

PLEASE READ BEFORE SAMPLING

Sampling Protocol for Surface Water Microscopic Particulate Analysis

This protocol satisfies sampling requirements for the following method:

Microscopic Particulate Analysis (MPA) for Filtration Plant Optimization; EPA 910-R-96-001

The same filter can be processed as a combination of MPA and ICR with processing modifications.

SAMPLING LOCATIONS AND TIMING

Raw Surface Water should be sampled prior to any chemical addition. It is preferable to collect the sample after any presedimentation basins or recycled water additions, but only if no chemicals were added prior to this point. Sampling after recycle input should be taken after adequate in-line mixing. The main objective of raw water collection is to get a representative sample of the organisms entering the treatment system.

Finished Surface Water should be sampled before chlorination. If this is not possible, sodium thiosulfate must be injected to neutralize the chlorine (see page 2). Collect samples prior to post-treatment storage.

Treatment Plant Evaluation: Raw water sampling should be initiated before finished water sampling. The amount of time between start of raw sampling and start of finished sampling should be equivalent to the detention time of the system. Finished water sampling should begin immediately after filters are put on line and encompass a full cycle run (or 24 hour period) including at least one backwash.

SAMPLING PROCEDURE

1. Source water measurements

- Run sample tap for 2-3 minutes to clear in-line debris and allow turbidity to become uniform. Measure and record turbidity, temperature and pH of sample source (optional) on CH Diagnostic Analysis Request form.

2. Flush equipment

- Assemble clean sampling apparatus as shown on page 3; **however, do not install filter or limiting flow orifice yet.** Use the additional equipment if sampling chlorinated water.
- Ensure proper flow direction by checking arrows on meter and in/out indications on pressure regulator and filter housing.
- Flush sampling apparatus for 3-5 minutes with the water being sampled. Allow water to flow through entire sampling apparatus (except for filter and limiting flow orifice).

3. Adjust pressure

- Attach the limiting flow orifice.
- Use pressure regulator to adjust water pressure to **10 psi** for unchlorinated samples (**25 psi** in the first gauge for samples requiring dechlorination).

➤ **If sampling a chlorinated source, follow injector adjustments on pages 2-3.**

4. Install filter

- Turn off water, open and drain filter housing.
- Put on new latex gloves. Open filter packaging and aseptically **place filter into filter housing**.
- Reassemble filter housing.

5. Begin Sampling

- Record date, time and initial meter reading. The one's unit on the meter is marked with an unchanging zero and is read from the red meter hand. The dial reads to tenths of gallons (see example on page 3).

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- Turn water on slowly with unit in upright position. Invert unit to expel all air from filter housing. When housing is full of water, return to upright position. **Increase water flow to no more than one gpm** and maintain this rate for entire sampling period (limiting flow orifice will prevent flow over 3.785 L/min (1 gal/min)).
- Monitor pressure gauge: 10 psi for unchlorinated samples (25 psi (read from the first gauge) for samples requiring dechlorination).
- **If sampling a chlorinated source, follow the dechlorination step on page 2.**

6. Sample the following amounts

Raw surface water:	minimum- 26.4 gal (100 liters); optimum- 1440 gal (5450 liters) or 24 hrs if flow <1 gpm
Finished surface water:	minimum- 264 gal (1000 liters); optimum- 1440 gal (5450 liters) or 24 hrs if flow <1 gpm

If filter plugs before prescribed amount is attained, collection of less volume is permissible. If plugging is anticipated, sample may be collected at a reduced flow rate to encompass a longer sampling period. Make a note on CH Diagnostic Analysis Request form if the filter plugged.

7. End sampling

- Shut off water. Record stop date and time, final meter reading, turbidity (optional) and total volume sampled.
- Disconnect lower section of filter housing while maintaining housing in upright position.
- With new latex gloves, aseptically remove filter from housing and place in plastic zip-loc bag.
- Pour about half of the remaining water from filter housing into the same bag. Seal bag.
- **Record sample name on bag with a permanent marker.**
- Do not allow bag to touch any environmental surface before placing inside a second bag.
- Sample should be refrigerated at 2-5°C prior to shipping. **DO NOT FREEZE**
- Sample must be received at CH Diagnostic within 24 hours of sample collection.

8. Ship sample

WRAP SAMPLE IN SOME FORM OF INSULATION (e.g. bubble wrap). Wrap ice packs around filters (outside of bubble wrap) so that ice is **NOT IN DIRECT CONTACT** with filters (frozen filters may compromise test results). Place into insulated shipping container. **DO NOT USE DRY ICE.** Avoid using wet ice whenever possible. Initial type of analysis to be performed on CH Diagnostic Analysis Request form. Place completed form in zip-loc bag then in cooler with sample. Ship by **priority overnight** courier to CH Diagnostic.

9. Clean up

Discard inlet hose. If using the same equipment for more than one sample, clean equipment by washing in hot water with detergent and bleach followed by hot water rinse and distilled water rinse then air dry. Alternatively, return equipment borrowed from CH Diagnostic within 5 days of sampling/schedule date. Equipment may be shipped separately from the sample by regular ground courier.

ADDITIONAL PROCEDURES FOR CHLORINATED WATER SAMPLES

2% Sodium Thiosulfate Solution (make prior to sampling):

Sodium thiosulfate pentahydrate is needed to dechlorinate the sample. Dissolve sodium thiosulfate from CH Diagnostic in 4 gallons of distilled water or sample water in a large sanitary container. (Alternatively, dissolve 3.14 grams sodium thiosulfate per 100 mL of distilled water or sample water to make a 2% solution. 10 mL of 2% sodium thio. solution is needed for each gallon of chlorinated water that is sampled).

Injector Adjustments (make while adjusting pressure in step 3, page 1):

Sample tap must supply water with at least 25 psi. If not, install 1-5 gal/min gas or electric pump after sample filter housing. Pump must be capable of producing at least 25 psi.

Adjust injector during 50 gallon flush period by placing injector tubing with injector filter and weight into a large sanitary container filled with distilled water or sample water.

Use water bypass screw to adjust pressure on second pressure gauge to 10 psi, while pressure is at least 25 psi on first pressure gauge.

Check for injection rate to be slowly and consistently drawing up the water. Coarse adjustments may be made with water bypass screw. Use the fine metering adjustment screw to fine tune injection rate.

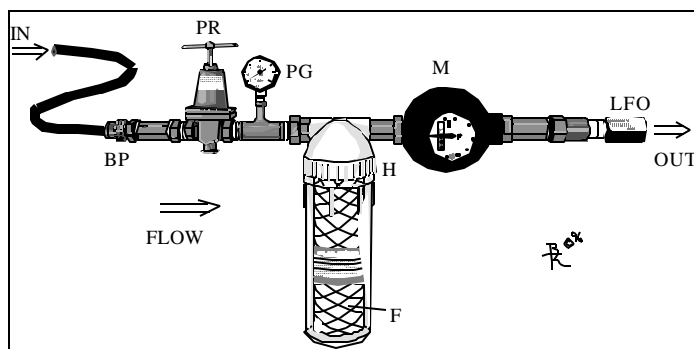
If there is no suction visibly drawing up the water, or if too much is flowing, make sure the first gauge has at least 25 psi and adjust the water bypass screw further to increase or decrease the pressure differential between the two gauges. Greater differential between the first and second gauges increases the flow rate; a smaller differential decreases the flow rate.

Dechlorination Step (performed during sampling in step 5, page 1):

After injector adjustments have been made, monitor level of sodium thiosulfate solution which should go down slowly and consistently at about 10 mL per minute.

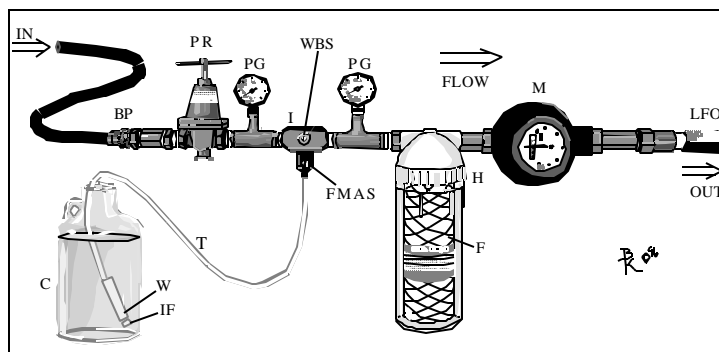
EQUIPMENT

1. Inlet hose (washing machine hose)
2. Backflow preventor (BP) (not included, air gap at effluent)
3. Pressure regulator (PR)
4. Pressure gauge (PG)
5. Filter housing (H) Fulflo LT10
6. 1 micron nominal porosity filter (F) Parker Hannifan M39R10A
7. Meter (M)
8. Limiting flow orifice (LFO) 3.785 L/min. (1 gal/min)



Additional Equipment for chlorinated samples:

9. Large sanitary container (C) for sodium thiosulfate solution
10. Injector (I) with:
 - a. water bypass screw (WBS)
 - b. fine metering adjustment screw (FMAS)
 - c. tubing (T)
 - d. injector filter (IF)
 - e. porcelain weight (W)
11. Second pressure gauge



Equipment on loan from CH Diagnostic is clean and ready to use. Otherwise, thoroughly clean equipment prior to use.

OTHER SUPPLIES

- (1) Turbidimeter (optional);
- (2) pH meter (optional);
- (3) Thermometer (optional);
- (4) Sanitary latex gloves;
- (5) Heavy duty zip-loc 1 gallon freezer bags;
- (6) Frozen ice packs and cooler for shipping;
- (7) For chlorinated water: sodium thiosulfate and distilled water or sample water (see page 2);
- (8) For non-pressurized source: 2-4 Liter/minute gas or electric pump.

Example of a Meter Reading

Meter Reading						
0	0	0	2	5	3	0
1,000,000 gallon mark	100,000 gallon mark	10,000 gallon mark	1,000 gallon mark	100 gallon mark	10 gallon mark	This digit remains zero, read the gallons from the red meter hand.
This meter reads 2,530. If the red meter hand is on the 4, then it reads 2,534.						