



EPA

United States
Environmental Protection
Agency

Hydrant Sampler Procedure



Hydrant Sampler Procedure

Introduction

When collecting water quality samples, taps located at a residence or business are often not available or accessible in some areas of the system, so hydrants must be used. Dry barrel hydrants are the most common type of hydrant. They are designed to be operated with their valves fully open. The hydrant sampler referred to in this procedure was designed to allow the hydrant valve to be fully open while collecting samples in a controlled, safe manner.

Hydrant Sampler Procedure

1. Determine the time needed to flush the sample line using the procedure on page 6 (i.e., calculated flush time [CFT] or “rule of thumb”).
2. Ask the system operator for the system pressure at the sampling location. If the pressure is > 125 psi at the sample location, install a pressure reducing valve (PRV) adapter. **See Figure 1.**
3. Prepare the hydrant for sampler installation by having the system operator remove the outlet cap. **See Figure 2.**
4. Close the gate valve on the sampler (turn the valve clockwise). **See Figure 3 for identification of hydrant sampler parts.**
5. Install the sampler (the system operator should install the sampler). Sampler is affixed to the hydrant outlet by turning clockwise. **See Figure 4.**
6. Slowly open the hydrant by turning the operating nut counterclockwise until it is fully open (the *system operator should operate the hydrant*).
7. Open the gate valve (turn the valve counterclockwise) on the sampler and start the timer. The hydrant sampler operates at a constant flow rate of 20 gallons per minute (gpm). Either (1) allow the sampler to flush for twice the CFT or (2) flush for the time designated by the “rule of thumb.” **See Figure 5.**
8. After flushing and when ready to collect a sample, reduce the flow rate using the gate valve to a rate that allows for safe sample collection. Detach the discharge hose using the cam and groove fitting and then take a sample. Close the gate valve between sample collection. **See Figure 6.**

If the PRV Adapter is not being used (i.e., the system pressure is \leq 125 psi), record the pressure reading from pressure gauge when both the sample and flush valves are closed.

9. Close the valve on the sampler (turn the valve clockwise) and have the system operator slowly close the hydrant (turn the operating nut clockwise).
10. Slowly open the gate valve (turn the gate valve counterclockwise) to release any remaining water pressure and confirm that the hydrant is closed.
11. Remove the sampler (have the system operator remove the sampler from the hydrant). Sampler is removed by turning the sampler counterclockwise.

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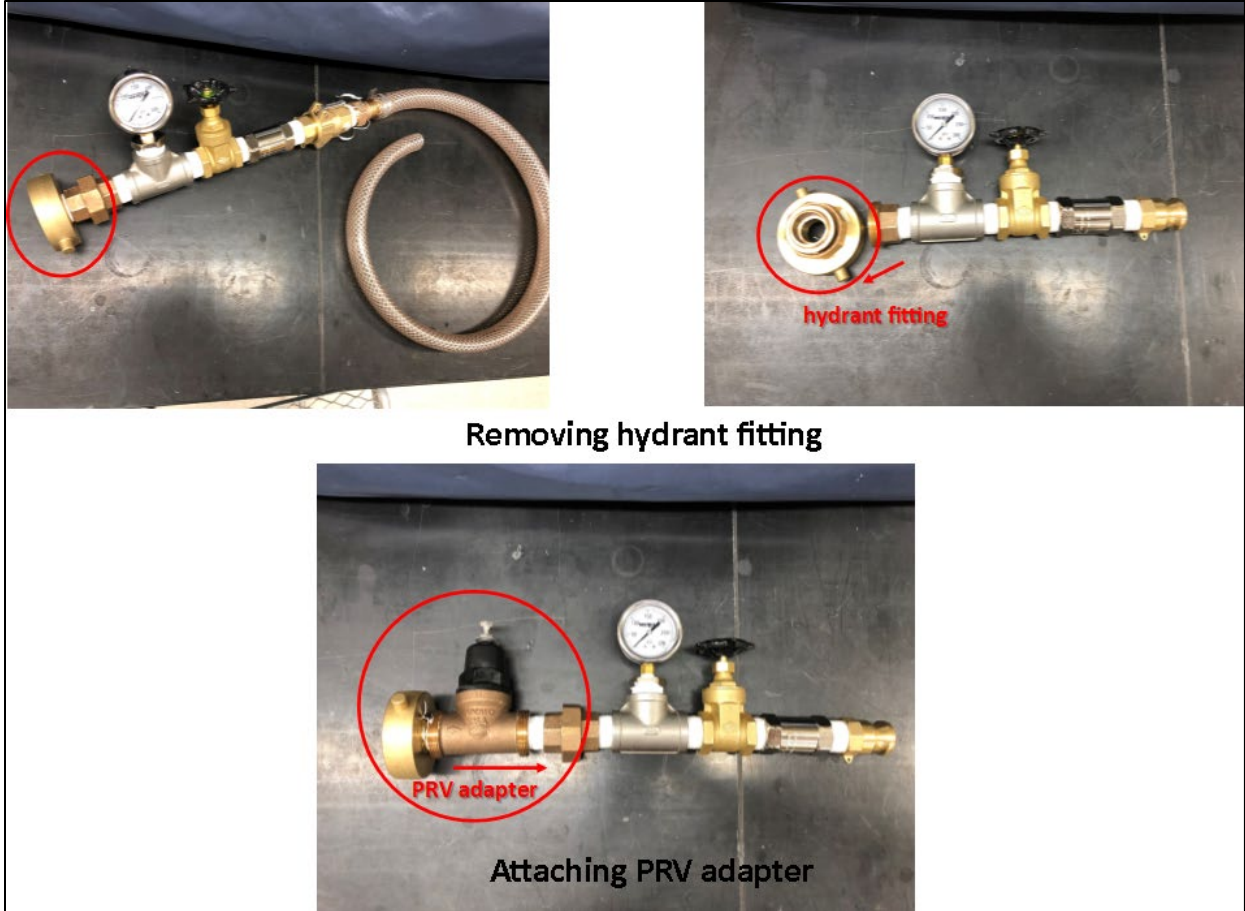
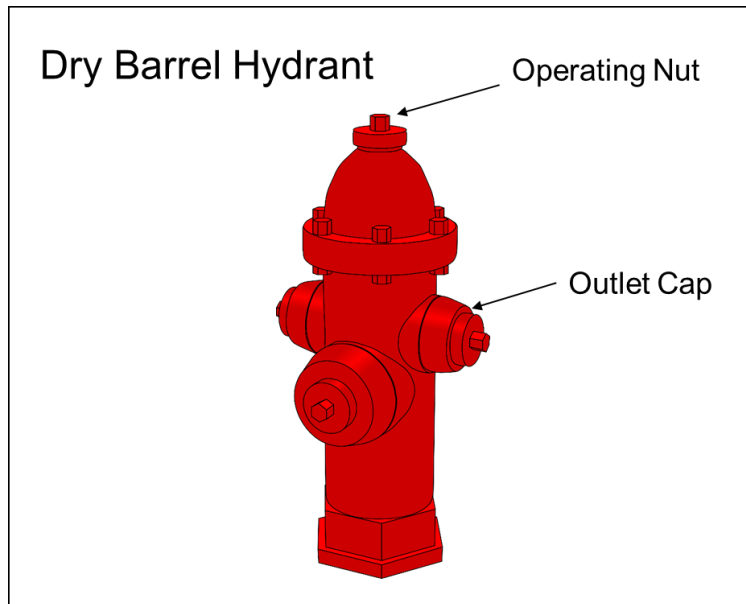


Figure 1. Removing hydrant fitting and attaching PRV adapter



Hydrant Sampler Procedure

Figure 2. Dry barrel hydrant

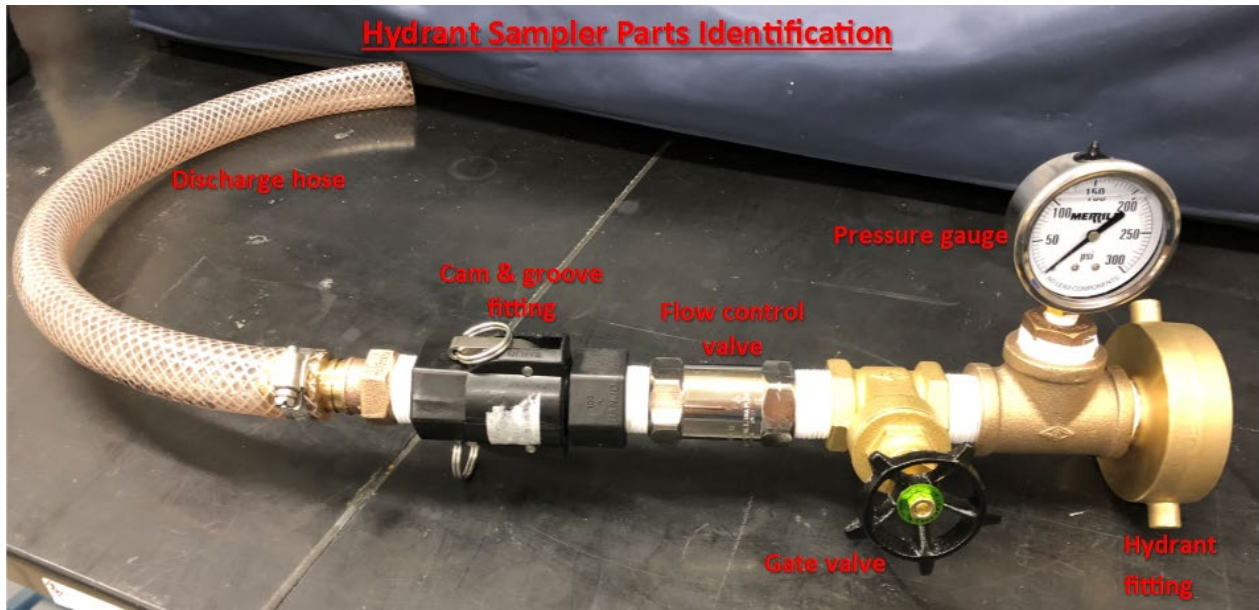


Figure 3. Hydrant sampler parts identification, without pressure reducing valve



Figure 4. Install hydrant sampler on hydrant

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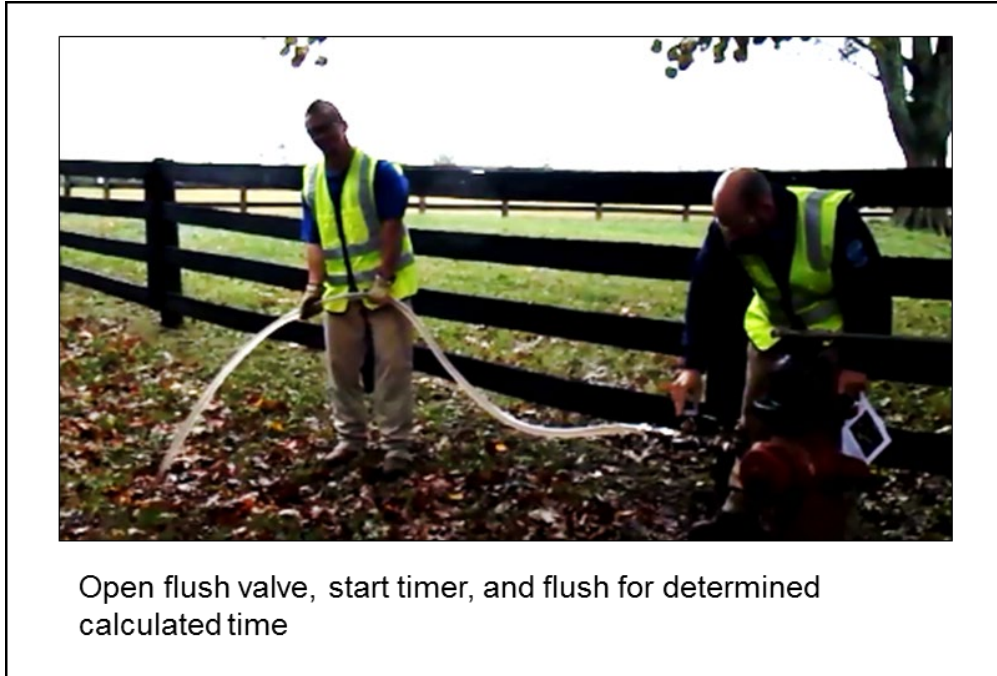


Figure 5. Flushing the hydrant



Figure 6. Removing discharge hose for sample collection

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Determining the Hydrant Flush Time

(Assumes flow rate of 20 gpm, regulated by flow control valve on hydrant sampler)

The purpose of hydrant flushing: Flushing improves the likelihood that the sample will be obtained from water main, which is more representative of distribution system conditions than water that has aged in the service line or hydrant lead. Flushing for an insufficient amount of time may result in obtaining a water sample from the service line or hydrant lead. Over flushing may obtain a water sample from another part of the distribution system further away from the intended sample location.

Approaches:

1. **Calculated Flush Time (CFT)** - CFT should be determined if time permits. Flush for two times the CFT before sampling.

The CFT is determined using the following steps:

- a. Estimate the total length and diameter of hydrant piping. Utilize the operator's knowledge of the system, a system site map, and/or design standards, as needed. See the figure below.

Vertical length/diameter:

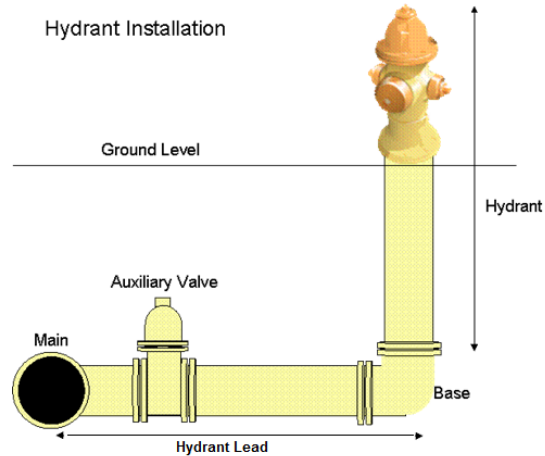
- The hydrant riser diameter is typically 6 inches, unless indicated differently.
- Assume the hydrant riser is 6 feet based on design standards, unless indicated differently.

Horizontal length/diameter:

- The hydrant lead diameter is typically 6 inches, unless indicated differently.
- Measure or estimate the length of hydrant lead pipe between the main and hydrant base. If the location of the main is not known, measure the horizontal distance between the auxiliary valve to the hydrant and add one foot to account for distance from the main to the auxiliary valve.

- b. Determine the necessary flush time from the table below based on the vertical and horizontal pipe lengths and diameters. Assume a 20 gpm flow rate due to the flow control valve on hydrant sampler.

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Number of minutes needed to flush hydrant at 20 GPM:

| Length of Hydrant Pipe | 2-inch Diameter | 4-inch Diameter | 6-inch Diameter | 8-inch Diameter | 12-inch Diameter | 16-inch Diameter |
|------------------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|
| 1 foot | 0.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.5 |
| 5 feet | 0.0 | 0.2 | 0.4 | 0.7 | 1.5 | 2.6 |
| 10 feet | 0.1 | 0.3 | 0.7 | 1.3 | 2.9 | 5.2 |
| 15 feet | 0.1 | 0.5 | 1.1 | 2.0 | 4.4 | 7.8 |
| 20 feet | 0.2 | 0.7 | 1.5 | 2.6 | 5.9 | 10.4 |
| 25 feet | 0.2 | 0.8 | 1.8 | 3.3 | 7.3 | 13.1 |
| 30 feet | 0.2 | 1.0 | 2.2 | 3.9 | 8.8 | 15.7 |
| 35 feet | 0.3 | 1.1 | 2.6 | 4.6 | 10.3 | 18.3 |
| 40 feet | 0.3 | 1.3 | 2.9 | 5.2 | 11.8 | 20.9 |
| 45 feet | 0.4 | 1.5 | 3.3 | 5.9 | 13.2 | 23.5 |
| 50 feet | 0.4 | 1.6 | 3.7 | 6.5 | 14.7 | 26.1 |
| 55 feet | 0.4 | 1.8 | 4.0 | 7.2 | 16.2 | 28.7 |
| 60 feet | 0.5 | 2.0 | 4.4 | 7.8 | 17.6 | 31.3 |
| 65 feet | 0.5 | 2.1 | 4.8 | 8.5 | 19.1 | 33.9 |
| 70 feet | 0.6 | 2.3 | 5.1 | 9.1 | 20.6 | 36.6 |
| 75 feet | 0.6 | 2.4 | 5.5 | 9.8 | 22.0 | 39.2 |
| 80 feet | 0.7 | 2.6 | 5.9 | 10.4 | 23.5 | 41.8 |
| 85 feet | 0.7 | 2.8 | 6.2 | 11.1 | 25.0 | 44.4 |
| 90 feet | 0.7 | 2.9 | 6.6 | 11.8 | 26.4 | 47.0 |
| 95 feet | 0.8 | 3.1 | 7.0 | 12.4 | 27.9 | 49.6 |
| 100 feet | 0.8 | 3.3 | 7.3 | 13.1 | 29.4 | 52.2 |

Depending on the type of pipe material and degree of corrosion inside the pipe, the inner diameter will vary. These diameters are meant to be approximations.

2. **“Rule of Thumb”** approach assumes a 3-minute total flush time before sampling. Easy to use and acceptable for one-time sampling. Assumes the pipe diameter is 6 inches or less, and the length of the hydrant lead pipe is less than 20 feet.