

Operator Quiz Corner
Water Sampling Overview
Dan Laprade, Training Coordinator
(dlaprade@masswaterworks.org 413-883-7030)

Public Water Systems (PWS) must collect a wide range of water samples. Some samples are collected by a third party, but many times the system's water operators collect the samples. The sampling equipment and procedures can vary greatly depending on the parameter being analyzed. Always follow the procedures provided by the laboratory that you are using. More information on water sampling can be found in EPA's "Quick Guide to Drinking Water Sample Collection" (https://www.epa.gov/sites/default/files/2015-11/documents/drinking_water_sample_collection.pdf)

Important Tips:

- ✓ Have a written Sampling SOP that describes in detail the location of sample collection and specific sampling instructions for that particular location and contaminant.
- ✓ Print out a copy of MassDEP's sampling plan for your PWS and post it in a highly visible location. A copy of the PWS sampling plan can be found here: <https://www.mass.gov/info-details/public-water-supplier-document-search>
- ✓ Be sure to contact your MassDEP regional office if you have any questions about your sampling plan. <https://www.mass.gov/massdep-contacts-service-center>

Biological Contaminants (E. Coli, Total Coliform, Enterococci, Heterotrophic Bacteria)

- Sample Bottle: Plastic 125 or 150 ml
- Preservatives: Sodium Thiosulphate (if water contains chlorine), keep cool
- Holding time: Generally less than 30 hours
- Important: Wear gloves. Use cold water tap. Do not touch lip of bottle or cap. Do not rinse/overflow bottle.

Inorganic Compounds (Metals)

- Sample Bottle: Glass may be used. Plastic is preferred. Check with lab on bottle size.
- Preservatives: Nitric acid in most cases
- Holding time: 28 days for mercury. 6 months for other metals
- Important: Wear glove & eye protection when handling acids. Fill bottle to within 2 inches of top.

Synthetic Organic Compounds (pesticides, herbicides)

- Sample Bottle: Usually amber glass bottles or vials depending on compound. Check with lab.
- Preservatives: Check with lab. Keep cool.
- Holding time: Generally very short. Check with lab
- Important: Wear glove & eye protection when handling acid preservatives.

Volatile Organic Compounds (petroleum products, solvents)

- Sample Bottle: Clear or amber glass vials
- Preservatives: Sodium Thiosulphate or ascorbic acid (if water contains chlorine). Hydrochloric acid to pH < 2. Keep cool.
- Holding time: 14 days

- Important: Wear glove & eye protection when handling acid preservatives. Fill vial completely so no air bubbles are present.

Trihalomethanes (disinfection byproducts)

- Sample Bottle: Clear or amber glass vials
- Preservatives: Sodium Thiosulphate or ascorbic acid (if water contains chlorine). Hydrochloric acid to pH < 2. Keep cool.
- Holding time: 14 days
- Important: Wear glove & eye protection when handling acid preservatives. Fill vial completely so no air bubbles are present.

Haloacetic Acids (disinfection byproducts)

- Sample Bottle: Glass bottle. Check with lab on bottle size.
- Preservatives: Ammonium Chloride. Keep cool.
- Holding time: 14 - 28 days depending on lab analysis method used.
- Important: Wear glove & eye protection when handling preservatives. Fill bottle to within 1-2 inches from the top.

1. Which of the following sampling protocols is common to almost every contaminant?
 - a. Add sodium thiosulphate to the sample bottle if the water contains chlorine.
 - b. Keep the filled sample container in a cooler and chilled for delivery to the lab.
 - c. Make sure there are no air bubbles in the sample container
 - d. All of the above
2. True or False? Exposure to sunlight can alter the constituents inside the sample bottle.
 - a. True
 - b. False
3. When sampling for _____ it is important that _____ otherwise it is possible that the contaminant of concern may off-gas in the sample container during delivery'.
 - a. Volatile Organic Compounds, no air bubbles be present
 - b. Inorganic Compounds, no air bubbles be present
 - c. Synthetic Organic Compounds, no air bubbles be present
 - d. Heterotrophic Bacteria, no air bubbles be present
4. It is important to avoid touching the rim of the sample container when collecting samples for all contaminants, but it is especially critical when collecting samples for _____?
 - a. Heterotrophic bacteria
 - b. Enterococci
 - c. Total Coliform
 - d. All of the above
5. Approximately how long (minutes) will it take to flush a 135 foot long, 1 inch diameter service line if it is flowing at a rate of 5 gallons per minute?
 - a. .15 min
 - b. 1.1 min
 - c. 21.2 min

d. 158 min

Solution:

Time = Volume / flow

Volume of service line = .785 X (Diameter)² X Length,

Where Diameter = 1 inch / 1ft/12in = 0.0833 ft

Volume = .785 X .0833 ft X .0833 ft X 135 ft = 0.736 ft³

Convert ft³ to gallons: 0.736 ft³ X (7.48 gal/ft³) = 5.5 gallons

Time = 5.5 gallons / 5 gpm = 1.1 minutes