

Appendix A

Free-Chlorine Sampling and Water Flushing Guideline

The following steps need to be performed to determine sampling locations within a building:

For buildings being sampled for the first time, the building's plumbing layout should be reviewed with FMCS personnel, identifying the water supply's entry point into the building and zones or branches within the building with common water supplies, e.g. a branch to a wing of a building or a set of branches served by the same riser.

For those buildings that are not new to the flushing process, a building sampling plan should be created based on the information obtained in the previous step. The following locations were prioritized for sampling:

1. The water supply's entry point to the building (or a water tap that is as close as possible to the water's entry point),
2. At least one tap within each zone/branch within a building, and
3. Supplemental samples based on the results from 1 and 2 or additional locations based on the layout and usage of the building. Reasons for additional samples and sampling locations may include large zones that span multiple floors, low free residual chlorine results at a sampling location, areas with sensitive populations (e.g. elderly or childcare), etc.

The following practices were followed during sample collection:

1. Sample collection and analysis were performed in accordance with the colorimeter's instructions (provided by the manufacturer) for low-range free chlorine. Instructions are provided in Appendix B.
2. Nitrile gloves were always worn to reduce fingerprints on sampling glassware.
3. Lint-free cloths were used to dry and clean the exterior of the sampling glassware.
4. Only cold-water taps were sampled as hot water will reduce the presence of disinfectants.
5. Touch-free sinks were not chosen as sampling locations as they may automatically mix cold and hot water.
6. The cold water was flushed for two minutes prior to sample collection and the sample was analyzed immediately following collection.
7. After completion of sample collection and analysis, the contents of the sampling container were immediately emptied, and the glassware and its lid were thoroughly rinsed with deionized water at least three times.

Sampling Instructions and Procedure

1. Identify sampling locations within selected building.
 - a. Location #1: within the selected building to be sampled, identify where the main water system enters the building and find the closest water tap to this location—this could be anything from a utility sink to a bathroom sink to a water fountain. This will be your first sampling location.
 - b. Location #2: within the selected building to be sampled, identify a water tap that is along the midpoint of the building's water system. This will be your second sampling location.
 - c. Location #3: within the selected building to be sampled, identify a water tap that is at the endpoint of the building's water system. This will be your third sampling location.

- d. Additional locations: as needed, additional samples may be collected from additional locations based on the building's layout and the overall plumbing layout.
2. Review "Chlorine, Free and Total, Low Range" instruction sheets from Hach provided inside the sampling kit. Only the Free Chlorine procedure will be conducted utilizing powder pillows.
3. Perform sampling:
 - a. Along with the manufacturer's instructions, be sure of the following:
 - i. Flush only the cold water of the tap to be sampled for two minutes. Be aware of automatic taps that may mix cold and hot water—do not sample these as hot water reduces the presence of chlorine.
 - ii. Use nitrile gloves to handle sampling glassware to prevent fingerprints.
 - iii. Only use glass containers as plaster may remove chlorine from the sample.
 - iv. Only use de-ionized water to clean sample containers after use.
 - v. Use lint-free cloth to dry the exterior of sample containers.
 - vi. Follow the "Powder Pillow Procedure" on page 3 of the Hach "Chlorine, Free and Total, Low Range" instruction sheet (steps 1-12, 15, 16).
4. Record sampling measurements on the "Free-Chlorine Sampling Log" and send to EHS, safety@andrew.cmu.edu.

Flushing Procedure

The water fixtures in the building should be flushed starting where the water enters the building and then moving outward from there. Water should be flushed for a minimum of two minutes at each location, unless otherwise noted. All the cold, water lines should be flushed first, followed by the hot, water lines.

If the building has zones, the water should be flushed zone-by-zone starting where the water enters the building. In each zone, starting with the zone closest to where the water enters the building and moving down the line from there, the cold water would be flushed first, followed by a flush of the hot water.