Ohio EPA, Division of Drinking and Ground Waters
Seasonal Public Water System Start-Up Requirements and Checklist

Date Completed: _____ **(REV 8/9/2016)**

Instructions: Beginning April 1, 2016, depressurized and partially-depressurized seasonal noncommunity public water systems are required to complete the start-up requirements specified by Ohio Administrative Code rule 3745-81-51 every year before the start of the season. Each of those requirements is listed below in the "Requirements" column. Items that have the "N/A" column shaded black must be completed. If some of the other requirements do not apply to your system, then put a check mark in the "N/A" column (but only if that box is not shaded). The "Procedure/Recommendations" column provides guidance on how to complete the start-up procedure and trouble areas to look for. This checklist must be retained in the water system records for no less than five years and be available for review by Ohio EPA. **After this checklist is completed, the Annual Start-Up Certification Form must be completed and submitted every year to the appropriate Ohio EPA District Office on or before the day when water is first available to the public.** Because the Start-Up Certification Form cannot be submitted until the system receives TC-negative start-up sample results, seasonal systems should request results from the lab as soon as they are available.

Key Points:

- **Review every item on this Checklist**
- **If N/A box is black; activity must be completed**
- **Then fill out one-page Certification Form**
- **Keep the Checklist**
- **Send in the Certification Form on or before the day when water is first available to the public**
- **Questions? Please contact your district office**

Northwest: (419) 352-8461 **Northeast: (330) 963-1200**
Central: (614) 728-3778
Southwest: (937) 285-6357 **Southeast: (740) 385-8501**

Activity	Requirements	Done	N/A	Procedure / Recommendations
		✓	✓	
1. Pre-Inspection Activities	1.1 Review Ohio EPA Sampling Schedule. Update Sample Siting Plan as necessary.			Start early so your opening is not delayed
	1.2 Make arrangements for sample analysis by a certified lab.			
2. Initial Inspection				Do a thorough inspection to ensure the integrity of the entire system.
2.1 Well and pumphouse	2.1.1 Well cap is tight and secure.			Look for signs of insects, rodents and other animals in the pump house and under the well cap, if it is not secure. Take measures to exclude animals such as keeping vegetation trimmed away from the well.
	2.1.2 Pump house, if present, is locked and secure.			
	2.1.3 Well casing is structurally sound.			
	2.1.4 The well vent is turned downward and the screen is intact.			

Activity	Requirements	Done	N/A	Procedure / Recommendations
2.1 Well and pumphouse	2.1.5 Chemicals (e.g. pesticides, fuels, solvents) are stored outside of isolation radius or at least 50 feet from the well.			Look for cracks or corrosion in well casing. Ohio EPA recommends a meter or hour meter to monitor and record water usage.
	2.1.6 Backup generator and fuel are stored to capture any leaks in a secondary (backup) containment area.			
	2.1.7 The sample tap does not leak and flows freely when opened.			
2.2 Storage tanks	2.2.1 Tanks were visually inspected for corrosion and physical damage.			External visual inspection of tanks annually. Internal tank inspection recommended every five years.
	2.2.2 The water level controls are functioning properly.			
	2.2.3 The access hatches are locked and the hatch areas and lids are protected from insects.			
	2.2.4 The tank overflow pipes are screened, the screens are intact and the discharge is at least 12 inches above grade.			
	2.2.5 The tank vents are turned downward and properly screened.			
	2.2.6 Necessary repairs were completed.			
2.3 Pressure tanks	2.3.1 Tanks were visually inspected for corrosion and physical damage.			
	2.3.2 All valves, gauges and controls are functioning properly.			
	2.3.3 Necessary repairs were completed.			
2.4 Distribution lines and valves	2.4.1 All accessible lines and equipment were visually inspected for signs of damage or corrosion.			
	2.4.2 All valves were opened and closed.			
	2.4.3 All outdoor hose bibs have vacuum breakers. Note: Does not apply to recreational vehicle hookups			
	2.4.4 All yard hydrants are of an acceptable design and do not have weep holes.			
	2.4.5 All testable backflow prevention devices have been tested by a certified tester within the past 12 months.			
	2.4.6 All RV dump stations have an approved backflow prevention device provided in accordance with Ohio Department of Health regulations.			
2.5 Treatment systems	2.5.1 All components have been visually inspected for damage.			
	2.5.2 Chemical injection points have been cleaned.			
	2.5.3 Associated pumps and valves are working properly.			

Activity	Requirements	Done	N/A	Procedure / Recommendations
	2.5.4 Necessary NSF-approved chemicals are on-hand and not expired.			
3. Activate and pressurize	3.1 Well pumps operate properly.			Turn on the power to the pumps and treatment equipment. Confirm that all pressure tanks are pressurized. Run water through the entire water system by opening up hydrants, blow-off valves and faucets. The goal is to remove all air pockets and sediment so the water is clear. Verify that chemical feed rates are correct.
	3.2 System is fully pressurized.			
	3.3 System is not leaking.			
	3.4 Chlorinator and any other treatment systems are operating properly.			
4. Complete any needed repairs	Leaks have been repaired, identified needed repairs have been made and the system is functioning properly.			
5. Disinfect and flush	5.1 Fresh chlorine was added and pumped throughout all tanks and distribution lines with sufficient concentration and retention time to disinfect the system. Chlorine must be NSF approved. Do not use any scented chlorine bleach.			10 mg/l free chlorine held overnight is recommended. **Additional guidance may be found at the end of this checklist.** Also, AWWA Standard C651-05 provides guidance for disinfecting water mains. Begin flushing with tap closest to the source. Flush all lines thoroughly but maintain 30 pounds per square inch (psi) of pressure. After flushing, a system that normally chlorinates should have normal chlorine residual levels.
	5.2 Entire system was flushed. Non-chlorinated systems must remove free chlorine to non-detectable level. Chlorinated water must be de-chlorinated (with vitamin C (ascorbic acid) or sodium thiosulfate) prior to discharge. Chlorinated water must not be discharged into any water body, wetland, or drainage ditch.			
6. Verify Treatment Systems are Operating Properly	All approved treatment units must be on-line and functioning properly.			To ensure proper operation of a treatment unit, a pre and post treatment sample can be taken to verify treatment is functioning properly.
7. Collect total coliform samples				Systems that do not have a chlorine test kit to confirm that chlorine is not detectable can

Activity	Requirements	Done	N/A	Procedure / Recommendations
7.1 Chlorine levels before sampling	7.1.1 In non-chlorinated systems –chlorine is non-detectable.			ensure chlorine is absent by waiting a period of seven days or more after flushing the system to take samples.
	7.1.2 In chlorinated systems –chlorine is at least 0.2 mg/l free chlorine and less than 4.0 mg/l.			Multiple TC samples are recommended especially in distribution systems that are large or split into different sections. Because the Start-Up Certification Form cannot be submitted until the system receives TC-negative start-up sample results, seasonal systems should request results from the lab as soon as they are available.
7.2 Collect special purpose TC samples	Collect at least one special purpose sample for total coliform analysis at the service connection considered to be most susceptible to contamination. The service connection farthest from the entry point is often the appropriate location. The sample must be TC negative before the system may serve water to the public. • Special purpose - Write **"start-up"** in the comments section on the lab sample submission form. <u>Repeat if necessary:</u> If the special purpose sample is TC-positive, repeat the disinfection and flushing procedure. Once the system has been thoroughly flushed, at least two special purpose samples collected at least 24 hours apart must be TC-negative before you can begin serving water to the public and proceed to step 8.			
8. Complete Start-up Certification Form	Submit completed Start-up Certification Form to appropriate Ohio EPA District Office **on or before the day when water is first available to the public.** Keep this annual Checklist with your water system records and have it available for review by Ohio EPA.			

Seasonal System Disinfection for Start-up

The information below is intended to assist noncommunity seasonal public water systems but is not a complete guide to industry standard practices. AWWA Standard C651 provides detailed guidance and procedures for disinfecting components of a water system. Chlorine bleach is a caustic chemical that must be handled properly. Check the label precautions. Also, be aware that use of a higher than necessary dose or concentration may result in damage to system components. More is not always better!

Disinfecting a storage tank and distribution system

If you believe it is necessary to disinfect both your wells and your storage tanks, disinfect the source first.

1. Start by calculating the volume of water in the distribution piping. This volume will be added to the volume of the storage tank to estimate the total volume of water in the system to be disinfected. Table 1 shows some common water distribution main sizes and volumes per foot of pipe. Estimate the total length of water pipes in your water system and multiply the total by the appropriate value from the table. You can use as-built drawings of the water system or a simple map to help estimate pipe diameters and lengths.

Table 1 Estimating Volume of Water in the Distribution System

Pipe Diameter (inches)	Volume in each linear foot of pipe (gallons)	Volume in 100 linear feet of pipe (gallons)
1	0.04	4
2	0.16	16
4	0.65	65
6	1.47	147

2. Add the volume in the distribution piping estimated in Step 1 to the storage tank volume and use Table 2 to determine the amount of chlorine to be added to the storage tank to result in the desired dose throughout the system. (If your system does not have a storage tank, drop down to the next section, "Disinfecting a distribution system that does not have a storage tank.")

3. Draw down the level of water in the storage tank. Pour the chlorine into the tank as the tank is refilling, in order to get some mixing.

Table 2 Storage Tank Disinfection: Amount of Chlorine Bleach to Use

Tank Volume PLUS Piping Volume (gallons)	Dosage		
	Non-scented Household Bleach (6%)		12% Bleach
	10 mg/L	20 mg/L	10 mg/L
5,000	13 ⅓ cups	1 ¾ gallons	6 ⅔ cups
10,000	1 ¾ gallons	3 ½ gallons	13 ⅓ cups
20,000	3 ½ gallons	8 ½ gallons	1 ¾ gallons
50,000	8 ½ gallons	16 ¾ gallons	4 ¼ gallons

4. Use a blow-off, fire hydrant, or outside faucet in the distribution system to draw chlorinated water from the tank out into the distribution system. Then go to all of the faucets in the water system and flush water from them until you detect chlorinated water. Usually you can smell the chlorine, but to be more accurate, use a chlorine residual test kit to measure chlorine residual.

5. Allow the chlorine to remain in the water system overnight (6 hours minimum, 24 hours is preferable). Chlorine needs time to do an effective job of disinfecting.

6. Use one or more outside faucets, blow-offs, or hydrants to draw water out of the water system in order to replace the chlorinated water with chlorine-free water from your source. During this process, make sure you don't damage a pump by drawing water down below a pump intake. Never discharge chlorinated water into any water body, wetland, or drainage ditch because it is extremely toxic to fish. You must de-chlorinate the water prior to discharge using sodium thiosulfate or ascorbic acid (Vitamin C).

Example – A campground has 500 feet of 4 inch pipe and 2,000 feet of 2 inch pipe and a 5,000 gallon storage tank.

Volume in 4" pipe = 500 x 0.65 gal/ft. = 325 gal.
Volume in 2" pipe = 2,000 x 0.0.16 gal/ft. = 320 gal.
Volume in pipe plus tank = 325 gal +320 gal+ 5000 gal = 5625 gal.

From Table 2- To achieve a concentration of 10 mg/L of chlorine in the tank and piping, 13 ⅓ cups of 6% bleach are required for the tank volume and 1 ⅔ cups (625/5000 x 13.33 cups) are required for the piping volume. A total of 15 cups of 6% bleach solution should be added to the tank.

7. Unless the system normally disinfects its water, the water must not have any detectable chlorine when total coliform samples are taken. Using a chlorine residual test kit to confirm there is no chlorine remaining in the water before collecting a coliform sample is recommended. Otherwise, waiting at least seven days after flushing will help ensure there is no chlorine remaining. The coliform sample result will indicate whether the disinfection was effective.

Disinfecting a distribution system that does not have a storage tank

Disinfecting a distribution system that does not have a storage tank begins with adding disinfectant solution to the well water so it may be pumped into the pressure tank and distribution lines. Simply pouring a bottle of chlorine bleach or dropping tablets into the well will not produce good disinfection results because the chlorine does not get evenly distributed in the casing and borehole.

1. Calculate volumes of water in the well and distribution system or plumbing. Table 3 can be used to estimate well water volume once you determine the height of the water column in the well and the casing diameter. Estimate the volume of water in your distribution system using the Table 1 above. Add the volumes to estimate the total water volume in the system.

2. Use the total system volume and Table 4 to determine the amount of liquid chlorine bleach solution to needed to achieve the desired chlorine dosage.

3. **Optional method** – Prepare diluted solution at surface before adding to the well. On the surface, in a water container or tank large enough to hold the total water volume, fill the container with water and add white distilled vinegar to lower the pH to approximately 3.5. This is important for proper mixing and to optimize the disinfecting ability of the solution. Test strips, kits or probes can be used to measure the pH of the disinfecting solution.

   Then, add the chlorine, at a slow rate, to the water/acid solution until the pH raises to approximately 6.0. The solution must be stirred with either a plastic or wood rod to ensure proper mixture. **CAUTION: Improper handling, mixing, or use of these chemicals can introduce the unwarranted risk of accidental exposure to potentially hazardous materials from spillage or inhalation. Extreme care must be used while working with any chemical. Work in a well-ventilated area. If you are uncomfortable performing a well disinfection, contact a licensed well driller or water system installer for assistance.** Do not use bleach with fragrance additives. Solid chlorine pellets, which are 65% to 70% calcium hypochlorite, should be dissolved in five gallons of water. Use only chlorine pellet products intended for water well disinfection. Do not use solid chlorine products used for swimming pools because

Table 3 Estimating Well Volume

Well Casing Diameter (inches)	Volume (gallons per vertical foot of water)
6	1.5
8	2.6
10	4.1
12	5.9
14	8.0
16	10
36	53

Table 4 Well Disinfection: Amount of Chlorine Bleach to Use

Well Volume (gallons)	Dosage		
	Non-scented Household Bleach (6%)		12% Bleach
	10 mg/L	20 mg/L	10 mg/L
50	2 ¼ Tbsps.	4 ½ Tbsps.	1 Tbsp.
100	4 ½ Tbsps.	9 Tbsps.	2 Tbsps.
200	10 Tbsps.	1 ¼ cups	4 Tbsps.
500	1 ½ cup	2 ¾ cups	10 Tbsps.
1000	3 cups	5 ½ cups	1 ½ cup

Alternative Method of Adding Chlorine to Well

Carefully pour the solution mixed at the surface directly into the well and then recirculate the chlorinated water by connecting a new garden hose (or one reserved for this purpose) to the nearest outside faucet and circulate the water through the hose and back into the well. This will mix the chlorine with the water and the pump will draw the chlorine to the bottom of the well. After you start smelling the chlorine in the water coming out of the hose, use the hose to rinse the upper portion of the well casing with the disinfectant. Recirculate for at least 30 minutes to about 2 hours from the time you smell chlorine from the garden hose.

they may contain additional chemicals, such as algaecides. If your water has a lot of dissolved calcium, do not use calcium hypochlorite because it may cause clogging of the well borehole.

4. Add the solution to the well. Thorough mixing to the bottom of the well can be achieved by injecting the solution into the well through a tremie pipe. The tremie pipe must be placed near the bottom of the well; this will ensure that the water is evenly distributed from the bottom and stirred enough for the chlorine to reach all the bacteria in the well. Gravity feeding, through a tremie pipe, should be sufficient for the disinfection process.

Then follow Steps 4 through 7 above under "Disinfecting a storage tank and distribution system."

NOTE: Do not to consume the water during the disinfection process. Arrange for an alternative source of drinking water. Please follow all directions and warnings for the chemical products used. Always use rubber gloves, eye protection, and protective clothing when handling mild acids and chlorine products (such as bleach). Avoid contact with the mild acids and chlorine products. If you should splash chlorine or acid solutions on your person or clothing, immediately rinse thoroughly with water.