

HELPFUL INFORMATION FOR TRANSIENT NONCOMMUNITY PUBLIC WATER SYSTEMS

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DRINKING WATER PROGRAM
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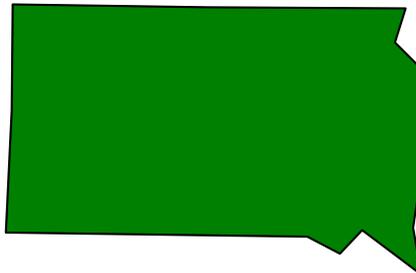


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I. ACRONYMS TO KNOW

TNC – transient noncommunity public water system.
DENR – Department of Environment and Natural Resources.
DOH – Department of Health
USEPA – United States Environmental Protection Agency.
EPAID# - Environmental Protection Agency identification number
RTCR – Revised Total Coliform Rule
GWR – Ground Water Rule
MCL – maximum contaminant level.
ppm – parts per million (equivalent to milligrams per liter).
mg/L – milligrams per liter (equivalent to parts per million).

II. FREQUENTLY ASKED QUESTIONS

1. What is a transient noncommunity (TNC) public water system?

A TNC is a water system that serves an average population of 25 or more people per day for 60 days of the year and that serves a traveling population rather than a permanent population. Examples of TNC are campgrounds, resorts, rest stops, motels/hotels, restaurants, tourist attractions, etc. that use their own well(s).

2. What are the sampling requirements for a TNC?

A TNC serving a daily population of 1,000 or less people must collect and have one bacteria sample analyzed per month, during the months the facility is open to the public. TNC that serve greater than 1,000 people per day must collect two samples per month. A nitrate sample must be analyzed once a year. A nitrite sample must be analyzed once every three years. **If a sample is positive or exceeds a standard, follow-up sampling is required.** See information summaries F (page 12) and H (page 14) and J (page 16) for details.

3. How often does the state perform a sanitary survey and what actions are required to take after receiving the survey report?

DENR will perform a sanitary survey every five years. After you receive the final report from DENR, read it, check for errors and make the appropriate improvements we have noted in the requirement/recommendation sections. Some requirements may be identified as “significant deficiencies.” A significant deficiency is a defect in design, operation or maintenance, or a failure or malfunction of the sources, treatment, storage or distribution system that the State determines to be causing, or have the potential for causing, the introduction of contamination into the water delivered to consumers. These items **MUST** be corrected within 30 days. See **information summary J (page 16)** for details.

4. What is the Ground Water Rule (GWR)?

This rule was developed to provide for increased protection against fecal contamination in public water systems that use groundwater sources. The occurrence of *E. coli*/fecal indicators in a drinking water supply is an indication of the potential presence of microbial pathogens (disease-causing organisms) that may pose a threat to public health. The rule requires groundwater systems that are at risk of fecal contamination that take corrective action to reduce the occurrence of illnesses due to exposure to pathogens. Raw GWR triggered source water sampling after a positive routine sample (in addition to the three repeat samples) and correcting significant deficiencies are requirements under this rule. See **information summary J (page 16)**.

5. What if my monthly routine bacteria sample is positive?

Immediately submit repeat and raw GWR triggered samples. Three repeat samples must be collected at locations at and around where the positive routine sample was collected. Repeat samples are necessary to determine if there is a contamination problem and how widespread it may be in the distribution system. Raw GWR triggered samples must also be collected from each well and must be raw/untreated water. GWR triggered samples are necessary to determine if there is a contamination problem with the well. See **information summary F (page 12)** for details on repeat and GWR triggered sampling requirements and directions. Routine, repeat and GWR triggered samples are collected in different locations and for different purposes. **The three repeat samples and raw GWR triggered samples are required and the USEPA does not allow the DENR to waive these samples.**

The three repeat samples and raw GWR triggered samples must be collected within 24 hours of learning of the positive routine sample (see **information summary F (page 12)**). The raw GWR triggered source sample(s) must be clearly labeled to distinguish them from the three distribution repeat samples. See **information summaries K (page 17) and L (page 18)** detail the sampling schedule for an imaginary water system.

6. What if some positive samples also contain *E. coli*/fecal bacteria?

If *E. coli*/fecal bacteria are present in a combination of routine and repeat samples, a violation of the *E. coli*/fecal coliform standard occurs. **The detection of *E. coli*/fecal bacteria is an immediate risk to health and requires immediate action.** As a TNC, you must:

1. Contact DENR within 24 hours of learning of the presence of *E. coli* bacteria in a sample.
2. Within 24 hours of learning of an *E. coli* violation, issue a public notice with a boil water order. The public notice must be posted wherever there is access to the water and must be delivered to each customer.
3. Continue to deliver/post the public notice for as long as the violation exists but in no case less than 7 days.
4. Take appropriate actions to correct the violation.
5. Continue sampling as required by the RTCR and GWR.
6. Within 10 days of issuing it, submit to DENR a copy of the public notice you posted/delivered that includes a description of corrective actions along with the completed “Certificate of Public Notice Distribution”.

Monday-Friday DENR can be reached at 605-773-3754. On weekends, please call 605-280-6831.

7. Who writes the sampling regulations?

The sampling requirements are rules written and passed by the USEPA which are in turn, adopted by the state of South Dakota.

8. If I serve bottled water to my customers for drinking, do I still have to sample my water?

Yes! The USEPA has defined human consumption as drinking, AS WELL AS bathing, showering, cooking, food preparation, dishwashing, handwashing and oral hygiene. **Sampling is required if you or your customers use the water for any of these purposes.**

9. My TNC is seasonal. Does that affect the sampling requirements?

Sampling is required only during the months the facility is open to the public. If the TNC is open half of a month, sampling is required during that month. For example, if the TNC is open May 1 through September 30, a sample is required in May, June, July, August and September. If the TNC is open May 1 through September 8, a sample is required in May, June, July and August. If the TNC is open May 28 through October 6, a sample is required in June, July, August and September.

10. What is a startup procedure?

Water systems that depressurize/drain all or any part of their water lines/reservoir during the off-season must complete startup activities on water system components and collect a safe pre-season sample before the facility opens and serves water to any customers. These activities are designed to prepare the water system and identify potential contamination problems early so they can be addressed before water is served. The completed startup procedure and safe bacteria result must be submitted to DENR before opening. A copy of the startup procedure document is available upon request and on the DENR website.

11. What is an assessment?

A level 1 and 2 assessments are evaluations meant to identify the possible presence of defects in the distribution system, wells, reservoirs, treatment or coliform monitoring practices that may be the likely reasons that the water system had a positive sample. A level 2 assessment is more detailed than a level 1 and must be performed by someone other than water system personnel (a new fresh of eyes) who is qualified and approved. It contains the same elements as a level 1 assessment but is investigated in greater detail. Assessments will help "find" the issue so you can "fix" the issue.

12. When should I collect my routine bacteria sample?

Collect and mail the sample as early in the month as possible. If routine and repeat samples are positive, you have the rest of the month to address the problem before the next month starts. Collect bacteria samples on a Monday, Tuesday, Wednesday or Thursday and they must be mailed the same day they are collected.

13. What does the lab test for in my routine bacteria sample?

The laboratory tests for a group of bacteria called the total coliform bacteria. Total coliform bacteria are widespread in the environment and are found in the soil, on plants and are present in high numbers in the intestinal tract of humans and other warm-blooded animals. Most of the bacteria in this group are not harmful but are an indication that some type of contamination has occurred and that disease-causing microorganisms may be present. If a routine sample is positive (total coliform bacteria are present), the lab must test that sample further to see if any of those coliform bacteria are *E. coli*/fecal coliform. If *E. coli* are present, fecal contamination from a human or animal has occurred and is an acute risk to health and a public notice and boil water order are required. Contamination may be the result of a number of things including surface runoff, septic tank drainage, biofilm growth in the water lines and following water system repairs or replacements without proper disinfection afterwards.

14. I collected a positive routine bacteria sample and collected repeat and raw GWR triggered samples. Two of three repeat samples were positive. Shouldn't all the samples be either positive or safe?

To produce a positive sample, at least one bacterium must make its way into the sample bottle. A very low concentration of bacteria in the water decreases the chances of a bacterium making its way into each of the sample bottles. Most bacteria do not float freely in the water but congregate and attach themselves to the pipe surface forming a biofilm. Periodically part of this biofilm will break free from the pipe surface and may enter one sample bottle but not the next sample bottle.

15. What should I do if I touch the lip of the bottle or the cap or drop it?

Do not use that bottle and collect the sample in a different bottle. It is possible that the touched or dropped sample bottle is now contaminated, causing the water sample to be positive even if the water supply is safe. Never blow into the bottle or rinse it. If you use a potentially contaminated sample bottle and the sample turns out to be positive, you still must go through the repeat and raw GWR sampling procedure. The federal rule does not allow the state to waive any of these samples. Collect samples carefully. They cannot be invalidated because they were collected using poor technique.

16. Can I collect a bacteria sample and have it not count as a compliance sample?

Yes! When you complete the submitter form with your name, water system name, EPAID#, address, etc, circle "Other" as the purpose of the sample. If you circle "Routine" or "Repeat of Unsafe Sample" or "GWR triggered", the sample WILL count for compliance whether it is safe or not. **The purpose of the sample cannot be decided after the test result is determined.** For example, if you collect a sample and label it as "Other" and then discover it is safe, that sample cannot then be changed to a monthly "routine" compliance sample. If you collect a sample and label it as "Routine" and then discover it is positive, that sample cannot then be changed to an "Other" noncompliance sample.

17. Is there any way to get out of collecting the repeat and raw GWR triggered samples?

No! DENR cannot waive the "repeat samples after a positive routine sample" or the "GWR triggered source sampling". The routine, repeat and GWR triggered samples give a water system a better chance of detecting contamination problems that may exist so those problems corrected. It also allows the system to quickly collect more samples on which to determine the effectiveness of any corrective action and the current water quality. **See information summaries F (page 12) and J (page 16)** explain the "repeat and GWR triggered sampling" requirements.

18. When is public notification required?

When a violation occurs, public notification is required. Violations that will prompt a public notice.

1. Multiple routine and repeat samples are *E. coli*/fecal positive samples occur during a month.
2. Fail to collect all three repeat samples after an *E. coli*/fecal positive routine sample.
3. Fail to collect all required routine samples during a month.
4. Fail to perform and/or submit an assessment.
5. Fail to correct an identified sanitary defect after an assessment.
6. Fail to perform and/or submit a startup procedure.
7. Fail to call DENR after an *E. coli* positive sample occurs.
8. Fail to collect a nitrate sample or a nitrite sample.
9. Exceedance of the nitrate and/or nitrite standard.
10. GWR triggered samples are *E. coli*/fecal coliform positive during a month.
11. Fail to collect raw GWR triggered water samples.

19. If my water system does incur a violation, then what?

The National Primary Drinking Water Regulations require that a water system deliver and post a public notice for each violation that occurs, as noted in question 18. The notice must be issued within a designated time frame depending upon the type and severity of the violation. The issuing deadline is noted in the violation letter you will receive. The notice must remain delivered/posted for as long as the violation exists but in no case, less than seven days, even if the violation or situation is resolved within seven days. When a violation occurs, the department may provide you with an example public notice to follow. A copy of the notice you post and deliver, plus a completed "Certificate of Public Notice Distribution" must be mailed to the DENR-Drinking Water Program within 10 days after it is posted. If the water system does not post/deliver and submit its own public notice, one will be issued on the water system's behalf in a local newspaper and the water system will incur a violation for failing to issue the required public notice. If several violations accumulate, the DENR must proceed with enforcement including a Notice of Violation and a Compliance Agreement. It outlines what actions the water system must take to achieve compliance with the regulations. If compliance is not achieved, the case will be referred to the Attorney General's office for monetary penalties.

20. What do I put in the public notice?

The public notification requirement is designed to protect public health. It is based on the public's right to know of potential problems or possible health concerns from the contaminants in the water they are using and if a water system has met all requirements. It also is a way to educate the public, protect public health, build trust with consumers through open and honest sharing of information. USEPA has outlined specific items that must be included in a public notice. **See information summary I (page 15)**. If these items are not included or are not correct, the public notice will be rejected and it must be reissued. If your water system incurs a violation, you will receive a violation letter and a public notice you may use. The link to a public notice booklet is at <https://denr.sd.gov/des/dw/public.aspx>.

21. Where do I collect routine bacteria samples?

Routine bacteria samples must be collected at locations in the distribution system where the customer has access to the water. The samples must be representative of the water in the distribution system; i.e., after the water leaves the well and any storage tank and treatment. Routine bacteria samples used for compliance cannot be collected at a well or a reservoir. Each TNC is required to have a bacteria sample site plan on which is assigned routine, repeat and GWR triggered sample site locations and that has been approved by DENR. Specifics about sample site plans and choosing proper sampling locations can be found in **information summary G (page 13)**. Any addition to a water system like a new well or reservoir or expansion of campsites/cabins/RV sites should prompt you to update the sample site plan.

22. Where do I collect bacteria repeat and GWR follow-up samples?

Repeat samples must be collected at and around the routine site that was positive. The first repeat must be collected at the same point as the original positive sample and the second and third from the assigned repeat sites that are upstream and downstream that you assigned on your sample site plan. The second and third must be within five water service connections of the positive routine site. Triggered GWR raw samples must be collected from each well in use at the time the positive routine sample was collected. See **information summaries F (page 12) and J (page 16)**.

23. Where do I collect the nitrate and nitrite samples?

Nitrate and nitrite samples must be collected at the entry point to the distribution system. These samples must be representative of the water BEFORE it enters the distribution lines but AFTER any treatment that may exist. In other words, they need to be collected as close to the well as possible but AFTER any treatment that may exist. See **information summary H (page 14)**.

24. Is continuous chlorination required for a TNC?

Not at this time. DENR does recommend that all TNC install and use a continuous chlorinator. A continuous presence of chlorine helps ensure that water is bacteriologically safe and can control biofilms (congregations of bacteria in the water lines). If a TNC under a DENR enforcement order, continuous chlorination may be required. We do not recommend using a pellet dropper type chlorinator because it is impossible to get raw GWR triggered samples as is required by the GWR.

25. Does my TNC need to have a certified operator?

If a TNC continuously chlorinates and serves less than 500 people per day, the person in direct responsible charge of the water system must obtain a "Small Water Treatment System" certificate. If a TNC continuously disinfects and serves greater than 500 people per day, a Class I Water Treatment certificate is required. To become certified, the person in direct responsible charge of the water system must pass an exam given by the Board of Operator Certification. The South Dakota Association of Rural Water Systems provides water operator training. For more information on class dates and locations, contact the SDARWS, 203 Center Street West, PO Box 287, Madison, SD. 57042. You may also call them at 605-556-7219 or visit their website at www.sdarws.com. If you have questions on certification requirements or the exams, contact Rob Kittay at 605-773-4208 or visit the website at <http://denr.sd.gov/des/dw/opcertqa.aspx>. Just because a TNC may not be required to have a certified operator that does not lessen the importance of regular operation and maintenance and sampling to ensure sufficient water quality.

26. I have the opportunity to connect my TNC to a municipal water supply or to rural water. Do I still have to sample after that occurs?

When your water system is receiving and using 100% water from an approved public water system at ALL taps, the TNC is no longer required to collect samples.

27. What records am I required to keep?

The drinking water standards require that the bacteria results be kept for at least five years and that the nitrate and nitrite results be kept for at least 10 years. The actual lab tests may be kept or you can record the appropriate data onto tabular summaries. The summaries must include:

1. The date, place and time of sampling and the name of the person who collected the sample.
2. Identification of the sample as a routine, repeat, GWR or other purpose sample.
3. Date of analysis.
4. Laboratory and person responsible for performing analysis.
5. Analytical method used.
6. Results of the tests.

In addition, you must keep actions taken to correct violations for three years. Also, you must keep sanitary surveys, associated communications and corrective actions taken for 10 years.

28. I drilled a new well recently. What tests must be done on it?

Any new well drilled in South Dakota must have a new well water analysis performed. This one-time test consists of five laboratory parameters – bacteria, nitrate, sodium, sulfate and conductivity. Also, according to the GWR, a raw, untreated source water sample must also be analyzed. If the well will be used to supply a TNC, it must be sampled for bacteriological quality, nitrate and nitrite, as was outlined under question #2.

29. What is the purpose of all these regulations anyway?

The regulations are meant to ensure reasonable protection of the health of people who consume the water. In other words, public health protection. USEPA does this by setting standards for contaminants that, when exceeded, may be harmful and ensuring monitoring for these contaminants is done in a reasonable manner.

III. INFORMATION SUMMARIES

A. How to Collect a Bacteriological Sample

Proper sampling technique is extremely important in obtaining accurate bacteria sample results. An improperly collected coliform sample may indicate bacteriological contamination when the water may actually be safe. Avoid the cost of repeat and GWR triggered water sampling by using good sampling procedures.

Carefully follow these steps when taking a sample for bacteriological testing:

- (1) **Select the sampling point.** The sampling point must be collected from a faucet which water is commonly used by the public.
 - The sampling point should be a non-swivel faucet whenever possible.
 - Remove any aerator or screen.
 - It should not be a faucet that leaks because leaking faucets can promote bacterial growth.
 - If an outside faucet is used, disconnect any hoses or attachments.
 - Do not sample from fire hydrants or frost-free faucets.
 - Do not sample from faucets that serve water that has gone through treatment devices such as carbon filters or softeners.
 - Do not dip the bottle in reservoirs or storage tanks in order to collect the sample.
- (2) **Use only sample bottles provided by the lab that does your analysis.** Bottles from the laboratories are sterile. Do not use a bottle if the cap is loose or has come off. Do not rinse the bottles or remove the powdered chemical inside.
- (3) **Do not open the sample bottle until the moment of filling.** This helps prevent contamination of the sterile sample bottle.
- (4) **Flush the line.** Run water through the faucet for at least two to three minutes before opening the bottle to take the sample. If tap cleanliness is questionable, swab or spray a solution of sodium hypochlorite (household bleach) on faucet before sampling and then let water run for additional two to three minutes after treatment. If sampling from a mixing faucet, run hot water for two minutes then cold water for two to three minutes.
- (5) **Reduce the water flow to a steady stream, uncap the sample bottle, and gently fill the bottle.** Hold the bottle near the base and be sure not to touch the inside of the sample bottle or the inside of the cap. Do not set the cap down while taking the sample. Any of these things can contaminate the sample. Be careful not to splash out the reagent already in the bottle. Fill the bottle between the 100 and 120 ml lines. There must be room in the bottle to shake the water. Do not allow water to "run over" bottle top.
- (6) **Replace the cap immediately.** Be sure that it is tight so it cannot leak. If you drop the cap or think you have contaminated the sample, do not use it. Use another bottle and collect a new sample.
- (7) **Fill out lab submitter form.** Be sure to fill the form out as completely as possible. Be sure to record the EPAID#, sample site number and site location/description on the submitter form.

- (8) **Mail or deliver the sample to the lab immediately.** The lab cannot accept samples older than 30 hours. We recommend collecting samples during the first two weeks of each month and sample only on Monday, Tuesday, Wednesday or Thursday and mail the same day.

B. Disinfection Procedure for a Well

A water well should be thoroughly cleaned and disinfected with a strong chlorine solution after:

- | | |
|------------------------------|---|
| 1. ORIGINAL CONSTRUCTION | 4. A PERIOD OF NONUSE |
| 2. ANY REPAIR OR MAINTENANCE | 5. TWO OR MORE "UNSAFE" BACTERIOLOGICAL |
| 3. FLOODING | SAMPLES ARE TRACED TO THE WELL |

Adequate chlorine disinfection requires a certain chlorine dosage for a minimum contact time - 100 parts per million for 2 hours or 50 parts per million for 8 hours or 25 parts per million for 24 hours.

Chlorine for disinfection can be either 5.25% sodium hypochlorite solution or 65% calcium hypochlorite powder. A 5.25% hypochlorite solution is common household bleach such as "Hilex", "Chlorox" or "Purex" available at grocery stores and supermarkets. Do not use the scented varieties. The 65% calcium hypochlorite powder is available from chemical suppliers and is known commercially as "HTH", "Perchloron" or "Pittchlor".

Recommended Procedures

- Determine chlorine dosage for the desired contact time from the following table:

AMOUNT OF CHLORINE NECESSARY PER 10 FEET OF WATER IN WELL

Inside diameter of well casing	5.25% sodium hypochlorite (bleach)			65% calcium hypochlorite		
	100 ppm for 2 hrs	50 ppm for 8 hrs	25 ppm for 24 hrs	100 ppm for 2 hrs	50 ppm for 8 hrs	25 ppm for 24 hrs
1 1/4 inches	1/8 fl oz	--	--	--	--	--
2 inches	1/2 fl oz	1/4 fl oz	1/8 fl oz	--	--	--
3 inches	1 fl oz	1/2 fl oz	1/4 fl oz	--	--	--
4 inches	1 1/2 fl oz	3/4 fl oz	3/8 fl oz	--	--	--
6 inches	4 fl oz	2 fl oz	1 fl oz	1/4 oz	1/8 oz	1/16 oz
8 inches	7 fl oz	3 1/2 fl oz	1 3/4 fl oz	1/2 oz	1/4 oz	1/8 oz
10 inches	10 fl oz	5 fl oz	2 fl oz	3/4 oz	3/8 oz	3/16 oz
12 inches	2 cups	1 cup	1/2 cup	1 oz	1/2 oz	1/4 oz
18 inches	4 1/2 cups	2 1/4 cups	1 1/8 cups	2 1/2 oz	1 1/4 oz	5/7 oz
24 inches	7 1/2 cups	3 3/4 cups	1 7/8 cups	4 1/2 oz	2 1/4 oz	1 1/8 oz
36 inches	17 1/2 cups	8 3/4 cups	4 3/8 cups	10 oz	5 oz	2 1/2 oz

*ppm = parts per million

1 heaping tablespoon of 65% chlorine powder = 1/2 oz.

8 fluid ounces = 1 cup

- Prepare a chlorine solution, lift well pump if possible, and pour the chlorine solution into the well.
- Lower the pump, turn on all faucets and operate the pump until a chlorine odor is noticed at all taps.
- Leave the chlorine solution in the well for the recommended contact time. Do not use the water.
- At the end of the contact time, pump the well to waste until the chlorine odor cannot be detected. **DO NOT ALLOW THE WATER TO ENTER A RIVER, LAKE OR STREAM.**
- Pump the well for a considerable period of time and collect a bacteriological water sample after one week of use and submit it for testing.

Or you may use the following chart to calculate the quantity of bleach recommended.

Quantity of Household Laundry Bleach (5.25% chlorine) Required to Develop a Concentration of 100 ppm of Chlorine in Clear Water Standing in the Well*

Depth of Water in Well	Well Diameter					
	6"	8"	10"	24"	32"	36"
10 feet	1 cup	1 cup	2 cups	3 quarts	4 quarts	6 quarts
20 feet	1 cup	2 cups	4 cups	5 quarts	8 quarts	10 quarts
30 feet	2 cups	4 cups	3 pints			
40 feet	1 pint	2 pints	4 pints	TOO MUCH CHLORINE IS BETTER THAN TOO LITTLE		
60 feet	2 pints	3 pints	6 pints			
80 feet	2 pints	4 pints	7 pints			
100 feet	3 pints	5 pints	4 quarts			
150 feet	5 pints	4 quarts	6 quarts			

*Adapted from Manual of Individual Water Supply Systems, EPA Water Supply Division

**In situations where it is inconvenient to determine depth of water or diameter of a drilled well, a minimum of 1/2 gallon of household bleach may be used for wells up to 8 inches in diameter with water estimated to be less than 80 feet deep. One gallon should be used for similar size wells with water deeper than 80 feet. In case of a well yielding more than 50 gallons per minute, special procedures are required.

C. Disinfecting and Maintaining a Cistern

A ground reservoir or cistern or water treatment plant basin should be thoroughly cleaned and then disinfected with a strong chlorine solution after:

- | | |
|------------------------------|---|
| 1. ORIGINAL CONSTRUCTION | 4. A PERIOD OF NONUSE |
| 2. ANY REPAIR OR MAINTENANCE | 5. TWO OR MORE "UNSAFE" BACTERIOLOGICAL |
| 3. FLOODING | SAMPLES ARE TRACED TO THE WELL OR STORAGE |

Adequate chlorine disinfection requires a certain chlorine dosage for a minimum contact time - 100 parts per million for 2 hours or 50 parts per million for 8 hours or 25 parts per million for 24 hours.

Chlorine to disinfect a water tank or cistern can be either a 5.25% sodium hypochlorite solution or 65% calcium hypochlorite powder. A 5.25% hypochlorite solution is common household bleach such as "Hilex", Chlorox" or "Purex" available at grocery stores and supermarkets. Do not use the scented varieties. The 65% calcium hypochlorite powder is available from chemical suppliers and is known commercially as "HTH", "Perchloron" or "Pittchlor".

Recommended Procedures

1. The unit to be disinfected should be full of water.
2. Determine recommended chlorine disinfection dosage for the desired contact time from the following table:

AMOUNT OF CHLORINE NECESSARY FOR DOSAGE AND TIME COMBINATIONS

Volume of Box, Basin, Reservoir or Cistern	5.25% sodium hypochlorite (bleach)			65% calcium hypochlorite		
	100 ppm for 2 hrs	50 ppm for 8 hrs	25 ppm for 24 hrs	100 ppm for 2 hrs	50 ppm for 8 hrs	25 ppm for 24 hrs
50 gal	1 1/2 cups	3/4 cup	3/8 cup	--	--	--
100 gal	3 cups	1 1/2 cups	3/4 cup	--	--	--

200 gal	6 cups	3 cups	1 1/2 cups	--	--	--
500 gal	1 gal	7 1/2 cups	3 3/4 cups	9 1/2 oz	--	--
1,000 gal	2 gal	1 gal	7 1/2 cups	1 lb 3 oz	9 1/2 oz	--
2,000 gal	4 gal	2 gal	1 gal	2 lb 6 oz	1 lb 3 oz	9 1/2 oz
5,000 gal	--	5 gal	2 1/2 gal	6 lb	3 lb	1 lb 8 oz
10,000 gal	--	--	5 gal	12 lb	6 lb	3 lb
20,000 gal	--	--	--	24 lb	12 lb	6 lb
50,000 gal	--	--	--	60 lb	30 lb	15 lb
100,000 gal	--	--	--	120 lb	60 lb	30 lb

*ppm = parts per million

3. Completely mix the chlorine solution throughout the unit to be disinfected.
4. Leave the chlorine solution in the unit for the recommended contact time.
5. Do not use the heavily chlorinated water.
6. At the end of the contact time, remove the water from the unit and discharge to waste. **DO NOT ALLOW THE WATER TO ENTER A RIVER, LAKE OR STREAM.**
7. Fill the unit with clean water and collect a water sample for bacteriological testing after one week of use.

Cistern Maintenance and Guidance

A cistern should have a watertight roof that excludes birds, animals, insects and excessive dust. It must have a vent AND an overflow. The overflow cannot be considered the vent and vice versa. The manhole hatch should have raised sidewalls. The lid should fit down and around the manhole hatch. It is similar to a shoebox lid fitting down and around a shoebox. The access manhole should be locked and, if needed, a fence built around the cistern to exclude trespassers or vandals that could contaminate the water or damage the structure. A cistern should be located at least 50 feet from sewers, septic tanks, drainfields, standing water and other potential sources of contamination. The area surrounding it should be graded to promote runoff away from the cistern. It should not be built in an area susceptible to flooding. A cistern should be inspected every couple of years. A visual inspection can detect structural damage and signal needed repairs. Accumulation of sediment will dictate cleaning frequency. After any work is done it must be disinfected. The disinfectant water needs to be removed and then the cistern refilled. A constant chlorine residual should be maintained in the cistern to prevent bacteria regrowth and this is best accomplished by continuously chlorinating the entire water system. If you do not continuously chlorinate, manually adding bleach to the cistern is helpful though this is not nearly as effective. ½ cup of bleach added to 1,000 gallons of water will provide 1.5 ppm chlorine residual in the water in the cistern. **NOTE THAT THE INTERIOR OF THE CISTERN IS CONSIDERED A CONFINED SPACE AND MAY BE AN OXYGEN DEFICIENT ENVIRONMENT. ENTRY SHOULD NOT BE MADE UNLESS ALL SAFETY MEASURES ARE OBSERVED.**

D. Reopening a Seasonal Water System

After a water system depressurizes/drains their water lines/reservoir for winter, any water not completely drained from the water system becomes stagnant. A startup procedure of actions that can be taken before the water is served to any customers is available is available upon request and on the website. <http://denr.sd.gov/des/dw/RevisedTCR.aspx>

1. Complete and submit the startup procedure, if required to do so by DENR.
2. Check the condition of the well casing and see that the well cap is still securely in place. Remove the cap and use a shop vac to clean any spiders or webs or bugs that may be present.
3. Disinfect the well, storage tank and the entire distribution system following the instructions given previously.
4. After drawing the highly chlorinated water through all the water lines and reservoirs, let it set overnight, flush the highly chlorinated water out of the system completely (until you can no longer detect any bleach smell).
5. Wait about one week after flushing is completed and send in a pre-season bacteria sample **BEFORE** your water system opens to the public.

E. Wells in Pits

According to South Dakota's Well Construction Standards, no new wells can be terminated in a pit, room or space that is below the ground surface. Well pits were common before the introduction of the pitless adapter so a well house would not have to be built and heated to prevent freezing. Pits can easily be flooded and the water does not have the opportunity to flow quickly away from the well casing. Water held in the pit for too long can seep back into and around the well casing and introduce contamination in that manner. Pits are not easy to enter for inspection or repair and frequently suffer from lack of attention. A poorly maintained pit can collect many items (water, snakes, bugs, rodents, weeds, litter, dirt, pine cones, etc) that can contaminate a water system. South Dakota's Well Construction Standards state that when a well in a pit is rehabilitated, the pit shall be eliminated. The casing and wellhead can be extended above the ground surface and a pitless adapter can be used.

F. Routine, Repeat and GWR Triggered Bacteria Procedure

TNC public water systems must monitor the microbiological quality of their drinking water monthly. The number of samples submitted each month is dependent on the number of people served.

Routine Sampling: Routine samples must be collected from the routine sites approved on your sample site plan. Routine samples can be taken on any Monday, Tuesday, Wednesday or Thursday of a month. If samples must be mailed, they need to be taken just prior to the mail leaving your post office. The submitter form must be completed properly with the Purpose of the Sample marked "Routine". Also record the EPAID#, sample site number and site location/description on the submitter form.

Systems must collect routine samples at sites which are representative of water throughout the distribution system. These sites are designated on a written sample site plan and approved by DENR. Routine samples CANNOT be collected at the wellhead or at a reservoir. The sites and plan are subject to State review and revision. See **information summary G (page 13)** entitled "How to Develop a Bacteriological Sample Site Plan."

Repeat Sampling: If a positive routine sample occurs, three repeat samples per positive routine sample must be submitted. Repeat samples must be collected from the repeat sites approved on your sample site plan. They are collected at, upstream and downstream of the positive routine site.

Repeat samples cannot be collected at the well. They must be at and clustered around the positive location. These samples must be marked as "repeat" on the sample submission form. Also note if the sample is from upstream, downstream or the original positive location.

Raw GWR Triggered Sampling: If a positive routine sample occurs, you must submit raw or untreated GWR triggered samples from each well that was in use at the time the positive routine sample was collected. GWR triggered samples must be collected from the GWR sites you assigned on your sample site plan.

One raw GWR triggered sample per positive routine sample per source is required. In other words, if a water system submits three positive routine samples in a month and were using two wells at the time the routine sample was collected, it must collect six raw GWR samples, three from each of the two wells. Spread them out by an hour.

3 positive routine samples X 2 wells = 6 raw GWR samples (three from each of the wells)

If a raw GWR triggered sample is *E. coli* positive, five more raw GWR triggered source samples must be submitted. If any of these five additional triggered samples are *E. coli* positive, your system is required to install continuous chlorination and other treatment to achieve 4-log removal. Any *E. coli* positive triggered water sample also requires immediate public notification and a boil water order.

If you cannot get a raw water sample directly from your well(s), you must install a sampling tap at the well(s) to facilitate taking this sample(s).

Summary of Repeat and Raw GWR Triggered Sampling as per the RTCR and the GWR: The steps below summarize the follow-up sampling procedure and sampling point locations after a positive routine sample occurs. Follow your approved sample site plan.

1. One repeat from the point of the original positive routine,
2. One repeat from within five service connections upstream of the positive point,
3. One repeat from within five service connections downstream of the positive point,
4. Raw GWR triggered samples from each well in use at the time the positive routine was collected.

This sampling is necessary to determine if the contamination stems from a distribution system issue or a source water issue.

All repeat and raw GWR triggered samples must be collected on the same day and within 24 hours after you receive notification of the positive routine sample. However, if samples must be mailed to the laboratory and notification is received on a Thursday, Friday, or Saturday, repeat and GWR sampling must be done on the next business day. SYSTEMS SHOULD HAVE AT LEAST FIVE SAMPLE BOTTLES ON HAND AT ALL TIMES FOR THIS FOLLOW-UP SAMPLING.

G. How to Develop a Bacteriological Sample Site Plan

A sample site plan is a schematic of your entire water system on which is marked the sites or locations where the routine, repeat and raw GWR triggered bacteriological samples will be collected. When the plan is completed, submit it to DENR for review and approval. It is your responsibility to report site or water system updates to the DENR as they occur. Changes include adding or abandoning a well or storage tank, additions to the distribution system like more campsites or cabins, or moving a sample site.

Follow these steps to prepare a proper microbiological sample site plan.

Step 1. Compile a schematic or map of your entire water system. It should include water lines, reservoirs, wells and/or other water sources. The locations of deadends are important when you start choosing routine sample sites. The map must represent the water system as it presently exists.

Step 2. Determine the number of routine sample sites that your system needs. Refer to the table below.

TABLE 1 - Number of Routine Sample Sites Needed

Population Served	# of Sites Required
25-1000	5
1001-2500	7
2501-3300	9

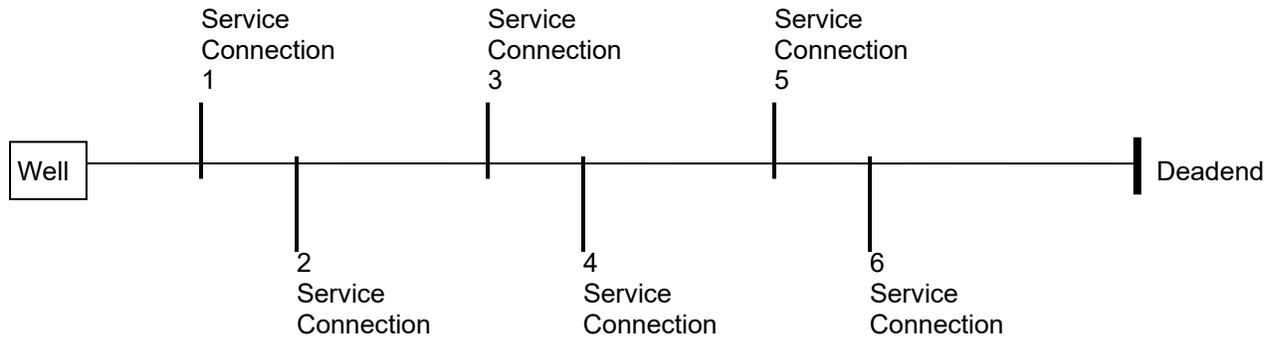
Step 3. Review your water system schematic and determine where the best locations for routine and repeat sample sites. Refer to criteria below to help you choose valid locations.

- Each routine site **must** have at least one service connection both upstream and downstream from it. In other words, routine sites cannot be located to a last service connection on a water line that comes to a deadend.
- Routine sites must be evenly distributed throughout the distribution. They cannot be clustered into a small area.
- Rotate through each of the sites monthly. All approved routine sites must be used at least once per year and one site cannot be used for more than 50% of routine samples.
- Sites need to be accessible at reasonable times of the day and preferably throughout the year.
- You must be able to flush the sampling tap so fresh water can be obtained for the sample.
- A tap suitable for sampling is needed – preferably a single, cold water, nonswivel tap, that can be disinfected by bleach.

Step 4. With a dot, plot on the map each routine site and assign them a number. Note the number of the cabin/RV pad/building and what tap you intend to use at each site.

Step 5. With dots, plot one repeat sample site that is within five service connections **downstream** of each routine sample site and one repeat sample site that is within five service connections **upstream** of each routine sample site. Assign them as upstream (U) or downstream (D) from the associated routine site number. Note the cabin/RV pad/building and what tap you intend to use at each site. **These sites are used only after a routine sample is positive.**

Step 6. Mark the GWR triggered locations on the map. These samples are collected directly from each well prior to any treatment. **These sites are used only after a routine sample is positive.** Find this GWR site(s) now before a positive sample occurs!



Water connections 1 and 6 are not eligible routine sites. 1 has no upstream water connections and 6 has no downstream water connections.

If water connection 3 is the routine site, repeat upstream sites could be connections 1 or 2 and repeat downstream sites could be connections 4, 5 or 6.

H. Nitrate and Nitrite Sampling

These samples must be collected at the entry point(s) to the distribution system. In other words, collect them as close to the well as possible and if you treat the water in any way (like chlorination, for instance), collect the sample from the first tap after treatment.

The MCL or standard for **nitrate** is 10 mg/L or ppm.

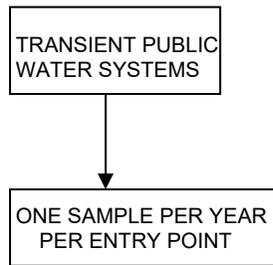
The MCL or standard for **nitrite** is 1 mg/L or ppm.

One nitrate sample is due each year from each entry point. A confirmation sample is required if a sample exceeds the standard of 10 ppm. Sampling frequency will increase if a sample exceeds the standard.

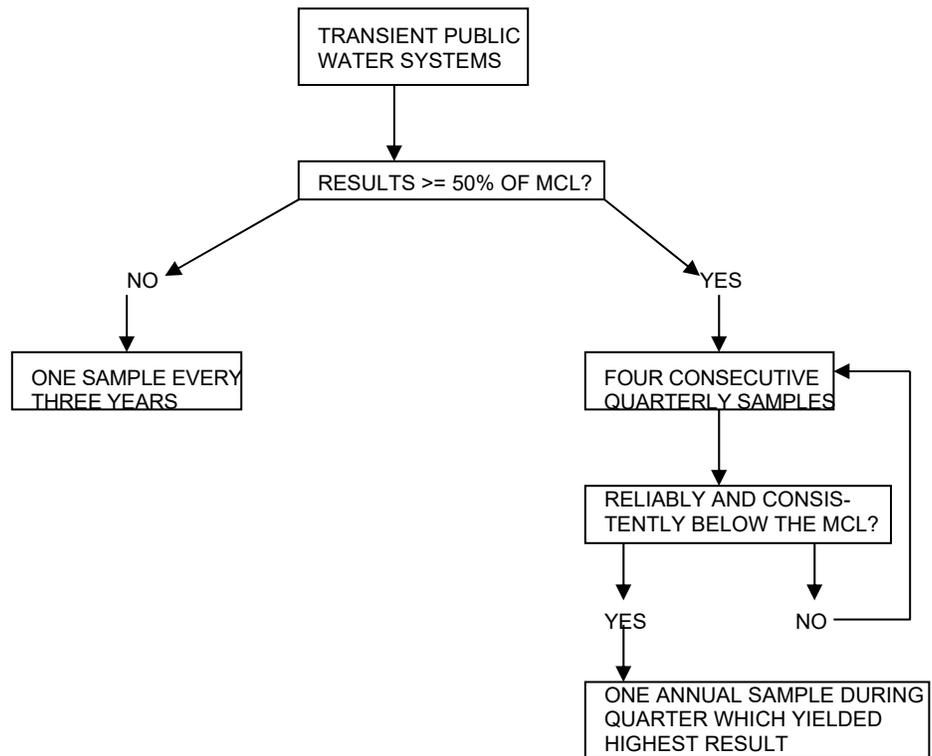
One nitrite sample is due every three years from each entry point. A confirmation sample is required if a sample exceeds the standard of 1 ppm or is greater than or equal to 0.5 ppm.

High nitrates and nitrites are of health concern because when ingested and absorbed into the blood stream, they transform the hemoglobin (the oxygen-carrying component of the blood) and make it unable to carry oxygen. When this occurs, no oxygen reaches the body's tissues and the person affected shows symptoms of asphyxiation and could potentially die. The transformed hemoglobin is called methemoglobin. This disease is known as methemoglobinemia or more commonly, "blue-baby syndrome" since the skin turns blue due to lack of oxygen. Human blood contains an enzyme that changes the methemoglobin back to hemoglobin but children less than one year old are less capable of making that change and are therefore more susceptible to the affects caused by water with a high nitrate concentration. DENR recommends that children less than one year old and pregnant women not consume water containing a high nitrate and/or nitrite level.

NITRATE MONITORING FLOW CHART



NITRITE MONITORING FLOW CHART



I. What Must Be in a Public Notice?

A TNC that has incurred a violation must notify persons served by the water system by means of a public notice. This requirement is based on the public's right to know about potential problems with the water and health effects. Some types of violations that a TNC public water system must issue a public notice for are listed in the *Frequently Asked Questions* section under question #18, "When is Public Notification Required?" If a proper public notice is not issued for a violation, the water system will receive a second violation for failing to issue the public notice.

The public notice must contain some basic information.

1. A description of the violation or situation, including contaminant levels if applicable.
2. When the violation or situation occurred.
3. Any potential adverse health effects. Standard Health Effects language must be used and this is language written by EPA and it must be included word for word in the public notice.
4. The population at risk.
5. Whether alternative water supplies should be used.
6. What actions consumers should take.
7. What the water system is doing to correct the violation or situation.
8. When the water system expects to return to compliance or resolve the situation.
9. The name, business address and phone number of the water system owner or operator.
10. A statement encouraging distribution of the notice to others, where applicable.

The public notice must be posted at all locations where consumers have access to the water and delivered to customers when arriving to the facility. It must be written so it is easily understandable and must remain posted and delivered for as long as the violation exists but in no case, less than seven days, even if the violation or situation is resolved within seven days. **A copy of your public notice plus the "Certificate of Public Notice Distribution" must be sent to the Drinking Water Program within 10 days after it is posted.**

J. Ground Water Rule Provisions

The first major provision of the rule requires raw GWR triggered sampling for *E. coli*/fecal bacteria. If a routine bacteriological sample is positive, raw GWR triggered sampling is required. These are in addition to the repeat samples collected in the distribution system. If *E. coli* is identified in the GWR triggered sample(s), five more GWR triggered samples from each well that is positive are required to confirm the presence of *E. coli*.

If you cannot get a raw water sample directly from your well(s), you must install a sampling tap on the well(s) to facilitate taking this sample(s). A GWR triggered sample must be collected from each well that was pumping at the time the original positive routine was collected.

If *E. coli* (fecal indicators) is confirmed in any of those five GWR triggered samples, the water system must post a public notice, issue a boil water order and take corrective action. The water system must implement the following corrective actions:

- Deliver/post a public notice that includes a boil water order.
- Correct all significant deficiencies identified.
- Provide an alternate source of water.
- Eliminate the source of contamination.
- Provide treatment that reliably achieves at least 4-log removal of viruses (using inactivation, removal, or a state-approved combination of 4-log inactivation and removal) before or at the first customer for the ground water source.

The second major provision of the rule requires that corrective action be taken if a significant deficiency is identified during a sanitary survey.

A sanitary survey is defined as “an on-site review of the water source, facilities, equipment, operation, and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation, and maintenance for producing and distributing safe drinking water.” The department performs a sanitary survey every five years. If a significant deficiency is identified, it must be corrected within 30 days.

A significant deficiency includes “but is not limited to, defects in design, operation or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the State determines to be causing, or have potential for causing, the introduction of contamination into the water delivered to consumers.”

The chart below lists the eight elements that are integral components of a sanitary survey and an example significant deficiency associated with each element. These are just some examples of significant deficiencies that may contribute to increased risk of microbial contamination.

Eight Key Elements of a Sanitary Survey and
An Example of a Significant Deficiency Identified With Each

Sanitary Survey Key Elements	Significant Deficiency for Each Element
1. Source	Well casing is improperly sealed.
2. Treatment	Not in compliance with applicable micro-biological treatment technique requirements under the Ground Water Rule.
3. Distribution/Transmission	Repeated/frequent Total Coliform Rule violations or sample detections of <i>E. coli</i> .
4. Finished Water Storage	No screen on vent and/or overflow.
5. Pumps	Inadequate pump capacity resulting in low or negative pressures.
6. Monitoring/Reporting	Bacteria sample site plan is not being followed

	or needs updating or one has not yet been developed.
7. System Management/Operation	Compliance monitoring records are not being maintained.
8. Operator Certification Compliance	The operator in direct responsible charge is not certified at the level required by the State for water treatment or distribution.

K. Example of Bacteriological Sampling Over the Course of a Year for a TNC With ONE Well

January – A routine sample submitted and only “Routine” should be circled. It is total coliform positive. Three repeat samples and one raw GWR triggered sample is submitted immediately. “Repeat” should be circled, and whether the sample came from the “Original Site” or “Downstream” or “Upstream” of the positive routine site. “GWR triggered” must be circled on the GWR triggered sample. All repeat samples are total coliform bacteria present and the raw GWR triggered sample is *E. coli* present. Five additional raw GWR triggered samples from the well are required to confirm *E. coli* presence. These samples are safe and no more sampling is required. An assessment is required.

February – A routine sample is submitted and only “Routine” should be circled. The routine sample is safe and no more samples are required.

March – A routine sample is submitted and only “Routine” should be circled. The routine sample is safe and no more samples are required.

April – One routine sample submitted and only “Routine” should be circled. It is total coliform positive. Three repeat samples and one raw GWR triggered sample are submitted immediately. “Repeat” should be circled, and whether the sample came from the “Original Site” or “Downstream” or “Upstream” of the positive routine site. “GWR triggered” must be circled on the GWR triggered sample. These samples are safe and no more sampling is required.

May – A routine sample is submitted and only “Routine” should be circled. The routine sample is safe and no more samples are required.

June – A routine sample submitted and only “Routine” should be circled. It is total coliform positive. Three repeat samples and one raw GWR triggered source water sample is submitted immediately. “Repeat” should be circled and whether the sample came from the “Original Site” or “Downstream” or “Upstream” of the positive routine site. “GWR triggered” must be circled on the GWR triggered sample. Two of three repeat samples are total coliform positive and the raw GWR triggered source sample is *E. coli* absent. An assessment is required.

July – A routine sample submitted and only “Routine” should be circled. It is safe and no more samples are required.

August – A routine sample submitted and only “Routine” should be circled. It is safe and no more samples are required.

September – A routine sample submitted and only “Routine” should be circled. It is total coliform positive. Three repeat samples and one raw GWR triggered source sample is submitted immediately. “Repeat” should be circled and whether the sample came from “Original Site” or “Downstream” or “Upstream” of the positive routine site. “GWR triggered” must be circled on the GWR triggered sample. These samples are safe and no more sampling is required.

October – A routine sample is submitted and only “Routine” should be circled. It is *E. coli* (fecal) positive. Three repeat samples and one raw GWR triggered sample is submitted immediately. “Repeat” should be circled and whether the samples came from “Original Site” or “Upstream” or “Downstream” of the positive routine site. “GWR triggered” must be circled on the GWR triggered sample. All three repeat samples are *E. coli* (fecal) positive and

the raw GWR triggered sample is *E. coli* positive. Public notification and a boil water order and an assessment is required. Five additional GWR triggered samples are required to confirm *E. coli* presence. If *E. coli* is confirmed in GWR triggered samples, installation of continuous chlorination and other treatment to achieve 4-log removal is required.

November - A routine sample submitted and only "Routine" should be circled. It is safe and no more samples are required.

December - A routine sample submitted and only "Routine" should be circled. It is safe and no more samples are required.

L. Example of Bacteriological Sampling Over the Course of a Year for a TNC With THREE Wells

January – A routine sample submitted and only "Routine" should be circled. It is total coliform positive. Three repeat samples and three raw GWR triggered well samples are submitted immediately. "Repeat" should be circled and whether the sample came from the "Original Site" or "Downstream" or "Upstream" of the original positive site. "GWR triggered" must be circled on the GWR triggered samples. All repeat samples are total coliform bacteria positive and the raw GWR triggered samples are *E. coli* positive. Five additional raw GWR triggered samples from each the wells is required to confirm *E. coli* presence. These samples are safe and no more sampling is required. An assessment is required.

February – A routine sample is submitted and only "Routine" should be circled. The routine sample is safe and no more samples are required.

March – A routine sample is submitted and only "Routine" should be circled. The routine sample is safe and no more samples are required.

April – One routine sample submitted and only "Routine" should be circled. It is total coliform positive. Three repeat samples and three raw GWR triggered samples are submitted immediately. "Repeat" should be circled and whether the sample came from the "Original Site" or "Downstream" or "Upstream" of the positive routine site. "GWR triggered" must be circled on the GWR triggered samples. These samples are safe and no more sampling is required.

May – A routine sample is submitted and only "Routine" should be circled. The routine sample is safe and no more samples are required.

June – A routine sample submitted and only "Routine" should be circled. It is total coliform positive. Three repeat samples and three raw GWR triggered source water samples are submitted immediately. "Repeat" should be circled, as well as whether the sample came from the "Original Site" or "Downstream" or "Upstream" of the positive routine site. "GWR triggered" must be circled on the GWR triggered samples. Two of three repeat samples are total coliform positive and the raw GWR triggered source sample is *E. coli* absent. An assessment is required.

July – A routine sample submitted and only "Routine" should be circled. It is safe and no more samples are required.

August – A routine sample submitted and only "Routine" should be circled. It is safe and no more samples are required.

September – A routine sample submitted and only "Routine" should be circled. It is total coliform positive. Three repeat samples clustered around the positive point and three raw GWR triggered source samples are submitted immediately. "Repeat" should be circled, as well as whether the sample came from "Original Site" or "Downstream" or "Upstream" of the unsafe routine site. "GWR triggered" must be circled on those samples. These samples are safe and no more sampling is required.

October – A routine sample is submitted and only "Routine" should be circled. It is *E. coli* (fecal) positive. Three repeat samples and three raw GWR triggered samples are submitted immediately. "Repeat" should be circled and whether the samples came from "Original Site" or "Upstream" or "Downstream" of the positive routine site. "GWR

triggered” must be circled on the GWR triggered samples. All three repeat samples are *E. coli* (fecal) positive and two raw GWR triggered samples are *E. coli* positive. Public notification, boil water order and an assessment is required. Five additional GWR triggered samples from each positive well are required to confirm *E. coli* presence. *E. coli* is confirmed in GWR triggered samples and installation of continuous chlorination and additional treatment to achieve 4-log removal is required.

November - A routine sample submitted and only “Routine” should be circled. It is safe and no more samples are required.

December - A routine sample submitted and only “Routine” should be circled. It is safe and no more samples are required.