

Quick Guide

Monitoring and Operation of Hand Pumped Wells

PROVIDED TO PUBLIC WATER SYSTEMS FROM THE COMPLIANCE ASSURANCE SECTION OF THE WATER QUALITY CONTROL DIVISION

Background

Transient, non-community public water systems, such as public campgrounds have historically used hand-pumped wells. These unique types of wells are typically shallow and found in places with no means for providing continuous disinfection. Historically these wells were microbiologically tested only once per quarter when the system was open to the public and historical records indicate that many hand-pumped wells exceeded the microbiological limit. In order to protect public health, the Department developed improved monitoring and operating procedures detailed in the "Monitoring and Operational Guidance Handbook for Colorado Public Water Systems Utilizing Hand-Pumped Wells Which Do Not Provide Continuous Disinfection."

Purpose

This quick guide is not considered Department approved hand-pumped well monitoring and operational criteria for the purposes of compliance with CPDWR 13.2(e)(1).

This quick guide is considered:

- A summary of the "Monitoring and Operational Guidance Handbook for Colorado Public Water Systems Utilizing Hand Pumped Wells Which Do Not Provide Continuous Disinfection"
- A quick reference for public water systems to aid in compliance with the CPDWRs found at 13.2(e).

Sampling Tips

Tips

- Use special purpose samples to test the well for microbiological presence and take remedial action before taking a routine sample
- After receiving a positive microbiological sample examine the well and areas around it for sources of contamination.
- Complete disinfection before repeat sampling to prevent positive samples (must disinfect/sample within 24 hrs)
- Close problematic wells indefinitely

Overview of Monitoring and Operation of Hand-Pumped Wells

Colorado Primary Drinking Water Regulations Article 13

- Applicability: Transient, non-community water systems that are unable to provide continuous disinfection and operate hand-pumped wells
- Operate and maintain hand-pumped wells in accordance with Department approved criteria.
- Criteria includes:
 - Microbiological Sampling– Routine, Repeat, and Confirmation
 - Start-Up and Shut-Down Procedures for Seasonal Wells
 - Nitrate and Nitrite Sampling
 - Disinfection
 - Wellhead Inspection
 - Public Notice
 - Recordkeeping
- The "Monitoring and Operational Guidance Handbook for Colorado Public Water Systems Utilizing Hand-Pumped Wells Which Do Not Provide Continuous Disinfection" is considered Department approved criteria.



Routine Microbiological Sampling

Take a routine microbiological sample:

- Each month the well is open to the public
- Anytime the pump stand is raised or lowered during the operational season
- At least 10 days before opening, for seasonally operated wells
- Within the first seven days of the first calendar month that a seasonally operated well is open



Take five routine microbiological samples:

- The month following a total coliform positive routine sample.

If a routine sample is positive, take action according to Figure 1 (see reverse). Including 4 repeat samples within 24 hours and possibly closing the well.

Questions?

Contact the Water Quality Control Division:

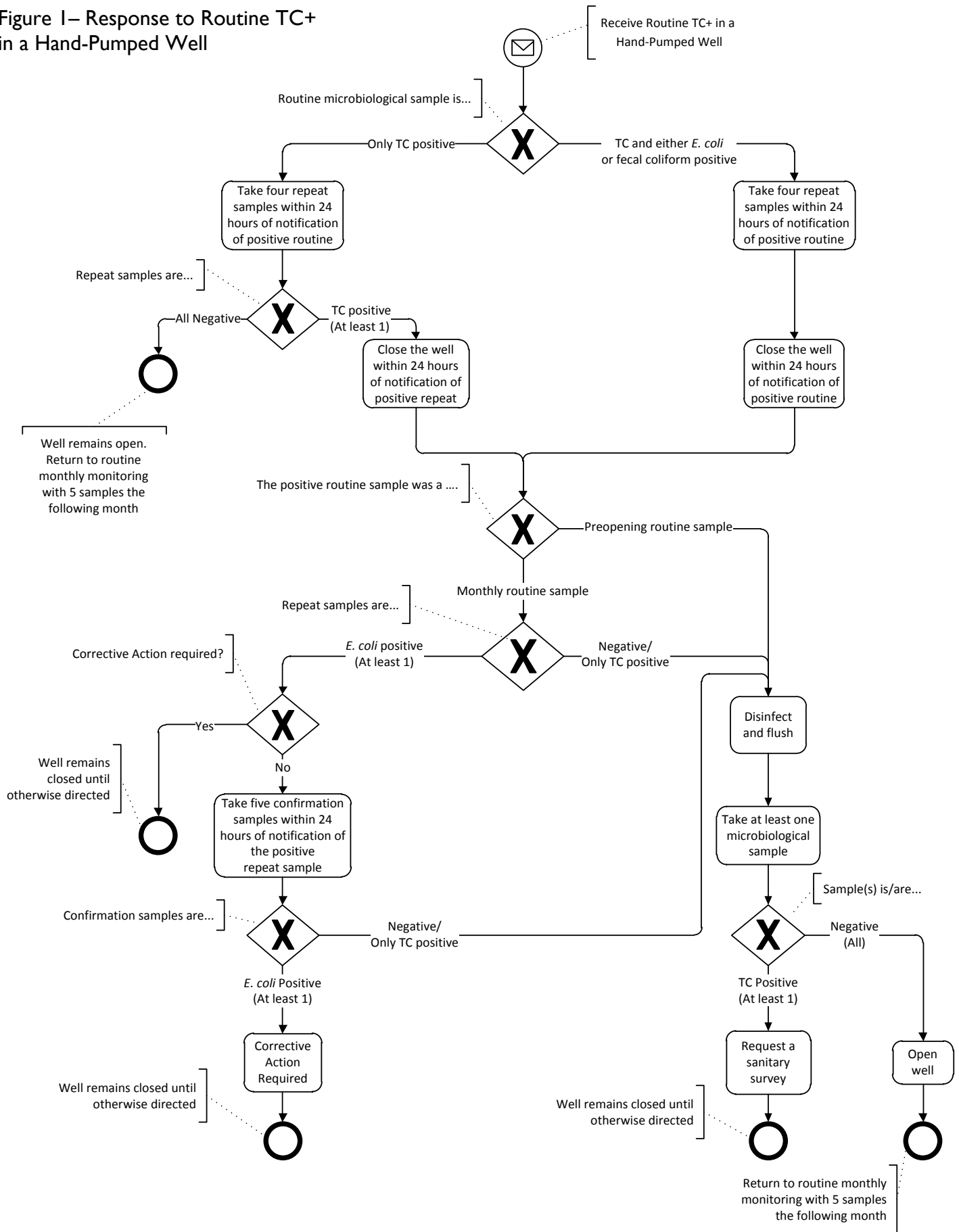
303-692-3541 or
Cdphe.drinkingwater@state.co.us

Sample Collection Procedure

1. Flush the well by pumping for approximately five minutes.
2. Avoid sample contamination by:
 - Keeping the sampling bottle unopened until the moment just before filling the bottle.
 - Not touching the threads on the cap, the inside of the cap, the inside of the bottle, or the neck of the bottle.
 - Not placing the cap on the ground while taking sample.
3. Important: Do not rinse the bottle before collecting the sample!
4. Hold the bottle near its base, fill the bottle ~4/5 full, and replace the cap immediately. Do not overfill!
5. Complete collection form and return form and sample to the laboratory.



Figure I– Response to Routine TC+ in a Hand-Pumped Well



Tips

Operating Tips

- Completing the Wellhead Inspection during shut-down is important as it allows maintenance problems to be identified. Materials can be ordered during the winter to be on hand for next season.
- When completing the Wellhead Inspection its not necessary to do a visual inspection of the weep hole. A demonstration that it is open and functioning correctly is sufficient.
- Nitrate and Nitrite sampling are not required every year so be sure to know your monitoring schedule and take them in the required years.
- When using bleach make sure that the bottle has not expired, as bleach has a relatively short shelf life, and expired bleach is not effective.
- 1 cup of 5-1/4 percent household bleach per five gallons of water is approximately a 100-mg/L-chlorine solution
- If the pump stand has not been raised or removed and the well can be disinfected without raising or removing the pump stand you may do so

Perform Wellhead Inspection (see below)

No more than 30 days before opening-
Disinfect and flush well

Nitrate and Nitrite samples

At least 10 days before opening-
Collect preopening routine
microbiological sample, a clean
sample is required to open

**Seasonal Well
Opens for the Season**

Nitrate and Nitrite Sampling

- Samples (when required) must be taken prior to opening for the season
- Samples must be analyzed by a Department certified laboratory
- All routine and confirmation samples must be submitted to the Department
- Check monitoring schedule for frequency



Public Notice

Systems must post public notice on or within sight of the hand-pumped well whenever the well is open to the public stating:

This hand pump serves unchlorinated well water. For more information, please contact: [phone number of public water system owner, operator, or designee of public water system.]

Disinfection

When?

- Seasonally operated wells- no more than 30 days before opening for the season.
- Wells operated year round- at least once a year during their busiest month of operation.
- Response to positive microbiological sample
- Anytime the pump stand is raised or removed

How?

If the pump stand is raised or removed:

1. Wash the exterior surface of the drop pipe and pump cylinder with a 100-mg/L-chlorine solution as they are lowered into the well.
2. Complete Steps 1-4 below

In all other cases of disinfection:

1. Pour a 100 mg/L chlorine solution into well. Add 5 gallons of solution for each 20 feet of standing water, e.g. 15 gal for 60 feet of standing water. Disperse chlorine evenly through the well by pouring chlorine solution through a disinfected hose or pipe that is moving up or down in the well while the chlorine solution is added.
2. Operate the hand pump until the distinct odor of chlorine is detected in the water.
3. Remove the pump handle and allow the chlorine solution to sit in the well for a minimum of 12 hours, preferably 24 hours.
4. Reinstall the pump handle and flush the well until the free chlorine residual is below 0.2 mg/L. Chlorine residual must be measured with an approved chlorine test kit. Remove pump handle till positive microbiological sample.



Wellhead Inspection Checkpoints

- Drainage system clear of any debris and functioning properly.
- Sanitary well seal secure, in place, and watertight.
- Concrete slab is not cracked and any burrows under this slab are filled, tight seal (no gaps) between wellhead and concrete slab.
- Nuts and bolts tight, gaskets intact at watertight joints.
- Pump stand and major components not cracked or broken.
- Packing nut and packing checked for wear; hole in packing nut not worn oblong; packing nut not bottomed out because packing worn out. Weep hole open
- Area around the well is clear of potential sources of contamination.

Recordkeeping

Keep the following records onsite or at a convenient near by location for the given amount of time. They may be inspected in a sanitary survey.

Record of:	Keep For:
Bacteriological Analyses	5 years
Chemical Analyses	10 years
Violations and Response Actions	3 years after date of last action
Sanitary Surveys	10 years
Monitoring and Operation	10 years
Corrective Actions	10 years