

**Iowa Department of Natural Resources**  
**Public Water Supply Bacteria Sampling Plan Requirements for**  
**Groundwater Systems Collecting Two or More Monthly Samples**

**Instructions:**

Attached is a model sampling plan for a public water supply that is required to collect two or more routine bacteria samples on a monthly basis. The model bacteria sampling plan has the following components:

**Section 1** covers the sample collection requirements and recommendations for the Revised Total Coliform Rule (RTCR), per 567—IAC 41.2(1)“c”. Systems must collect total coliform samples at sites which are representative of water throughout the distribution system according to a written sample siting plan. Major elements of the plan shall include but are not limited to:

- Map of the distribution system served by the system;
- List of routine compliance sample locations for each sample period;
- List of repeat compliance sample locations for each routine compliance sample location;
- Any other sample locations necessary to meet the rule requirements;
- Sample collection schedule;
- Proper sample collection techniques; and,
- Log of samples taken.

The plan shall be reviewed by the public water supply system every two years, updated as needed, and shall be retained on file at the facility. The plan must be made available to the DNR upon request and during sanitary surveys, and must be revised by the system as directed by the department. Failure to have and to maintain the plan is a significant deficiency.

Any time a system wishes to collect a coliform bacteria sample for operational control purposes, such sample should be labeled Special (SP). Special samples cannot be used for compliance purposes and positive results do not trigger additional monitoring. Samples cannot be changed from Special to Routine or from Routine to Special once the results have been transmitted by the laboratory without DNR approval.

**Section 2** covers requirements and recommendations for the Groundwater Rule (GWR). The Groundwater Rule applies to all PWSs that use groundwater, including consecutive systems, which do not combine all of their groundwater with surface water or with groundwater under the direct influence of surface water prior to treatment. Groundwater systems that do not provide at least 4-log virus inactivation and/or removal at or before the first customer are required to collect source water samples whenever a routine RTCR sample tests positive for bacteria or, for consecutive systems, to notify their groundwater supplier. There are four types of source water samples:

TG = triggered source water sample collected in response to a routine RTCR coliform-positive sample,

AD = additional source water sample collected in response to a fecal indicator positive triggered sample,

NEW = collected from a new well prior to first use as a potable water source, and

AS = Assessment source water sample collected when directed by the department.

Further information on the Groundwater Rule and its requirements can be found in the "Bacteria Sampling Plan GWR Supplement" in Section 2. This document also contains the necessary components that must be included in this sampling plan. The supplement for consecutive systems is available for download or printing from the DNR Drinking Water website <http://www.iowadnr.gov/WS-Forms>, which can then be inserted where noted in this document, or you may contact the DNR for a copy if you do not have Internet access. Section 2: Groundwater Rule Supplement to the Bacteria Sampling Plan must be completed if applicable to your system, to include these elements:

- When sampling is required;
- Guidelines for determining which sources must be sampled;
- Further compliance steps; and,
- Items to be included on the map mentioned above.

This sampling plan should be provided to and reviewed by all persons responsible for collection of bacteria samples. The model plan may be modified as needed as long as the required components as listed in the rules are contained in the plan. Add additional pages as needed.

If you should have any questions please contact the DNR:

**Regional Field Offices**

FO 1, Manchester	563-927-2640
FO 2, Mason City	641-424-4073
FO 3, Spencer	712-262-4177
FO 4, Atlantic	712-243-1934
FO 5, Windsor Heights	515-725-0268
FO 6, Washington	319-653-2135

**Water Supply Section, Des Moines**

515-725-8200  
FAX: 515-725-8202

Include your 7-digit Public Water Supply Identification number (PWSID)/Permit Number located on the front page of your operation permit on all correspondence and sampling sheets. This number should also be used when contacting your contract lab or the DNR.

## Section 1: Groundwater Bacteria Sampling Plan

PWS Name: \_\_\_\_\_ PWSID: \_\_\_\_\_

### Two or more Samples per Month Bacteria Sampling Plan

#### A. Sampling Plan for System

The operator will collect the required number of bacteria samples on a monthly basis as required in the public water supply operation permit. The bacteria samples shall be collected at various locations throughout the distribution system. In order to avoid a concentration of samples in certain areas of the distribution system, a distribution system map is attached with all of the planned sampling locations marked for the year.

Using this sampling plan, the water supply is able to provide an adequate, uniform representation of the water throughout the distribution system. Please note that higher risk or more vulnerable areas are recommended to be sampled at a higher frequency. Examples of these include:

- Schools
- Day care facilities
- Hospitals, nursing homes
- Mobile home parks

The sampling locations for the year are listed on the Sample Collection Schedule. These sample locations are shown on the Distribution System Map. When the samples are collected, document the locations and sampling information on the Sampling Plan Log. Any deviation from the Sample Collection Schedule should be documented on the Log.

If coliform bacteria are detected in the routine sample (referred to as a total coliform-positive sample) after analysis by the laboratory, the system must react immediately and collect repeat samples within 24 hours of notification of the coliform-positive sample. The repeat samples must be collected on the same day unless otherwise approved by the DNR. In addition, the repeat samples must be analyzed by the same laboratory that analyzed the positive routine sample unless approved by the DNR.

The system is required to collect \_\_\_\_\_ (routine (RT) samples per month. Groundwater systems taking five or fewer routine samples per month may collect all of the samples on the same day. If notified by the laboratory or DNR that a routine sample has tested positive for coliform bacteria, the system must take three repeat (RP) samples for each coliform-positive routine sample. The repeat locations must be identified in this sampling plan for each routine sample location.

- One repeat sample must be collected at the location of the coliform-positive routine sample.
- A second repeat sample must be collected within five (5) service connections above or upstream of the coliform-positive sample location.
- A third repeat sample must be collected within five (5) service connections below or downstream of the coliform-positive sample location.

If the water supply is unable to meet the repeat monitoring specifications as noted above (location or timeframe), an alternate location or time extension must be requested. The DNR must be contacted within 24 hours of notification of the coliform-positive sample to approve any alternate location or time extension. Reasons for such a request may be as follows:

1. Coliform-positive sample located at a “dead end line.”
2. Coliform-positive line supplying one serviced customer; i.e., country club, school, etc.
3. Coliform-positive sample collected from a dwelling that cannot be re-entered in a timely manner: i.e., residents on vacation, residents gone south for winter, residents’ refusal.
4. System needs to obtain additional sample bottles.
5. Laboratory is unable to process samples within 24 hours of collection (weekends, holidays).

If the system has more than one coliform-positive routine or repeat sample, there are additional steps it must take for system assessments and could include additional repeat samples. The DNR will instruct the system on those steps at that time.

## **B. Proper Sampling Technique for Bacteria Drinking Water Samples**

The following recommendations regarding sample collection technique are to ensure that the sample is representative of the drinking water quality in the distribution system, and not the result of a drinking water sample that was improperly collected. Four instructional You-Tube videos are available from the DNR’s website: <http://www.iowadnr.gov/WS-Training-Videos>. Two are on the RTCR requirements, one is Bacteria Sample Collection Procedure, and the last is Chlorine Sample Collection Procedure.

1. Be sure that you have the correct sterile sample bottle for coliform bacteria sample collection. If you provide continuous chlorination of your water supply, the sample bottle must contain a dechlorinating agent. Check with your laboratory if you are not sure. Minimum sample volume for analysis is 100mL; bottles will be at least 125mL.
2. Avoid collecting a sample from the following locations:
  - a. Faucets with hose or sprayer attached
  - b. Faucets served by home softening units or home treatment units
  - c. Hoses or outside faucets/sillcocks
  - d. Swivel “bar type” or “swing arm” faucets
  - e. Frost-proof hydrants
  - f. Sprinkler systems for fire protection
  - g. Meter pits
  - h. Fire hydrants, blow-off, or clean-outs
  - i. Taps or sinks that are dirty
  - j. Taps that are leaking at the base of the faucet or at the handles
3. Collect the sample using the following procedure:
  - a. Remove any hose attachments
  - b. Remove any aerator or “screen” on the end of the faucet
  - c. Ensure that the faucet is clean from contamination
  - d. Run the cold water for 3-5 minutes or for sufficient time to clear the service line
  - e. Do not rinse out the bottle
  - f. Throttle tap back to smooth flow, about the width of a pencil
  - g. Ensure the water does not splash
  - h. Do not adjust the flow while sampling

- i. Remove the bottle cap and hold in one hand; hold bottle in the other
- j. Do not touch the inside of the cap
- k. Do not set the cap down
- l. Do not touch the lip or the inside of the bottle
- m. Fill the bottle to within ½ inch of the top or to the mark on the bottle or as directed by your laboratory
- n. Remove the bottle from the stream of water and immediately cap it. Do not overly tighten the cap or it may split.

You may now turn the water off and fill out the sample analysis sheet.

The sample must reach the lab so that the test (incubation) is begun within 30 hours of collection. It is recommended but not required to hold samples below 10°C (50°F) during transit.

If the system uses water to which chlorine or chloramines have been added, the water must be tested for free and total chlorine residual at the time of sample collection. The chlorine concentration must be recorded on the sample collection form submitted to the laboratory.

List persons authorized to collect bacteria samples:

_____	_____
_____	_____

### Sample Collection Schedule

List each Routine (RT) sample address for the month, followed by the Repeat (RP) sample location within 5 connections upstream and 5 connections downstream for that Routine site.

#### January:

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

#### February:

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

#### March:

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

#### April:

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

#### May:

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

#### June:

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

**July:**

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

**August:**

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

**September:**

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

**October:**

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

**November:**

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

**December:**

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

Routine Location: \_\_\_\_\_

Repeat (up): \_\_\_\_\_

Repeat (down): \_\_\_\_\_

**Map of System**

Indicate all sample locations, wells, treatment plant, and storage reservoirs





### Sampling Plan Log

Record the sample collection information for each sample

Month/ Year	Section	Location	Sample Type*	Collection		By	Chlorine (ppm)		#RTCR Samples Collected during month (RT+RP)	Comments	Lab Report Received
				Date	Time		Free	Total			
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\*RT - Routine, RP - Repeat, SP - Special, TG - Triggered, AD - Additional, AS - Assessment, NEW - New Well

### Sampling Plan Log

Record the sample collection information each month in this log for each sample

Month/ Year	Section	Location	Sample Type*	Collection		By	Chlorine (ppm)		#RTCR Samples Collected during month (RT+RP)	Comments	Lab Report Received
				Date	Time		Free	Total			
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\*RT - Routine, RP - Repeat, SP - Special, TG - Triggered, AD - Additional, AS - Assessment, NEW - New Well

## Section 2: Groundwater Rule Supplement for Bacteria Sampling Plan

### Instructions:

The Groundwater Rule applies to all public water supply systems, including consecutive systems, which use groundwater and do not combine all of their groundwater with surface water or with groundwater under the direct influence of surface water prior to treatment. Groundwater systems that do not provide at least 4-log virus inactivation and/or removal at or before the first customer are required to collect source water samples when a routine Revised Total Coliform Rule (RTCR) sample tests positive for total coliform bacteria.

### Triggered Source Water Monitoring Plan

The purpose of the triggered source water monitoring plan is for the system to have a step-by-step plan in place that identifies which sources (wells) must be sampled in response to a routine total coliform-positive sample at any given sampling site. It is important that the plan be readily available to water system personnel responsible for sample collection, since triggered source water samples must be collected within 24 hours of learning of the positive routine sample result.

A triggered source water monitoring plan should include the following minimum elements:

1. Add the following to your existing bacteria sampling plan distribution system map or create a separate map for these items:
  - Pressure zone boundaries in the distribution system, if separate pressure zones exist.
  - RTCR routine monitoring locations, distinctly labeled.
  - Entry points of all sources, distinctly labeled, with the contributing sources (wells) clearly identified.
  - Entry points and status of any interconnections to or from other systems.
  - Storage tank and reservoir locations and any seasonal operational changes.
  - Pressure regulation facilities (reducing stations).
  - Other infrastructure that may affect pressure and/or flow in the distribution system.
  - Booster pump stations.
  - Critical valves, particularly those used to hydraulically separate portions of the system.
2. The source type and level of treatment provided for each source/point of entry and whether it is seasonal, emergency, ground water, surface water, a wholesale supply, etc.
3. The source(s) serving each RTCR routine monitoring location and the basis for the determination (e.g., system hydraulics, operation, water quality data, etc.)
4. For wholesale systems, the consecutive systems served and, if applicable, the sources serving each consecutive system.
5. For consecutive systems, the wholesale system(s) providing water to each sampling location.
6. Any changes or variations expected in the monitoring plan such as the use of seasonal sources, rotating sources, etc.

Where there is uncertainty of which wells are in use, a conservative approach should be used in which all potential sources are included.

Record the source water sample(s) on the Sampling Plan Log.

**Contact Information:**

**Laboratory Name:** \_\_\_\_\_

Primary Contact Name:	Phone:	After Hours Phone:

**DNR Field Office #:** \_\_\_\_\_

Primary Contact Name:	Phone:	After Hours Phone:
		515-725-8694

**DNR Water Supply Operations Section**

Primary Contact Name:	Phone:	After Hours Phone:
		None

Items with an \* and in blue may or may not be needed for your system, and may be deleted if not needed.

**\*Statement for a PWS that has DNR-approved 4-log virus inactivation/removal treatment:**

\* \_\_\_\_\_ PWS uses DNR-approved treatment to provide 4-log inactivation/removal of viruses and is completing the required treatment technique monitoring. Therefore, the following source water sampling is not required unless the 4-log treatment technique was not in place at the time of RTCR sample collection.

\*(The above statement should be omitted if the system does not have approved 4-log treatment.)

**TRIGGERED SAMPLING (TG)**

- When notified of a total coliform-positive routine distribution system sample, at least one groundwater source sample must be collected from each well in use at the time the total coliform-positive sample was collected or that reasonably could have contributed to the water in the sample. This is in addition to the distribution system repeat coliform bacteria monitoring samples.
- **Samples must be collected within 24 hours of being notified of the positive routine sample. If sampling cannot be completed within 24 hours, DNR must be contacted immediately.**
- The sample must be analyzed for the presence of one of the three fecal indicators: *E. coli*, coliphage, or enterococci.

- The DNR may waive the triggered source water monitoring requirement if the system determines and documents, in writing, that the total coliform-positive routine sample is the result of a distribution system deficiency. Contact the DNR within 24 hours of the initial notification to request approval to waive the triggered source water monitoring.
- The DNR may invalidate a fecal indicator-positive groundwater source sample for very specific conditions. The PWS must collect another source water sample within 24 hours of being notified by the DNR of its invalidation decision.
- \*Consecutive Systems that are notified of a total coliform-positive routine distribution system sample that is located in an area of their system served by water purchased from a groundwater wholesale system must notify the wholesaler within 24 hours of the initial positive sample notification. This notification must be to the system that produced the water. The wholesale system must then conduct triggered source water monitoring unless it has DNR-approved 4-log treatment technique requirements in place.

### **Sampling steps when triggered source water sampling is required:**

1. Determine which source(s) were in use at the time the routine bacteria sample was collected or could have reasonably contributed to the water in the sample.
2. Collect a sample from each well determined to be in use or contributing to the sample following the same collection procedures as outlined in your bacteria sampling plan. Samples must be collected before any treatment. **Combined source samples are not permitted.**
3. The source water sample(s) must be labeled as Sample Type routine (RT), Facility ID as the well WL facility number (WL##), and Sampling Point ID as triggered (TG).

### **ADDITIONAL SAMPLING (AD)**

- Five additional samples must be collected from the source (well) when a triggered source water sample is fecal indicator-positive.
- The PWS may be required by DNR to take corrective action instead of or before additional source water sampling. Consult with the DNR within 24 hours to determine if corrective action is required instead of additional sampling.

### **Sampling steps when additional source water sampling is required:**

1. Samples must be collected within 24 hours of being notified of the fecal indicator-positive sample. DNR must be contacted immediately if sampling cannot be completed within 24 hours.
2. Contact the DNR immediately to see if corrective action is required or if the system is required to take the additional source water samples.
3. Collect five additional source water samples from the same well(s) that tested positive, using the same indicator as used in triggered source water monitoring and following the same collection procedures as outlined in your bacteria sampling plan. Samples **must** be collected before any treatment. The samples may be collected in sequence, one after the other. **Combined source samples are not permitted.**
4. The source water sample(s) must be labeled as follows: Sample Type routine (RT), Facility ID as the well WL facility number (WL##), and Sampling Point ID as additional (AD).

**Groundwater Sources or Combination of Sources used at the PWS:**

	Source ID	Operation Schedule
1.		
2.		
3.		
4.		
5.		
6.		

**Triggered Monitoring Plan (TG)**

RTCR Sample Site	Contributing Source(s)	Seasonal Considerations

**\*Consecutive Connection: Receives water from another PWS**

\*This system receives water from the following groundwater wholesaler(s). Therefore, we are required to notify the wholesaler within 24 hours from our notification of a positive routine RTCR sample.

*Wholesale System Name (System buys from them)	*Contact	*Contact Phone

**\*Consecutive Connection: Sells water to another PWS**

\*This system sells water to the following consecutive water systems. Therefore, when we are notified that the consecutive system has had a positive routine RTCR sample, we as the wholesaler must collect triggered source water samples within 24 hours of being notified by the consecutive system.

<b>*System Name</b> (System sells to them)	<b>*Contact</b>	<b>*Contact Phone</b>

**GROUNDWATER RULE NOTIFICATION LOG**

<b>Date/Time</b>	<b>Entity Notified (System Name or DNR)</b>	<b>Name of Person Notified</b>