to dislodge any air bubbles.
(c) Carefully add 2 drops of 1:1 hydrochloric acid to center of the water surface (i.e., to the meniscus). The acid will sink to bottom of vial, displacing 2 drops of sample.
(d) Carefully hook cap over the top of the vial. The **Teflon side of the septum must be down** (facing the sample). (Teflon surface is shiny.)
(e) Screw cap on securely. Check for air bubbles by inverting the vial and gently tapping the vial. If bubbles are present, remove the cap and repeat step (b). If any sample in the vial is spilled, resample with a fresh vial. (Note: **Samples with bubbles cannot be analyzed**.)
(f) Shake sample for one minute.

7. Unchlorinated Water Supplies

(a) Use vials that have 1:1 hydrochloric acid added to the vial by the bottle supplier.

(b) Hold vial at an angle. Fill vial carefully until water is above the vial rim. (This will prevent the formation of an air pocket in the vial). Gently tap the vial to dislodge any air bubbles.

(c) Carefully hook cap over the top of the vial. The **Teflon side of the septum must be down** (facing the sample). (Teflon surface is shiny.)

(d) Screw cap on securely. Check for air bubbles by inverting the vial and gently tapping the vial. If bubbles are present, remove the cap and repeat step (b). If any sample in the vial is spilled, resample with a fresh vial. (Note: **Samples with bubbles cannot be analyzed**.)

(e) Shake sample for one minute.

8. Shipping and Handling:

(a) Complete chain-of-custody form if requested by lab or water supply program.

(b) Keep samples in closed chest at temperatures above 0°C and less than 6°C and away from direct light and solvent vapors.

(c) Deliver the samples to lab the same day, if possible.

The following table lists the maximum holding time for the applicable parameters.

Parameters	Holding Time
Volatile organic compounds, including trihalomethanes	14 days

HALOACETIC ACIDS (HAA5) - SOP

READ INSTRUCTIONS CAREFULLY. LAB MAY REJECT SAMPLES IF ALL INSTRUCTIONS ARE NOT FOLLOWED. CONFIRM SCHEDULING AND INSTRUCTIONS WITH LAB BEFORE SAMPLING. WASH HANDS, WEAR SAFETY GLASSES, AND CLEAN NITRILE GLOVES.

1. **Applicable Parameters:** Haloacetic acids (See 40 CFR Part 141 for the most up to date list of approved methods.)

2. **Sample Location:** A state-approved location. If one has not been designated, select an appropriate location that is representative of the distribution system. Avoid threaded faucets.

3. **Sampling Materials:**
   (a) Containers: For 552.1, one pre-cleaned 250-mL amber glass bottle with Teflon-lined cap. For 552.2, two pre-cleaned 60-mL amber glass septum vials with Teflon septa.
   (b) Preservatives: Granular ammonium chloride added to bottles before shipment to field, ice.
   (c) Other: Labels, marker, safety glasses, and phthalate-free gloves.

4. **Safety Concerns**:
   (a) Caution! "Empty" sample bottles will contain special preservatives. (They should be labeled accordingly.) Open them slowly and carefully.
   (b) Before collecting samples, all samplers must receive thorough training in proper handling of chemical preservatives and safety protocols so they are aware of the associated dangers and to determine appropriate safety precautions and first aid, should it be necessary.

5. **Sample Collection Procedure:**
   (a) Complete sample tag and sample collection form, using waterproof ink. Proper identification, including the date and time of collection must be submitted.
   (b) Remove aerator, screen, and all attachments from the faucet.
   (c) Turn on cold water tap and run for 4 to 5 minutes or until water temperature has stabilized, whichever is longer. Then reduce flow so that stream of water is no greater than 1/8 inch in diameter.
   (d) Remove container cap. Do not put cap face down or in pocket. Do not allow inside of cap, inside of bottle or bottle threads to be touched by any object.
   (e) Hold container at an angle. Fill each bottle or vial carefully until water is actually above the rim. (This will prevent the formation of an air pocket inside the container.) Gently tap the container to dislodge any air bubbles.
   (f) For vials, carefully hook cap over the top of the vial. The Teflon side of the septum must be facing the sample. (Teflon side is smooth and shiny).
   (g) Screw cap on securely. Check for air bubbles by inverting the container and gently tapping the cap. If bubbles are present, add more water. (Note: Samples with bubbles cannot be analyzed.)
   (h) Shake sample for one minute.

6. **Shipping and Handling:**
   (a) Complete chain-of-custody form if requested by lab or water supply program.
   (b) Keep samples in closed chest at above 0°C and less than 6°C. Keep them away from direct light and solvent vapors.
   (c) Deliver samples to lab the same day if possible.

The following table lists the maximum holding time for the applicable parameters.

Parameters	Holding Times
Haloacetic Acids Monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, dibromoacetic acid	28 days for 552.1 14 days for 552.2

Sample Container and Preservation Table

Test	Container Type		Preservative in Bottle	Hold Time
Bacteria Coliform, Heterotrophic, E. coli, Enterococci, Coliphage		125 ml plastic with sterile seal Must be filled at least 100 mL	Sodium thiosulfate pellet	8 hours SWTR - Total/ Fecal Coliform, Heterotrophic 30 hours Coliform, E.coli, Enterococci, 48 hours Coliphage
Common Anions and Disinfectant By-Products Bromide, Chloride, Fluoride, Nitrate-N, Nitrite-N, 0-Phosphate -P, Sulfate		250 mL plastic or glass	None added	28 days Bromide, Chlorate, Fluoride, Nitrate/ Nitrite, Sulfate Chloride 14 days Chlorite 48 hours Nitrite, Nitrate O-Phosphate
Nitrate/Nitrite Combined, Bromate, Chlorate, Chlorite		Chlorite must be opaque	For Nitrate/Nitrite Combined - 3 mL conc. Sulfuric Acid Bromate, Chlorate, Chlorite - 0.1 mL 5% EDTA per 100 mL	
Lead and Copper (Lead and Copper Rule)		1L plastic or glass 250 mL plastic or glass for school and daycare fountains	1 mL 1:1 nitric acid may be added in the field or by the lab after receipt of the sample.	14 days (6 months once preserved in field or lab). Must be acidified a minimum of 16 hours before analysis.

<table>
<tr>
<td rowspan="2">Inorganic Compounds and Unregulated Physical Tests

Alkalinity, Asbestos, Chlorine,

Chlorine Dioxide, Color, Conductivity, Hardness, Odor, Oxygen, Diss., pH, Solids, Surfactants SUVA, Turbidity</td>
<td>  </td>
<td rowspan="2">½ gallon plastic

or

2 - 1L glass</td>
<td rowspan="2">Hardness Nitric or Sulfuric Acid to pH < 2

Others: None Added</td>
<td>Chlorine, Chlorine dioxide, Oxygen, dissolved and pH: ASAP</td>
</tr>
<tr>
<td>  </td>
<td>Odor: 24hr

Asbestos, Color, Surfactants, SUVA, Turbidity: 48hr

Total Dissolved Solids:

7 days

Alkalinity:

14 days

Others: 28 days</td>
</tr>
<tr>
<td>Volatile Organic Compounds

(VOC)</td>
<td>  </td>
<td>3 - 40 mL glass vials with Teflon septa.

Need 3 vials to do MS/MSD.</td>
<td>0.25 mL 1:1 HCl

If chlorinated first add 25 mg ascorbic acid to the vials, then add HCl to the sample.</td>
<td>14 days</td>
</tr>
<tr>
<td>Haloacetic acids (HAA5)</td>
<td>  </td>
<td>2-60 mL amber glass vials with Teflon septa.

Need 3 vials to do MS/MSD.</td>
<td>6 mg ammonium chloride</td>
<td>Method 552.1: 28 days

Method 552.2: 14days</td>
</tr>
<tr>
<td>Total Trihalomethanes (TTHM)</td>
<td>  </td>
<td>2 - 40 mL glass vials with Teflon septa.

Need 3 vials to do MS/MSD.</td>
<td>3 mg sodium thiosulfate</td>
<td>14 days</td>
</tr>
</table>

REFERENCES

New England States Sample Collection & Preservation Guidance Manual for Drinking Water, Revision 4.2 May 1, 2009

EPA's Interactive Sampling Guide for Drinking Water System Operators – EPA816-C-06-001 – April 2006

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