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How to Develop a Monitoring Plan for a Public Water System

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Water Supply Division

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

How to Develop a Monitoring Plan for a Public Water System

Prepared by
Water Supply Division

RG-384
August 2011
(Revised)



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Glossary

Terms

Note: More terms and definitions can be found in the Texas regulations (30 TAC 290.38 and 290.103). Read the preface of this guide to learn how to obtain copies of regulations.

Accredited laboratory A laboratory that is NELAC accredited by the TCEQ. For answers to your questions about lab certification, contact the TCEQ Quality Assurance Section at 512-239-5420.

Approved laboratory A laboratory that is approved by the TCEQ. To be approved, the laboratory or public water system must submit, and have approved, the Drinking Water Laboratory Approval Form included in Chapter 6 of this guide. For answers to your questions about laboratory approval, contact the TCEQ Public Drinking Water Section, at 512-239-4691.

Certified laboratory A laboratory that was certified by the commission to analyze water samples to determine their compliance with maximum allowable constituent levels. For answers to your questions about lab certification, contact the TCEQ Quality Assurance Section at 512-239-5420. Starting June 30, 2008, only labs that are NELAC accredited can be used for analyzing public water system coliform and chemical samples.

Community water system A public water system that has a potential to serve at least 15 residential service connections on a year-round basis, or that serves at least 25 residents on a year-round basis.

Compliance sample A sample that a public water system is required to collect and report to the TCEQ in order to determine compliance with the Drinking Water Standards (30 TAC, Subchapter F: “Drinking Water Standards Governing Drinking Water Quality and Reporting Requirement for Public Water Systems”).

Demand water source A well, surface source, or purchased-water source that is used on a regular basis, usually annually, to meet peak demand. Demand water sources are included in source water capacity compliance calculations.

Drinking water All water distributed by any agency or individual, public or private, for the purpose of human consumption, or which may be used in the preparation of foods or beverages or for the cleaning of any utensil or article used in the course of preparation or consumption of food or beverages for human beings. The term “drinking water” also includes all water supplied for human consumption or used by any institution catering to the public. In this document, the terms “drinking water,” “potable water,”

and “finished water” are used to mean the same thing: water that has been treated in accordance with TCEQ standards and which is delivered to customers for human consumption by public water systems.

Effective contact time (T_{10}) The time within which 10 percent of a tracer material will have passed through a unit process. Theoretical T_{10} can be calculated by multiplying the baffling factor (BF) by the theoretical hydraulic detention time (HDT).

Emergency water source A well or purchased-water source that is not used on an annual basis, but that is only maintained for use under emergency conditions, such as fire. Emergency water sources are not included in source water capacity compliance calculations.

Entry point Any point where treated water enters the distribution system. Entry points to the distribution system may include points where chlorinated well water, treated surface water, or water purchased from another supplier enters the distribution system.

Groundwater under the direct influence of surface water (GUI) Any water beneath the surface of the ground that is subject to surface water intrusion. This may be shown by the presence of insects, macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium* [30 TAC 290.38(27)(A)]; by significant and relatively rapid shifts in water characteristics, such as turbidity, temperature, conductivity, or pH, which closely correlate to climatological or surface water conditions [30 TAC 290.38(27)(B)]; or by geological circumstances.

Maximum contaminant level (MCL) A primary MCL is some health-based level below which the EPA considers water safe to drink. Compliance with MCLs is often not based on the result of a single sample, but instead is calculated. For instance, compliance could be based on whether the average of all samples collected in a year is over the MCL. See “Running annual average.”

Nonregulatory sample A sample that a water system collects in order to make operational decisions, but that does not have to be reported to the TCEQ.

Non-transient non-community (NTNC) system A public water system that is not a community water system and regularly serves at least 25 of the same persons at least six months out of the year.

Public water system (PWS) A system that provides to the public water for human consumption through pipes or other constructed conveyances, which includes all uses described under the definition for drinking water. Such a system must have at least 15 service connections, or serve at least 25 individuals at least 60 days out of the year. This term includes any collection, treatment, storage, and distribution facilities under the control of the operator of such system and used primarily in connection with such system; and any collection or pretreatment storage facilities not under such

control that are used primarily in connection with such system. When two or more systems owned by the same entity are combined to serve more than 25 people at least 60 days out of the year, the combined operation will be considered a public water system. An individual is considered served by a water system if they live, work, or have employees in a place where drinking water is supplied by the system.

Purchased-water system A public water system that purchases (or otherwise receives) at least some portion of its potable water from a different public water system. A purchased-water system that operates as a “distribution-only” system retains responsibility for managing drinking water quality and compliance with Texas rules within the distribution system. When a seller (or provider) takes responsibility for the Texas rules within the purchaser’s distribution system, the TCEQ may merge the two systems under the provider’s PWS ID.

Running annual average (RAA) The average of all sample results collected in the most recent twelve months, four quarters, or one year.

Sampling site The site at which a sample is collected.

Transient non-community (TNC) system A public water system that is not a community water system and serves at least 25 persons at least 60 days out of the year, yet by its characteristics, does not meet the definition of a non-transient non-community (NTNC) water system.

Wholesaler Any public water system that sells or otherwise provides water to another public water system. Two types of wholesalers exist: treated water wholesalers and raw water wholesalers. Both are subject to the Texas regulations.

Abbreviations

AWWA American Water Works Association

BDL below detection limit. If a contaminant is measured in a concentration lower than that at which a given method can be accurately used, it is considered BDL. Often, a BDL reading is reported as zero. See “MDL.”

BF baffling factor. The BF is used to account for potential short circuiting when determining the effective contact time for calculating CT.

CCI Comprehensive Compliance Inspection. A sanitary survey performed by TCEQ regional staff.

CCN Certificate of Convenience and Necessity

CCR Consumer Confidence Report. The report of drinking water quality that every community public water system is required to send to their customers every year.

- CFR** Code of Federal Regulations
- CT** concentration time (the product of disinfectant concentration and effective contact time [T_{10}]). This value describes the effectiveness of a given level of disinfectant in a given unit process.
- CWS** community water system
- DBP** disinfection byproduct. An undesirable byproduct of beneficial disinfection.
- DBPP** disinfection byproduct precursor. Molecules present in natural water that will tend to form disinfection byproducts when the water is disinfected. The EPA is using total organic carbon (TOC) and specific ultraviolet absorbance (SUVA) as surrogates for DBPP.
- DBP1** Stage 1 Disinfectants and Disinfection Byproducts Rule
- DBP2** Stage 2 Disinfectants and Disinfection Byproducts Rule
- DLQOR** Disinfectant Level Quarterly Operating Report
- DOC** dissolved organic carbon. This group parameter measures the total amount of carbon present in organic molecules dissolved in the water. Basically, it is done on the same machine as total organic carbon (TOC), but the sample is filtered before analysis.
- DWW** Drinking Water Watch. The EPA's Web-based library of all data for public water systems. Texas data is available on the TCEQ Web page <dww.tceq.texas.gov/DWW/> and national data is available on the EPA Web page <www.epa.gov/enviro/html/sdwis/sdwis_query.html>.
- EPA** Environmental Protection Agency
- GPM** measured or reported well output in gallons per minute
- GUI** groundwater under the direct influence of surface water. For regulatory purposes, GUI is subject to the same requirements as surface water.
- GWR** Ground Water Rule. Effective Dec. 1, 2009, the GWR requires raw water sampling, corrective action in response to detection of viral indicators, and notification of significant deficiencies.
- HAA** haloacetic acid (a DBP). There are nine different HAAs that contain bromine, chlorine, or both, although only five of these are currently regulated.
- HAA5** a specific group of five haloacetic acids. DBP1 and DBP2 set a maximum contaminant level (MCL) for the sum of the following five HAAs: monochloroacetic acid (MCAA), dichloroacetic acid (DCAA), trichloroacetic acid (TCAA), monobromoacetic acid (MBAA), and dibromoacetic acid (DBAA).
- HAAFP** haloacetic acid formation potential. The theoretical maximum amount of HAA a given source of water can form.

- HDT** hydraulic detention time
- IESWTR** Interim Enhanced Surface Water Treatment Rule
- IDSE** Initial Distribution System Evaluation
- LT1** Long Term 1 Enhanced Surface Water Treatment Rule
- LT2** Long Term 2 Enhanced Surface Water Treatment Rule
- MCL** maximum contaminant level. The concentration level of a contaminant that is regulated. If a system has a contaminant concentration greater than the MCL, they may be in violation of the regulations. See “RAA.”
- MCLG** maximum contaminant level goal. The health-effects based ideal level for a contaminant. This is not the regulated concentration.
- MDL** method detection limit. The concentration below which a given method cannot accurately measure concentration. See “BDL.”
- MOR** monthly operating report
- MRDL** maximum residual disinfectant limit. EPA regulations establish these limits on the allowable concentration of disinfectant leaving a plant.
- MRDLG** maximum residual disinfectant limit goal
- NTNC** non-transient, non-community water system. A water system that serves the same people all year, but is not a community. A school or factory may be a NTNC.
- NTU** Nephelometric turbidity unit. A measurement of the cloudiness of water. Turbidity monitoring is required at all surface water and GUI treatment plants.
- PWS** public water system
- PWSID** public water system identification number
- QOR** quarterly operating report
- RAA** running annual average
- SDWA** Safe Drinking Water Act
- SDWIS** Safe Drinking Water Information System. The database of record for EPA drinking water quality data, also known as SWRL, for “SDWIS-Web Release.” The online form of this data is known as Drinking Water Watch. Texas data is available at <dww.tceq.texas.gov/DWW/> and national data is available at <www.epa.gov/enviro/html/sdwis/sdwis_query.html>.
- SCL** secondary contaminant level
- SOC** synthetic organic chemical
- SUVA** specific ultraviolet absorbance
- SW** surface water

- SWMOR** Surface Water Monthly Operating Report
- SWTP** surface water treatment plant
- SWTR** Surface Water Treatment Rule
- T** detention time (see “HDT”) *or* temperature
- T₁₀** effective contact time. The time within which 10 percent of a tracer material will have passed through a unit process. Theoretical T₁₀ can be calculated by multiplying the baffling factor (BF) by the theoretical hydraulic detention time (HDT).
- TCEQ** Texas Commission on Environmental Quality. Before Sept. 1, 2002, the TCEQ was the Texas Natural Resource Conservation Commission.
- TEEX** Texas Engineering Extension Service
- THM** trihalomethane (a DBP). These are halogenated organic molecules with one carbon, three halogens, and one hydrogen. The four THMs of interest are chloroform (three chlorines, also called “trichloromethane”), dichlorobromomethane, dibromochloromethane, and bromoform (a molecule containing three bromines; also called “tribromomethane”).
- TNC** Transient non-community water system
- TNRCC** Texas Natural Resource Conservation Commission. The former name of the Texas Commission on Environmental Quality (TCEQ) until Sept. 1, 2002.
- TOC** total organic carbon. A group parameter measuring the total amount of carbon in water present as organic molecules. The EPA is using TOC as a surrogate for DBPPs in the **DBP1**. See “DOC.”
- TTHM** total trihalomethanes. The sum of the four THMs upon which compliance is based.
- TWDB** Texas Water Development Board
- TWUA** Texas Water Utilities Association
- UV** ultraviolet
- UV₂₅₄** absorbance of ultraviolet light at a wavelength of 254 nanometers, measured in units of inverse length
- VOC** volatile organic chemical, volatile organic contaminant, *or* volatile organic compound
- WUD** Water Utilities Database. The TCEQ's database for Texas drinking water quality data, also known as IWUD, for “Integrated Water Utilities Database,” which is the form of the data viewable online, at <www.tceq.texas.gov/goto/wud>. The same data, plus more, is available through Drinking Water Watch (DWW) at <dww.tceq.texas.gov/DWW/>.

Preface

This publication provides guidance on how to comply with Title 30 of the Texas Administrative Code (30 TAC), Chapter 290, Subchapter F: “Drinking Water Standards Governing Drinking Water Quality and Reporting Requirements for Public Water Systems,” Section 290.121: “Monitoring Plans.”

Monitoring requirements for each constituent are described in this guide, but more detailed information is available in the rules. If there appears to be a discrepancy between this guidance and the rules, follow the rules.

In this guide, the word “you” refers to operators of public water systems. The word “we” refers to the Texas Commission on Environmental Quality (TCEQ), and also to its public drinking water program.

The rules governing this guide were published in the Texas Register on Jan. 4, 2008. We have links to the Secretary of State’s official version of the rules on our website, at <www.tceq.texas.gov/goto/rules>.

What rules apply to public water systems in Texas?

The State of Texas has primacy over the regulation of public drinking water. This means that the Texas Commission on Environmental Quality (TCEQ) implements a Public Water System Supervision (PWSS) program for public water systems in Texas. The TCEQ writes, adopts, and enforces Texas rules that are at least as stringent as the rules promulgated by the United States Environmental Protection Agency (EPA). The Texas rules may be more specific than or worded differently from the EPA rules, so Texas public water systems and their consultants should become familiar with the specific Texas rules.

Public water systems should also be aware of the rules pertaining to drinking water that are contained in various parts of the Texas regulations. A public water system must comply with all the applicable requirements. Each rule explains exactly which public water system it applies to. Some examples of additional rules and their location within the regulations are given below:

- **30 TAC, Chapter 290, Subchapter E.** Requirements regarding the Public Health Service (PHS) fees for public water systems. If you have questions about Subchapter E, contact the TCEQ Public Drinking Water Section at 512-239-4691.
- **30 TAC, Chapter 290, Subchapter F.** Requirements regarding harmful or potentially harmful constituents for water systems that supply potable water to the citizens of Texas. If you have questions about Subchapter F, contact the TCEQ Public Drinking Water Section at 512-239-4691.
- **30 TAC, Chapter 290, Subchapter D.** Rules and regulations for public water systems related to requirements for water treatment plant

design, operation, and maintenance. If you have questions about Subchapter D, contact the TCEQ Public Drinking Water Section at 512-239-4691.

- **30 TAC, Chapter 290, Subchapter H.** Rules and regulations for community public water systems related to Consumer Confidence Reports. If you have questions about Subchapter H, contact the TCEQ Public Drinking Water Section at 512-239-4691.
- **30 TAC, Chapter 291.** Rules and regulations for water utilities related to requirements for rates, capacity development, and Certificates of Convenience and Necessity. If you have questions about these requirements, contact the Water Utilities Rates and Districts Section at 512-239-4691.
- **30 TAC, Chapter 293.** Requirements for water districts. If you have questions about these requirements, contact the Water Utilities Rates and Districts Section at 512-239-4691.
- **30 TAC, Chapter 325.** Requirements for licensing of water works operators. The TCEQ's Operator Licensing Division can answer questions about these requirements at 512-239-6133.
- **30 TAC, Chapter 30.** Requirements for laboratories used by public water systems. If you have questions about lab certification or accreditation, contact the TCEQ Quality Assurance Section at 512-239-5420.
- **Title 2, Texas Water Code, Water Administration, Subtitle D, Chapters 32 and 33.** Requirements for water well drillers. If you have questions about these regulations, call 1-800-803-9202 or 512-463-8876.

The Department of State Health Services (DSHS) implements federal Food and Drug Administration (FDA) and Texas regulations for water haulers, water bottlers, water vendors, restaurants, day cares, hospitals, and other entities that may own or operate public water systems. It is highly recommended that business owners and operators review the DSHS rules to determine whether they apply to them.

Who can answer questions about these rules?

If you have questions about the rules described in this guidance manual, contact the TCEQ Public Drinking Water Section at 512-239-4691.

What useful features are in this publication?

We have included several features to help you use this document:

- A glossary of commonly used abbreviations and acronyms will help you understand which term in these rules corresponds to terms you encounter in related publications.
- Chapter 7 provides examples of monitoring plans for community, non-transient non-community, and transient non-community systems.
- Appendix A provides a brief, one-page generic outline of a monitoring plan.
- Appendices B through F provide outlines that specific types of systems can follow in developing their monitoring plan.

New sections added to the current version of this guide include:

- Section 2.3, which offers recommendations for developing a Source Monitoring Plan for the Ground Water Rule (GWR).
- Section 5.4, which provides guidance for selecting new sampling sites for the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBP2), including guidance for Initial Distribution System Evaluation (IDSE).

How can I get copies of TCEQ publications?

Here are ways you can obtain copies of rules, forms, or publications from the TCEQ:

- E-mail your order to the Publications Section at the following address: <puborder@tceq.texas.gov>. Be sure to provide your name, address, and the title and number of the publication you are requesting.
- On the Internet, go to the TCEQ home page, at the following address: <www.tceq.texas.gov>; under the Site Navigation bar, follow the links to “Rules,” “Forms,” or “Publications.”
- Fax your order to 512-239-4488, or order by phone at 512-239-0028.
- Write to TCEQ Publications, MC 195; PO Box 13087; Austin, TX 78711-3087.

If the item you want is not listed on the website, the TCEQ Publications Unit will help you find it; contact them as shown in the bulleted items above. Try to give the rule, form, or publication number as well as the title. This information will help the TCEQ get the correct item to you as quickly as possible.

Chapter 1. Introduction

1.1. Who Must Have a Monitoring Plan?

All public water systems are required to have a monitoring plan. This requirement was expanded in October 2000 in response to the Stage 1 Disinfectants and Disinfection Byproducts Rule (DBP1). Previously, systems were required to keep track of their sample sites and frequency, but were not required to put their sampling documentation together in one document. This guide in its current version is updated to include new requirements from the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBP2), the Long Term 2 Enhanced Surface Water Treatment Rule (LT2), and the Ground Water Rule (GWR).

If your system treats surface water (SW) or groundwater under the direct influence of surface water (GUI), you must send your monitoring plan to the TCEQ for review and approval. You must revise it and send it in again every time your sample sites or monitoring frequency change.

If your system treats groundwater (GW) or purchases treated water, you must develop a monitoring plan, but you do not have to send it to the TCEQ unless we ask you to. The TCEQ investigator will look at it as part of the comprehensive compliance investigation (CCI, or sanitary survey), and the TCEQ sampling contractor will look at it when they come to collect chemical samples.

If your system purchases water, you need to coordinate with your wholesaler. You must make your monitoring plan available to other systems that provide or receive water from you, as needed. If you employ an operating company, you must give them a copy of your monitoring plan and be sure that they are following it.

When required, you should send your monitoring plan to:

Attn: Monitoring Plan Coordinator
Public Drinking Water Section, Mail Code 155
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Table 1.1. When to Prepare and Send Your Monitoring Plan

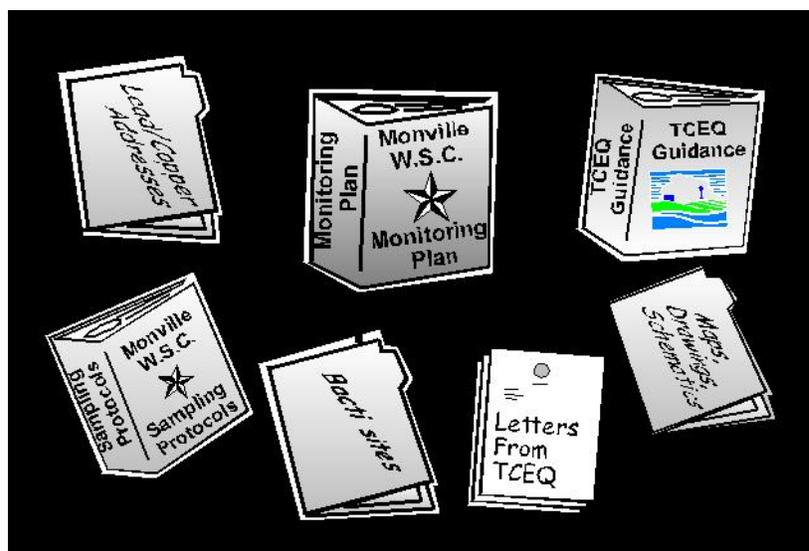
If your system . . .	You should send your Monitoring Plan to the TCEQ . . .
Treats surface water (or groundwater under its direct influence)	You should send it to the TCEQ whenever it is revised.
Treats and/or distributes only groundwater or purchased water	You should send it to the TCEQ if we ask you to. Otherwise, keep it on hand for the regional investigator.
Is a transient non-community (TNC) public water system that does not treat surface water	

Transient non-community (TNC) systems must have approved sample sites for their coliform sampling, and know where their entry point samples should be taken. TNCs do not necessarily have to have a full monitoring plan, but must clearly document all treatment and sample sites—raw, treated, and distributed. It is highly recommended that TNCs use the monitoring plan format in this guide. Usually, compliance with the monitoring plan requirements for TNC systems will be determined by the regional investigator during a Comprehensive Compliance Investigation (CCI). Sometimes, the TCEQ's Public Drinking Water Section staff will require submittal of a monitoring plan for a TNC system.

1.2. What Is a Monitoring Plan?

The monitoring plan is a tool to help water system operators coordinate all the monitoring requirements for different chemicals in the plant and distribution system. It is like an operations and maintenance manual for sampling. The information that must be included in the monitoring plan is

information your system should currently have on hand. The first step in developing your system's monitoring plan is gathering the existing documentation you have for sample sites, such as address lists for lead and copper or coliform sampling, maps of your system, etc.



By having an up-to-date monitoring plan, your system can easily refer to sampling requirements and pass this information on to new employees. In addition, the monitoring plan will help your system communicate with the TCEQ and the sampling contractor.

1.3. What Does This Guide Cover and What Has Changed?

This guide will help you develop the monitoring plan that every public water system must develop. The first half has general instructions and a summary of rule requirements. The second half has appendices with specific outlines and examples for you to follow.

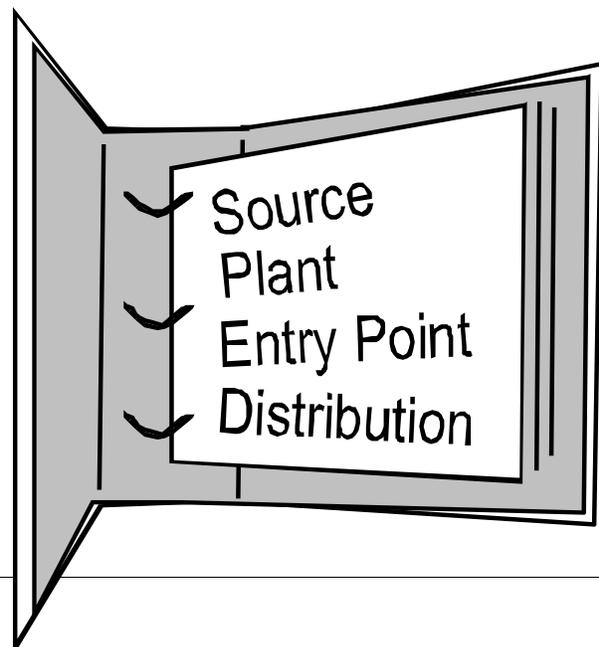
The current version of this guide has been revised based on new regulations. Some of the required tables are formatted differently now. If you followed the 2003 instructions for your monitoring plan, we strongly recommend that you update the plan to match the new formatting. As long as your plan includes all of the required information, the TCEQ may approve monitoring plans that follow the old format as being in compliance.

The instructions in this guide are organized in the same order that the monitoring plan should be organized, as follows:

- Chapter 2 covers raw water sampling requirements.
New! This chapter has been revised to describe raw water sampling requirements from the Ground Water Rule (GWR) and Long Term 2 Enhanced Surface Water Treatment Rule (LT2).
- Chapter 3 describes the requirements for samples that are taken in the treatment plant, or in-plant sampling.
- Chapter 4 describes sampling requirements for entry points to the distribution system.
- Chapter 5 describes sampling that occurs within the distribution system.

New! This chapter has been revised to include instructions for the Initial Distribution System Evaluation (IDSE) and setting sample sites for the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBP2)

The monitoring plan has been reorganized to add separate appendices for users of chlorine dioxide and ozone. By including these as separate sections, we hope



to make it easier for you to revise your monitoring plan when you have to comply with the new rules.

Both the guidance and the monitoring plan follow the flow of water—from the raw water through the treatment processes to the distribution system.

Follow one of these outlines to develop your monitoring plan:

- **New!** We have added additional examples (in Chapter 7) of monitoring plans for transient non-community (TNC) systems like roadside parks or convenience stores, and for non-transient non-community (NTNC) systems like schools or factories.
- **New!** Appendix A has a simple one-page outline of monitoring plan elements. This appendix has been added as a checklist to help you be sure you have included all of the needed sections in your monitoring plan.
- Appendix B provides an outline for systems that operate surface water treatment plants or if your system treats groundwater under the direct influence of surface water.
- If your system operates any wells, and you don't have any surface water treatment plants, use the outline in Appendix C.
- If your system redistributes purchased potable water only, then use the outline in Appendix D.
- If your system is a transient non-community (TNC), use the outline in Appendix E.
- **New!** Monitoring for systems using chlorine dioxide or ozone has been reorganized into a single appendix. If your system uses chlorine dioxide or ozone, your monitoring plan will need to include the attachment described in Appendix F.
- **New!** Systems that must perform Initial Distribution System Evaluation (IDSE) sampling under DBP2 can use the guidance provided in the new Appendix G.
- **New!** Forms for lead and copper sampling are included in Appendix H.
- **New!** The sampling requirements for systems that use chloramines are in Appendix I.
- **New!** Systems that must comply with the new surface water rules will find guidance for that in Appendix J.
- **New!** Regional contact information is in Appendix K.

The rule requirements summarized in this guidance document are from 30 TAC, Chapter 290, Subchapter F.

If you have questions about the monitoring plan, the rules that apply to public water systems, or sampling, please call the TCEQ's Public Drinking Water Section at 512-239-4691 or e-mail <PDWS@tceq.texas.gov>.

1.4. Sources, Plants, Entry Points, and Distribution Systems

The monitoring plan follows the water through the system, and uses these four items or concepts to track where it is going:

- *Sources.* Sources can be owned or purchased, wells or surface water, potable or raw.
- *Plants.* Anywhere the water quality is changed may be identified as a plant. Every source has to have a plant associated with it, as all raw water must be treated at some point to make it potable.
- *Entry Points.* An entry point is any point at which water from a plant flows to a distribution system. Every entry point must be connected to one or more plants.
- *Distribution System.* A distribution system is where consumers get potable water, and may be broken into pressure planes. Sometimes, a single system will operate separate, disconnected distribution systems.

Figure 1.1 shows some simple, typical arrangements of sources, plants, and entry points. For many systems, these relationships are much more complicated. Therefore, in addition to the lists of sample sites that are still required, we have modified the format of the entry point requirements to better describe how water flows through a system. The table used for this data is called the Entry Point, Plant, and Source Table, and it is described in Chapter 4.

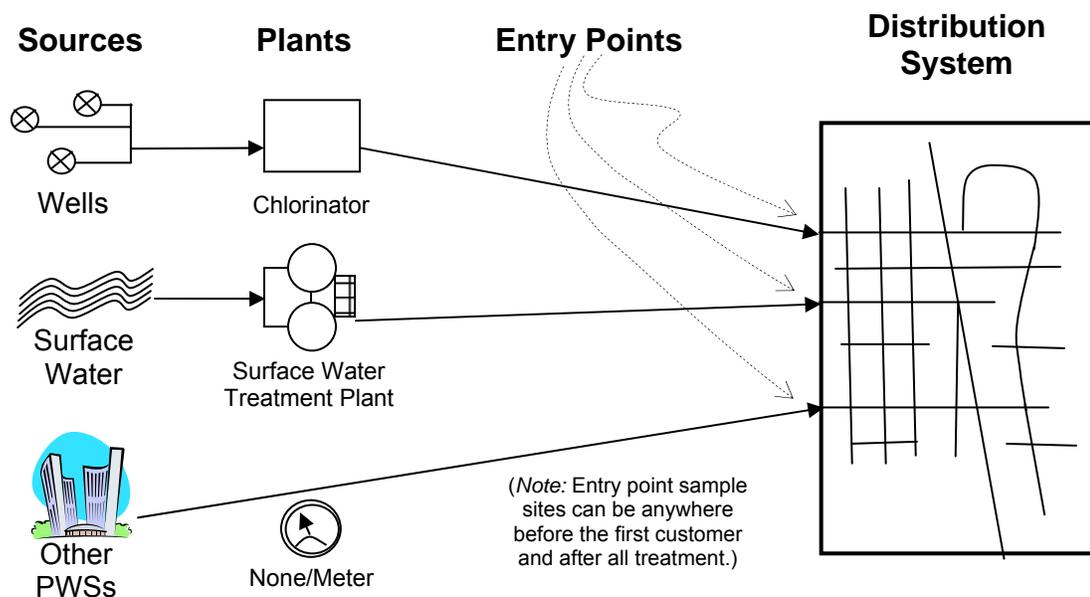


Figure 1.1. Some Typical Combinations of Sources, Plants, and Entry Points

You can see the data that the TCEQ has for your system's sources, plants, and entry points on our website through the Integrated Water Utilities Database (IWUD). Go to <www.tceq.texas.gov/goto/wud> and select the PWS Data Sheet report, and search for your system's name or public water system identification number (PWSID). The same data, plus more, is available through Drinking Water Watch at <dww.tceq.texas.gov/DWW/>.

A public water system does not always have all four things: a source, plant, entry point, and distribution system. In Texas, there are about 1,000 "distribution-only" public water systems that purchase and redistribute potable water from a different public water system that does all of the water treatment. There are about 50 treated-water wholesalers that have a source of surface water and a large surface water treatment plant, but do not provide water directly to any retail connections. There are a few raw water wholesalers that only operate wells or surface water intakes.

Recently, there are systems that operate as "water-wheelers," buying purchased water from one system and transporting it downstream for sale to another system, without providing water directly to any houses or other retail connections. All of these types of systems are regulated by the TCEQ, because a failure in any one area could create a risk to public health, and because that is how the federal rules are structured. They all need some kind of monitoring plan; the complexity of the monitoring plan depends on the complexity of the system.

1.5. Wholesalers and Consecutive Systems (Providers and Receivers)

Many public water systems buy or sell potable water. Others have interconnections but no sales agreement. The rules require that a monitoring plan represent the entire system, including both wholesalers and purchasers. Therefore, people who have a relationship like this must share monitoring plans as needed.

- *Wholesalers.* The EPA defines wholesalers as public water systems that send any water downstream for redistribution. Some wholesalers do not have their own retail connections, but many do. Wholesalers must provide their receivers with data for CCRs, any required public notices, corrosion control studies, and their monitoring plan, as needed.
- *Consecutive systems.* The EPA defines a consecutive system as a public water system that receives some or all of its finished water from other systems. Thus, any entity that meets the definition of a public water system and is not part of their provider's monitoring plan is a consecutive system. The other term frequently used for a consecutive system is "purchased-water system." Consecutive systems must

provide their wholesaler(s) with a copy of their monitoring plan, as needed.

1.6. Choosing Sampling Sites

As you develop your monitoring plan, you may find that new rules, such as the Stage 2 Disinfectants and Disinfection Byproducts Rule or the Ground Water Rule, require you to sample in locations where you haven't sampled before. If so, we encourage you to work with us to choose locations for the new sampling.

Many public water systems are growing. As your system grows, you will need to update your sampling sites to take into account new connections and new sources. When you do this, you may want to check with the TCEQ to make sure you understand the site location requirements. In some cases you are required to notify us when you change sample sites. There are special rules about where sample sites must be located. This guide covers those rules briefly in each chapter. The Public Drinking Water Section can help you figure out where to locate your sampling sites: call us at 512-239-4691, or e-mail us at <PDWS@tceq.texas.gov>.

The number in parentheses after many of the headings refers to the section of the rules dealing with that subject. Should there be a discrepancy between this guidance and the rule, the rule will be used, and not this guidance.

Chapter 2. Raw Water Sampling

Every system is required to have a raw water sample tap on each well, and a raw water sampling location for a surface water source. These sources and sampling locations must be listed in your monitoring plan. New rules have increased the requirements for raw water monitoring.

Some water systems are required to take monthly coliform samples of their raw water. The new Ground Water Rule (GWR) requires all public water systems to perform raw water sampling following any positive routine distribution system coliform sample starting Dec. 1, 2009. If a system develops a Triggered Source Monitoring Plan describing the sources that feed each distribution sample site, and gets it approved by the TCEQ, then the follow-up monitoring can be limited to the well(s) feeding that distribution site.

The new Long Term 2 Enhanced Surface Water Treatment Rule (LT2) requires systems that treat surface water (or groundwater under the direct influence of surface water) to complete *Cryptosporidium* or *E. coli* monitoring at all raw water intakes. The type of sampling depends on the size of the system.

All water systems that treat surface water are required to collect total organic carbon (TOC) samples from their raw water. The discussion of TOC samples is included in Chapter 3, "In-plant Sampling." The raw water TOC sample is collected as part of the TOC sample set that includes a treated water sample.

Wells Not Continuously Used

Sometimes, a system that has several wells will not use all the wells all the time. For example, in Figure 4.2, the well that feeds EP 002 is not always connected to the distribution system. The monitoring and sampling requirements for this well depend on whether it is an emergency well or a demand well. (See the glossary at the beginning of this guide, for definitions of demand water source, emergency water source, and other terms.) You may choose to not monitor emergency water sources; however, demand sources must be included in your routine monitoring plan.

New Wells

Before a new well can be approved to provide water to the public, coliform and chemical samples must be collected to make sure the well provides water that meets the drinking water standards. Call the TCEQ's Plans Review Team at 512-239-4691 to learn about design or construction requirements for new drinking water wells. Call the TCEQ's Drinking Water Quality Team at 512-239-4691 or e-mail <PDWS@tceq.texas.gov> to learn about sampling requirements for new wells.

2.1. Source Sample Site Table

Every system must include a list of its sources, and show how the sources are connected with plants and entry points in their monitoring plan. All sources should be listed and described even if they are for emergency use. Descriptions of the data to put in your source sample site table are given in Table 2.1. An example list of source sampling sites is shown in Table 2.2. You must also list your sources in the Entry Point, Plant, and Source Table, which is described in Chapter 4 (section 4.2).

Table 2.1. Source Sample Site Table Field Definitions

Source	TCEQ Source ID	Sample Site	Notes
List the source(s). Use the system's name for the source.	The 9-digit code that you can find in TCEQ documentation. The first letter is a code for the type of source, followed by the 7-digit PWS ID, then a letter code to distinguish each unique source.	A brief description of the place where you sample the source water. For a well, this is often "Tap at Wellhead"; for a purchased-water source, it is often "Tap at Take Point"; for a SWTP, it is often "Lab Raw Tap."	Make any comments that are important. Note if the well is only used on an emergency basis. For emergency wells, note the 5-year sample cycle.

Table 2.2. Example of a Source Sample Site Table for a System with One Well

Source	TCEQ Source ID	Sample Site	Notes
Well 1	G3560046A	Wellhead	

Table 2.3. Example of a Source Sample Site Table for a System with Wells, Surface Water, and Purchased Water

Source	TCEQ Source ID	Sample Site	Notes
Well 1	G2550001A	Wellhead	Emergency (5-yr samples due in 2010)
Well 2	G2550001B	Wellhead	
Raging River	S2550001A	Raw sample tap in SWTP lab	
Purchased water from the City of Aguadulce	P2550001A	Sample station at 123 Elm Street	Aguadulce PWS 2550003

2.2. Assessment Source Monitoring

Currently, systems with wells that have been identified in aquifers that are sensitive to surface water intrusion, or are vulnerable in some other way, must

collect raw water samples for coliform bacteria. If your system is required to conduct raw water coliform monitoring, you should list all of these sources in your monitoring plan. You should keep a copy of the letter that requires this sampling—for example, a sanitary control easement exception letter.

2.3. Ground Water Rule (GWR) Requirements

The EPA adopted the Ground Water Rule Oct. 11, 2006. The rule became effective Dec. 1, 2009. It applies to all public water systems, including transient non-community (TNC) water systems as well as community and non-transient non-community (NTNC) systems that provide groundwater.

Under the new rule, when you get a total coliform positive result in any routine distribution system sample, you must sample every well feeding that distribution system (for the fecal indicator specified by the TCEQ) within 24 hours. This includes purchased-water sources. Your monitoring plan must include contact information for any systems that supply you with potable water for redistribution to ensure this information is readily available.

However, sampling can be limited to fewer wells if you have a TCEQ-approved Triggered Source Monitoring Plan [290.109(c)(4)(B)(ii)]. For more information on submitting a Triggered Source Monitoring Plan, contact the Drinking Water Protection Team at 512-239-4691 or go to the GWR information posted at <www.tceq.texas.gov/goto/gwrule>.

Triggered Source Monitoring Plan

If approved by the TCEQ, systems with more than one groundwater source may conduct triggered source monitoring at a representative groundwater source or sources. This can save time and money for the system in the long term. Under some circumstances, the TCEQ may require a system to have a Triggered Source Monitoring Plan.

Before using a Triggered Source Monitoring Plan, you must submit it to the TCEQ for approval. You should use this guidance to ensure we have all the required information. When you receive written approval for your Triggered Source Monitoring Plan, keep it on file with your system's monitoring plan.

There are two categories of representative source water monitoring for the GWR:

1. Wells representing coliform monitoring locations in the distribution system.
2. Wells representing other wells within the same hydrogeologic setting.

How Distribution Sites Link to Wells

Table 2.4 shows the requirements for the Triggered Source Monitoring Plan table of distribution sites and sources. Table 2.5 shows an example of a list of sites and sources. Figure 2.1 shows an example of a distribution map.

Table 2.4. Requirements for a Distribution Sites and Sources Link Table

Routine Distribution Coliform Sample Sites	Entry Points that Feed Each Site	Wells Feeding Each Entry Point	TCEQ Source ID
List all routine distribution coliform sites. This list should already be in your monitoring plan under the "Distribution" section. If the sites are numbered, include the numbers also.	List any entry points that feed each routine distribution coliform site. If that changes under different operating conditions, list all the entry points that might feed that part of the system. If you know that a site gets water from a different entry point in the summer and winter, note that.	List all the wells that feed each entry point. Include emergency and demand wells.	List the TCEQ Source ID for each well.

Table 2.5. Example of a Source Monitoring Plan Distribution Sites and Sources Link Table Showing Example Sources and Sites for Ground or Surface Water

Routine Distribution Coliform Sample Site	Entry Point Feeding That Site	Wells Feeding That Entry Point	TCEQ Source ID
1 City Hall	EP001	Well 1 (emergency), Well 2	G1019999A
2 Fire Department			G1019999B
3 123 Apple Street	EP002	Well 3	G1019999C
4 15401 Querca Street			
5 20 Industrial Park Road	EP003	Well 4	G1019999D
6 456 Fleet Street (Operator's house – Alternate site)	EP001	Well 1 (emergency), Well 2	G1019999A, G1019999B

Table 2.6. Example of a Triggered Source Monitoring Plan Distribution Sites and Sources Link Table for Figure 2.1, a Community PWS with Two Wells and Seven Coliform Sites

City of County Seat, Source Monitoring Plan			
Routine Distribution Coliform Sample Site		Well / EP	
		Summer Well 1 (demand)	Winter Well 2 Only
SS-A	Sample Station at 765 FM 4691	Well 1 / Entry Point 1	Well 2 / Entry Point 2
SS-B	Hose bibb at NE corner of Court House	Well 2 / Entry Point 2	
SS-C	Sample Station at High School (Bldg 4)	Well 2 / Entry Point 2	
SS-D	Hose bibb at SW corner of Middle School	Well 1 / Entry Point 1 or Well 2 / Entry Point 2	
SS-E	Sample Station at 987 S East Avenue	Well 2 / Entry Point 2	
SS-F	(alt) Hose bibb at back of roadhouse	Well 1 / Entry Point 1	
SS-G	(alt) Hose bibb on side of church	Well 2 / Entry Point 2	

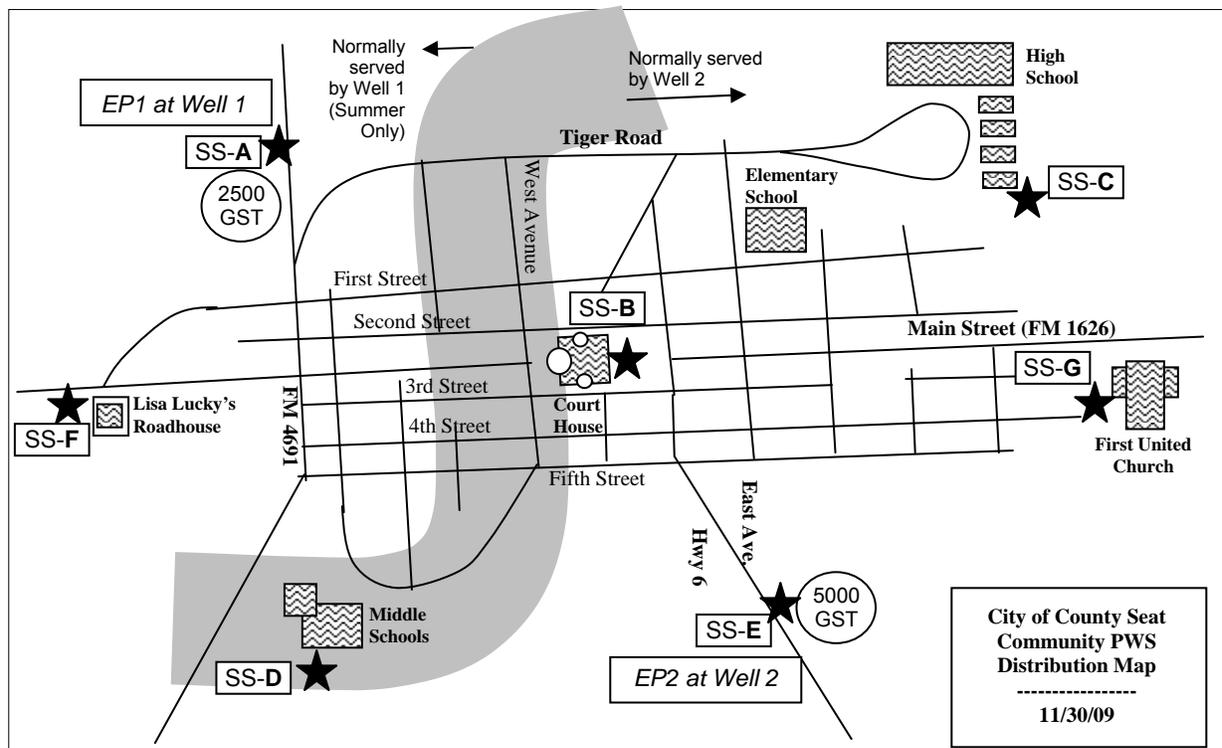


Figure 2.1. Diagram of the Distribution Site and Source Relationship

Representative Wells

The Triggered Source Monitoring Plan describes any groups of wells that are hydrogeologically similar enough that a sample from one well can represent the whole group. You must provide justification and documentation showing hydrogeologic similarity if you wish to limit follow-up raw well sampling. It is only needed if you wish to limit sampling to one of a group of wells. If you only have a few wells, you may not need to include this section.

When wells are hydrogeologically similar, they are drawing water from parts of the aquifer that are interconnected and the water that they produce is expected to be comparable. It should be possible to get a sample from one well that reasonably represents water from all the wells. So, if one well is free of fecal contamination, you can deduce that all the wells are also free of fecal contamination.

Table 2.7 describes the requirements for a representative well group table. Examples of representative well group tables are given below. Table 2.8 is an example of a representative well table for a single group of two wells, while Table 2.9 is an example of a table for two groups of four wells. Figure 2.2 is a diagram depicting the relationships described in Table 2.9.

Table 2.7. Requirements for a Representative Well Group Table

Well Proposed to Be Sampled as Representative of the Group	Backup Well ID	Source IDs of Wells Represented	Names of Wells Represented	Aquifer / Well Depth / Well GPM	Entry Point(s) Associated with Wells
The well that you propose to sample as representative of the group of wells.	Well to be sampled if primary representative well is offline.	TCEQ source IDs for wells that are proposed to be represented by the well listed in the first column.	System's name for well.	Aquifer that those wells draw water from / depth of well / well output in gpm.	Usually a group of wells will feed the same entry point, but not always.

Table 2.8. Example of a Representative Well Table (for One Group with Two Wells)

Representative Well ID	Backup Rep Well ID	Source IDs of Wells Represented	Names of Wells Represented	Aquifer / Well Depth / Well GPM	Entry Point(s) Associated with Wells
G1019999A	G1019999B	G1019999A	Well 1	Chicot / 280' / 45	EP001
		G1019999B	Well 2	Chicot / 300' / 50	

Table 2.9. Example of a Representative Well Table (for Two Groups of Four Wells)

Representative Well ID	Backup Rep Well ID	Source IDs of Wells Represented	Names of Wells Represented	Aquifer / Well Depth / Well GPM	Entry Point(s) Associated with Wells
G2550001A	G2550001B	G2550001A	Well 1	Glen Rose / 1233' / 115	EP001
		G2550001B	Well 2	Glen Rose / 1200' / 100	
		G2550001C	Well 3	Glen Rose / 1188' / 136	
		G2550001D	Well 4	Glen Rose / 1046' / 125	
G2550001D	G2550001E	G2550001E	Well 5	Trinity / 541' / 76	EP002
		G2550001F	Well 6	Trinity / 540' / 80	
		G2550001G	Well 7	Trinity / 555' / 45	
		G2550001H	Well 8	Trinity / 539' / 50	

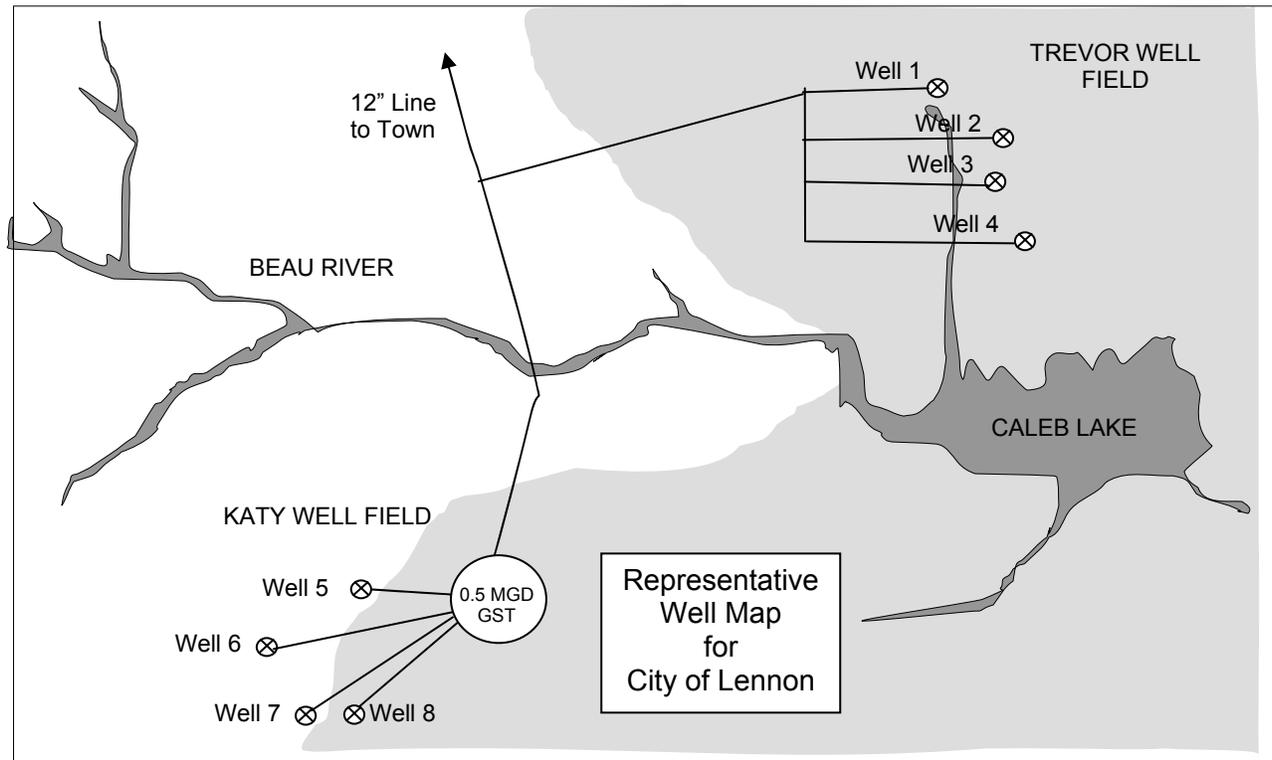


Figure 2.2. Diagram of Representative Wells

Interconnections with Other Groundwater Systems

Part of the Triggered Source Monitoring Plan is a description of interconnections with other systems that have wells. This section of the plan should describe which purchased-water interconnections provide water to each part of your distribution.

The Triggered Source Monitoring Plan should include contact information and maps or geographically representative schematics showing which wells provide water, and which wells will be sampled depending on the location of a coliform positive sample in your distribution system.

Information to Be Included in a Triggered Source Monitoring Plan

For assistance in submitting a Triggered Source Monitoring Plan, contact the Drinking Water Protection Team at 512-239-4691 or go to the GWR monitoring provisions online at <www.tceq.texas.gov/goto/gwrule>. For information on what to include in a Triggered Source Monitoring Plan, download the appropriate checklist(s):

- Checklist D: Wells Representing Coliform Monitoring Locations in the Distribution System
- Checklist H: Wells Representative of Other Wells in the Same Hydrogeologic Setting

2.4. New Long Term 2 Enhanced Surface Water Treatment Rule (LT2) Requirements

The EPA published the LT2 rule in the Federal Register on Jan. 5, 2006. The TCEQ adopted the LT2 rule on Jan. 4, 2008. The LT2 rule applies to all public water systems (PWSs) that treat surface water (SW) or groundwater under the direct influence of surface water (GUI). These systems are required to monitor all raw water intakes for *Cryptosporidium parvum* or *E. coli*. The results of the sampling will determine if the source water has an elevated risk of *Cryptosporidium*. If elevated *Cryptosporidium* levels are found, a system is required to install additional treatment to reduce the risk of sickness from *Cryptosporidium*.

A system that treats SW or GUI must conduct at least two rounds of raw surface water monitoring at each SW intake and at each GUI well. The purpose of the monitoring is to establish minimum treatment technique requirements for *Cryptosporidium* and other pathogens. The TCEQ may waive the raw surface water monitoring requirements for an intake or a well if the combination of pathogen removal and disinfection processes used to treat the raw water achieves at least a 5.5-log total removal and inactivation of *Cryptosporidium*.

Determining Raw Surface Water System Schedules for Existing Sources

Systems will undertake two rounds of sampling. Scheduling for the LT2 requirements is based on the size of the system or the combined distribution system (CDS). A CDS is an interconnected group of systems. (Groups are based on the population of the largest single system in the CDS, not on the sum of the populations of the interconnected systems.)

Table 2.10 is the raw source water monitoring schedule for SW and GUI systems. This table contains the start dates for both rounds of sampling, which are based on the number of people served within a single system or CDS, if applicable (designated by the Schedule Number).

Table 2.10. Raw Source Water Monitoring Schedule for SW and GUI Systems

Schedule Number	Systems that are not part of a combined distribution system ¹ and serve must begin the 1st round of source water monitoring no later than the month beginning and must begin the 2nd round of source water monitoring no later than the month beginning . . .
1	at least 100,000 people	October 1, 2006	April 1, 2015
2	from 50,000 to 99,999 people	April 1, 2007	October 1, 2015
3	from 10,000 to 49,999 people	April 1, 2008	October 1, 2016
4	fewer than 10,000 people and monitor for <i>E. coli</i>	October 1, 2008	October 1, 2017
	fewer than 10,000 people and monitor for <i>Cryptosporidium</i>	April 1, 2010	April 1, 2019

1. Systems that provide treated surface water to another system and are part of a combined distribution system (CDS) must begin monitoring at the same time as the system in the CDS with the earliest compliance date.

Determining Raw SW System Schedules for New Sources

If a system installs a new well or intake after the date that the first round of raw source water monitoring begins, the system must submit a proposed monitoring schedule. This schedule for the first round of raw surface water monitoring must be submitted no later than three months after the new source is placed in operation.

Raw Surface Water Sampling Plan

A system must submit a proposed raw surface water monitoring plan when requested by the TCEQ. Each system receives a package of information from the

TCEQ that must be completed and returned before the due date for the sampling plan. The sampling plan must do all of the following:

- identify all of the system's intakes and wells
- provide the location of each raw water sampling point
- include the parameters that will be monitored
- state the frequency and dates that samples will be collected
- specify the laboratories that will perform the analyses

See Appendix J for forms and worksheets.

Surface water samples must be collected from the raw water line prior to any treatment and before the first point where a recycled stream is returned to the treatment process. You should submit the drawing from the system's monitoring plan, but you can use the diagrams in Appendix J as guides.

Raw Surface Water Sampling Frequency

You must also submit a detailed schedule of when the samples will be taken. The frequency and length of sampling depends on the size of the system.

Systems in Schedules 1 to 3 must monitor turbidity, *E. coli* levels, and *Cryptosporidium* levels in the raw water at least once a month for a period of not less than 24 consecutive months. Schedule 4 systems that choose to not monitor for *E. coli* will be required to monitor for *Cryptosporidium*. Schedule 4 systems that choose to monitor for *E. coli* must take samples at least once every two weeks for a period of not less than 12 consecutive months (26 samples total). If *E. coli* levels do not exceed triggers, these Schedule 4 systems will not be required to monitor for *Cryptosporidium*. If *E. coli* levels exceed triggers, these Schedule 4 systems can choose to monitor for *Cryptosporidium* either twice a month for one year or once a month for two years.

The method of coliform monitoring for Total Coliform Rule compliance is different from this method.

2.5. Naturally Occurring Ammonia Sampling for Systems that Use Monochloramine

Some systems are allowed to use monochloramine as a disinfectant, in addition to or as a replacement for free chlorine. These systems are granted that permission through a case-by-case exception from the TCEQ. If your system uses monochloramine, and if your raw water has any significant naturally-occurring ammonia, you should include a description in your monitoring plan of how you sample and analyze for that. More information is provided in Appendix I of this manual.

Chapter 3. In-Plant Sampling

This chapter summarizes the sampling that is required within water treatment plants. Sections 3.1 and 3.2 contain general information. The subsequent sections contain in-plant sampling requirements for each constituent that must be measured. Additional information for each constituent is contained in the Texas Administrative Code (30 TAC, Chapter 290, Subchapters D and F).

Applicability

For surface water (SW) treatment plants and plants treating groundwater under the direct influence of surface water (GUI), the monitoring plan must include a description and diagram showing where chemicals are injected and where chemicals or water quality parameters are monitored.

Most small systems have a chlorinator of some type. Chlorination is important for keeping the water safe from pathogens. All systems are required to keep a record of the amount of chemicals used. Most systems keep track of whether the chlorinator is operating correctly. Creating a treatment table is simple if you only use chlorine—it includes just one line.

Operational Samples

Most SW or GUI water treatment plants realistically require more samples in the treatment plant than is required by the rules. Keep in mind that the rules are minimum requirements. Most operators recognize the need for additional sampling to determine how well the plant is working. You will need to take additional samples for non-regulatory purposes. You use these sample results to make operational decisions about how to run the treatment process.

You are not required to describe the plant operational sampling in your monitoring plan. That information is included in your operations and maintenance manual. You may choose to include non-regulatory sampling in your monitoring plan, but if you do, you should clearly indicate that it is not for compliance sampling.

Sampling for Systems that Use Monochloramine

Some systems are allowed to use monochloramine as a disinfectant, in addition to or as a replacement for free chlorine. These systems are granted that permission through a case-by-case exception from the TCEQ. If your system uses monochloramine, you should include a description in your monitoring plan of how you ensure that the correct ratio of chlorine to

ammonia is applied. More information is provided in Appendix I of this manual.

3.1. Treatment Table

Examples of chemicals a plant may use for treatment include:

- disinfectants (chlorine, chloramine, chlorine dioxide)
- taste and odor control (powdered activated carbon, potassium permanganate)
- coagulants (alum, polymer, ferric)
- pH adjustment (caustic, lime, various acids)
- softening (lime)
- corrosion control (orthophosphates, silicates)
- fluoride

Examples of things that may need to be monitored at the plant include:

- disinfectant residual (for each disinfection zone)
- pH (for each disinfection zone)
- turbidity (combined filter effluent turbidity and individual filter turbidity)
- fluoride residual
- disinfection byproduct precursors (total organic carbon)
- free ammonia (for systems that use chloramines)

Treated or Blended Chemical Monitoring Site

Any groundwater or purchased-water system that uses treatment or blending to reduce its level of chemicals must include a schematic (or diagram) and a description of that process in its monitoring plan. Surface water treatment plants would also include this in their schematic. An example of a schematic for a system using reverse osmosis (RO) treatment is shown in Figure 3.2.

Disinfection Zones

One of the most important parts of the monitoring plan for surface water treatment plants is the description of the disinfection zones. A disinfection zone is a segment of the treatment process that begins at a disinfectant application point and ends at the next downstream disinfectant application or residual sampling point. Each disinfectant application point, regardless of the frequency of use, represents the beginning of a separate disinfection zone.

The plant's disinfection zones are described in its concentration-time (CT) study. Every surface water treatment plant is required to have a current, accurate, approved CT study. If you have questions about CT studies, contact the TCEQ's Technical Review and Oversight Team at 512-239-4691.

Under the new Ground Water Rule, some groundwater treatment plants will have to achieve at least 4-log (99.99 percent) removal or inactivation of viruses. Those systems will have to submit a CT study for the TCEQ's approval. The TCEQ will develop separate guidance for groundwater CT studies.

Examples of Treatment Tables for a Plant

A system that treats water should include a table of treatments in their monitoring plan. A table should be included for each separate treatment plant. Table 3.1 shows the information that must be captured in the treatment table. If the system treats surface water (or GUI), you can expect this table to be long, because it needs to show all chemical addition points and disinfection zones. For a system that treats groundwater, the table will be much simpler. Tables 3.2, 3.3, and 3.4 give examples for both surface and groundwater plants.

Table 3.1. Treatment Table Field Definitions

Treatment Sequence	Treatment
Number the treatments in order of how they are applied to the water. In other words, list the chemicals applied to raw water before those applied to finished water	List the chemical that is added or the physical unit process that is used. You don't have to list pumps, since those don't change the drinking water quality. You only need to list storage if it is used for disinfectant contact time (CT).

Table 3.2. Example of a Treatment Table for Groundwater with Corrosion Control Treatment

Treatment Sequence	Treatment
1	Gaseous chlorination (at wellhead)
2	Orthophosphate injection (at plant building located near town)

Table 3.3. Example of a Treatment Table Used at a Surface Water (or GUI) Treatment Plant

Disinfection Zone	Treatment Sequence	Treatment
1	1	Gaseous chlorination(pre)
	2	Activated carbon (powdered)
	3	Alum (coagulant)
	4	Polymer (coagulant aid)
	5	Sedimentation
	6	Media filtration
2	7	Gaseous chlorination (post)
	8	Ammonia injection
	9	Ground storage tank
	10	Fluoridation

Table 3.4. Example of a Treatment Table for a Groundwater Treatment Plant with Reverse Osmosis

Treatment Sequence	Treatment
1	Reverse osmosis
2	Gaseous chlorination
3	Ammonia injection
4	Ground storage tank

3.2. Plant Schematic

Figure 3.1 is an example of a schematic (or diagram) for a plant that just has a chlorinator, and Figure 3.2 is an example of a schematic for a groundwater system that uses reverse osmosis to remove a chemical contaminant. Figure 3.3 is an example of a schematic of the in-plant sampling for a surface water treatment plant.

If you do not operate a treatment plant, leave the plant schematic out of the monitoring plan. If you operate a small groundwater system and the only treatment that you use is disinfection, you do not have to monitor anything within the plant. Therefore, you do not have to include a section in your monitoring plan for in-plant sampling.

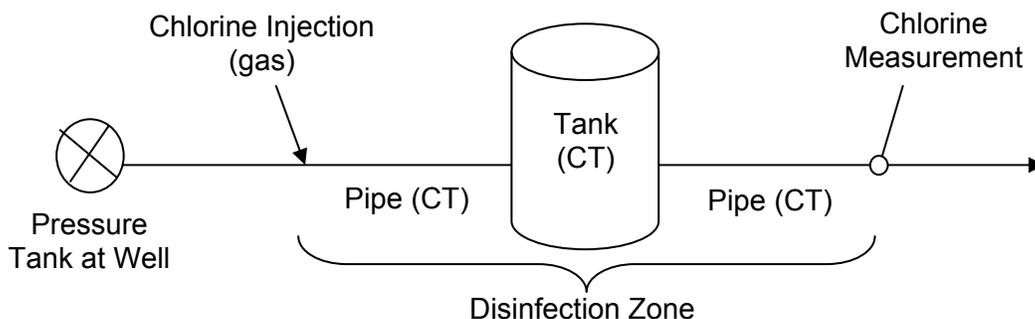


Figure 3.1. Example of a Plant Schematic for Chloraminated Groundwater Meeting 4-log CT

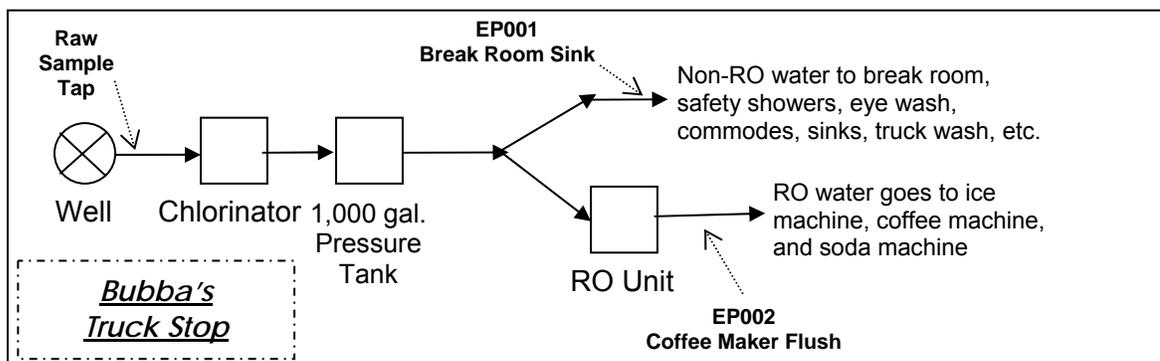


Figure 3.2. Example of a Plant Schematic for a Groundwater System Using Reverse Osmosis (RO) to Remove Chemical Contaminants

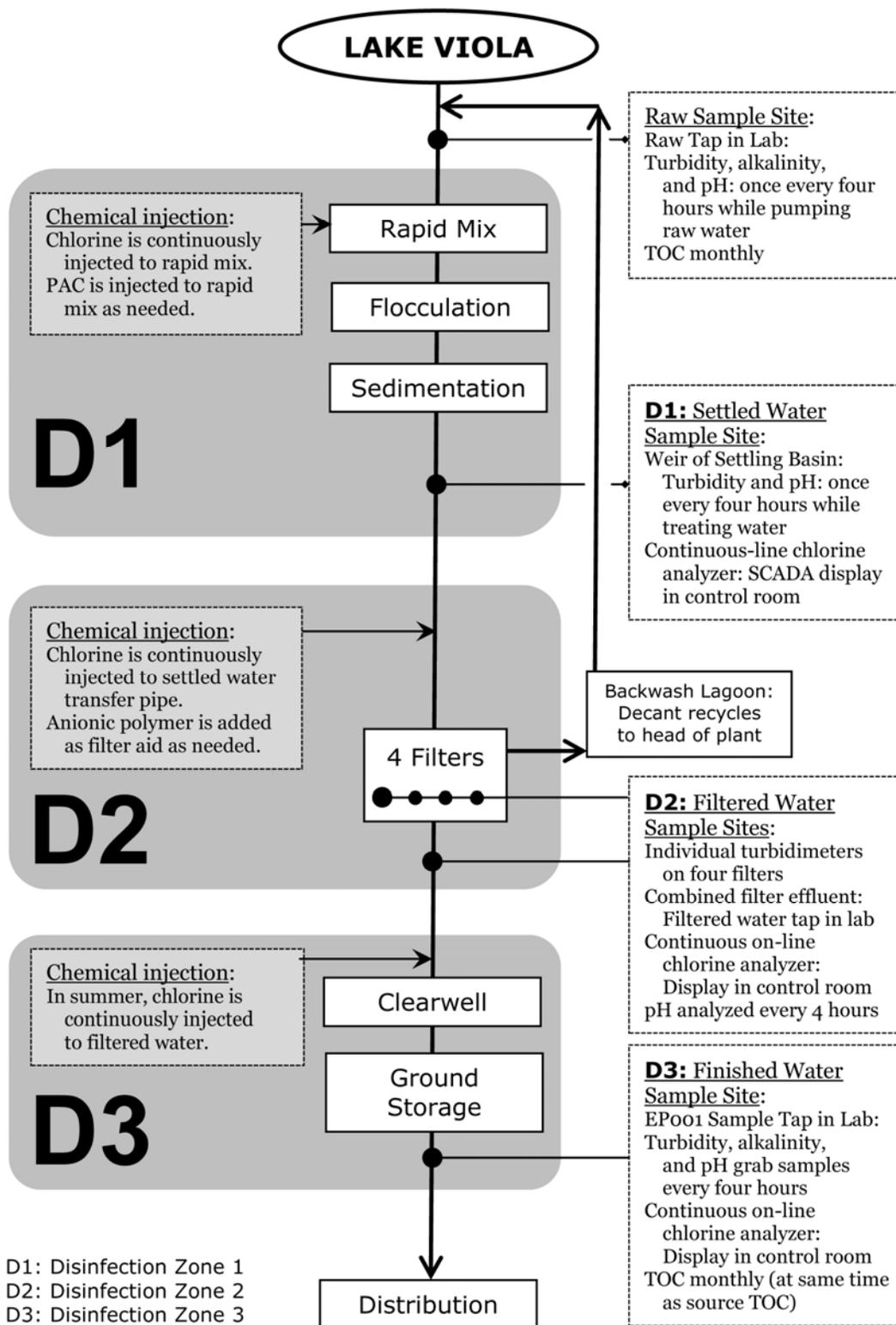


Figure 3.3. Example of a Plant Schematic for a Surface Water Treatment Plant (SWTP) Showing Pumps, Flow Meters, Injection Points, Sampling Points, and Disinfection Zones

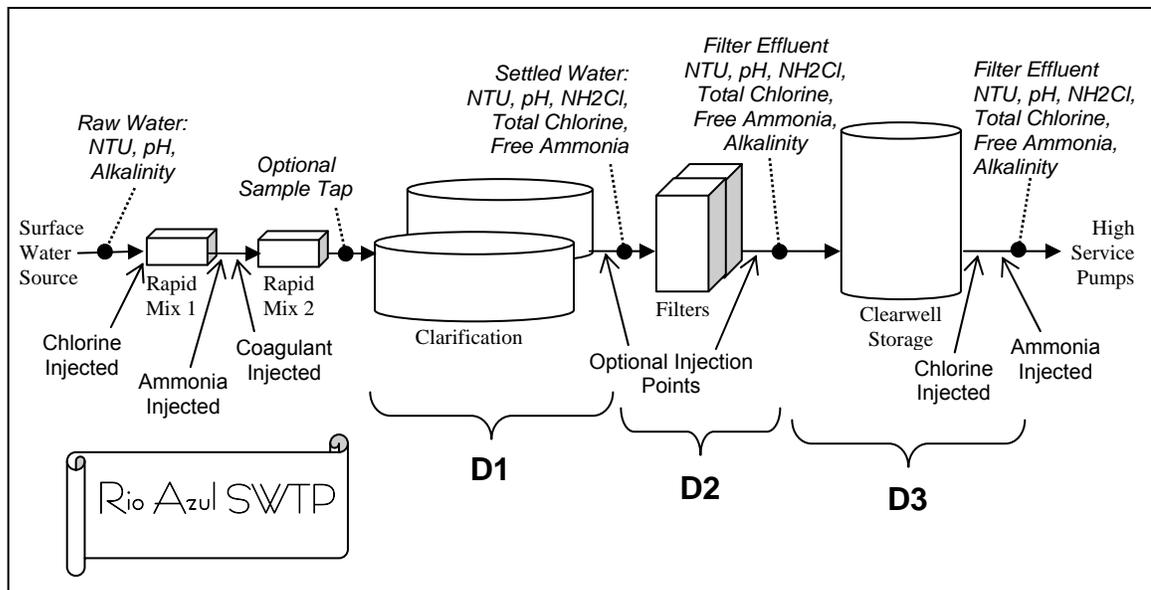


Figure 3.4. Example of a Treatment Sequence for Chloramination

3.3. Combined Filter Effluent Turbidity for SWTPs (30 TAC 290.111)

Every SW and GUI plant (SWTP) must demonstrate that the treatment process removes the required amount of turbidity, which is a surrogate measure for pathogens.

Additional information about surface water monitoring and reporting can be found in *Monthly Testing and Reporting at Surface Water Treatment Plants: Using the New Automated Forms* (TCEQ publication RG-211). If you have questions about where to locate sampling points, contact the Surface Plant Evaluation Team at 512-236-4691.

Location

Combined filter effluent samples must be taken downstream of the point at which the water from all of the plant's filters is combined. At most plants, the combined filter effluent sampling site is located where the water enters the clearwell, but it may be downstream of plant storage if it is not possible to monitor before storage. A location after the high-service pumps (but before any customer's tap) is acceptable if no better sampling location is available. A plant must obtain approval to use a combined filter effluent turbidity sampling site that is not located on the clearwell fill line.

Frequency

If your public water system serves fewer than 500 people, you must monitor the turbidity of the combined filter effluent (CFE) at least once each day that the system serves water to the public.

If your water system serves 500 people or more, you must monitor the turbidity of the combined filter effluent at the combined filter effluent sampling points at least every four hours that the system treats water.

3.4. Individual Filter Effluent Turbidity for SWTPs (30 TAC 290.111)

Every SW and GUI treatment plant is required to demonstrate that each filter is operating properly. The performance of an individual filter is evaluated based on the turbidity level of that specific filter.

Location

SW plants must monitor the turbidity in the water produced by each individual filter.

Frequency

The following requirements took effect Jan. 1, 2002:

- If your public water system serves at least 10,000 people, you must continuously monitor the filtered water turbidity at the individual filter effluent (IFE) of each filter and record the turbidity value every 15 minutes.
- If your SW or GUI water system serves fewer than 10,000 people, you must measure and record the filtered water turbidity level at the effluent of each individual filter at least once each day that the plant is in operation. Upcoming EPA rules may require continuous monitoring in the future, with some exceptions for very small systems.

3.5. Microbial Inactivation in a SWTP (30 TAC 290.109)

Every SW or GUI treatment plant must demonstrate that the treatment process provides adequate microbial inactivation through disinfection.

If you have specific questions about in-plant disinfection, you can contact the TCEQ's Surface Plant Evaluation Team at 512-239-4691. You can also get

guidance from *Monthly Testing and Reporting at Surface Water Treatment Plants: Using the New Automated Forms* (RG-211), using any of the methods described in the preface of that publication.

Location

SW and GUI treatment plants must measure the disinfectant residual, pH, temperature, and flow rate of the water in order to calculate the amount of viral and *Giardia* inactivation the plant achieves. Disinfectant residual and pH must be measured at the end of each disinfection zone. Raw water sampling is usually used for flow rate and temperature. The plant schematic must show the plant's disinfection zones (see figures 3.2, 3.3, and 3.4).

Frequency

The raw water flow rate, raw water temperature, disinfectant residual, and pH in each disinfection zone must be measured at least once per day at peak hourly raw water flow rates. You may wish to take more than one set of measurements a day. If so, the operator should report the set of data that produces the lowest inactivation value.

3.6. Total Organic Carbon for SWTPs (30 TAC 290.112)

Every SW or GUI plant must comply with the total organic carbon (TOC) monitoring requirements. Only systems that use coagulation, flocculation, and sedimentation followed by conventional media filtration must meet the removal requirements.

If you are required to comply with the TOC rules, you should obtain a copy of the TCEQ publication *Total Organic Carbon (TOC) Guidance Manual* (RG-379) and use any of the methods described in the preface (page vii) of that publication.

Location

The raw water sampling point should be before any chemical addition. The finished water sampling location may be any point after sedimentation but before the first customer.

Frequency

Your system must take one TOC sample set every month. The monthly TOC sample set consists of raw water alkalinity, raw water TOC, and treated water

TOC. The samples should be taken during normal operating conditions and normal influent water quality. The raw water alkalinity and TOC must be taken at the same time (within 5 minutes). The finished water TOC sample must be taken between 1 and 8 hours after the raw water samples were taken. You should only take your TOC sample set when the plant is operating at a steady state. Do not take a TOC sample set directly after changing chemical dosage water flow rates. Instead, wait at least an hour, until the plant has had a chance to even out.

Actual Contact Time: Your system has the option of sampling finished water at a delay time equal to the actual hydraulic detention time by requesting this option in writing, and explaining the method or equipment you will use to calculate the sampling delay. First, however, you should get approval from the Surface Plant Evaluation Team, 512-239-4691.

You also have the option of taking additional TOC sample sets in a month. Possible reasons for taking multiple sets include a change in raw water conditions because of rain, or use of a different raw water blend.

Even if you are meeting one of the alternate compliance criteria (ACC), you still have to take a TOC sample set, and maybe some other samples, and report them every month. Table 3.5 gives summaries of the ACCs and their reporting requirements.

If your plant has a running annual average of treated water TOC of less than 2.0 mg/L for two consecutive years, you may reduce monitoring to one TOC sample set per plant per quarter. However, if the running annual average treated water TOC in a given quarter is greater than or equal to 2.0 mg/L, your system must go back to routine monitoring in the month following that quarter.

For more information on TOC, see the *Total Organic Carbon (TOC) Guidance Manual* (TCEQ publication RG-379).

Table 3.5. Alternate Compliance Criteria (ACC) Summaries and Reporting Requirements for Total Organic Carbon

ACC	Requirement	Monthly Sampling and Reporting
1	Raw water TOC < 2.0 mg/L	TOC sample set
2	Treated water TOC < 2.0 mg/L	TOC sample set
3	Raw water TOC < 4.0 mg/L	TOC sample set and quarterly THM
4	Raw water SUVA < 2.0 mg/L	TOC sample set plus raw water SUVA
5	Treated water SUVA < 2.0 mg/L	TOC sample set plus treated water SUVA jar test results.
6	Alkalinity removal > 60 mg/L	TOC sample set and treated water alkalinity.
7	Magnesium hardness removal >10 mg/L	TOC sample set and raw and treated magnesium.

Chapter 4. Entry Point Sampling

This chapter summarizes the sampling that is required at entry points to the distribution system. Section 4.1 discusses how to set good entry point sampling sites and section 4.2 shows the entry point tables to include in the monitoring plan. Section 4.3 gives examples of the entry point schematics required for the monitoring plan. Section 4.4 explains entry point disinfectant residual sampling and section 4.5 discusses the chemical sampling rule requirements for each constituent that is measured. Additional information for each constituent is contained in the regulations (30 TAC, Chapter 290, Subchapter F).

An entry point to the distribution system is the point where treated water flows from the plant or well site into the distribution system. A lot of sampling is done at the entry points to monitor for chemicals, including:

- synthetic organic chemicals (SOCs), such as atrazine
- volatile organic chemicals (VOCs), such as gasoline
- inorganic chemicals (IOCs), such as arsenic, nitrate, and fluoride
- radiochemicals, such as gross alpha, radium 226, and radium 228

The entry point samples should reflect the quality of the water that is delivered to a system's customers.

Applicability

All systems that provide potable water have an entry point. Therefore, all systems are required to do some type of entry point sampling. The subsections on specific constituents explain the monitoring frequency in detail.

Usually, purchased-water entry points are not sampled for chemicals. However, the minimum disinfectant residual requirements (30 TAC 290.110) do apply, so every take point where ownership of the water is transferred should be equipped with a sample site. The TCEQ will require samples to be taken at purchased-water take points under some circumstances, for example: if the providing system is in violation of a chemical maximum contaminant level (MCL).

Summary of Disinfectant Monitoring Rule Requirements

All systems must continuously maintain a disinfection residual during treatment and throughout distribution (30 TAC 290.110). SW and GUI systems must monitor their entry points frequently (daily or weekly) to make sure the water has disinfectant in it. Groundwater and purchased-water systems are not required to monitor at the entry point. However, many systems do monitor the

residual at the entry point voluntarily, and it is appropriate to note this in the monitoring plan. The section on disinfectant monitoring (4.4) explains the monitoring frequency in detail.

Summary of Chemical Monitoring Rule Requirements

Any system that operates a well or treats surface water must monitor for chemicals (30 TAC 290, Subchapter F). Systems that only purchase water do not usually have to perform entry point chemical sampling. Entry point chemical sampling is performed for drinking water constituents that do not change very much over time. This means that the amount of a particular constituent in the seller's water is at the same level when it is delivered to the purchased-water system.

Most of the chemical samples discussed in this chapter are collected by the TCEQ's contractor. For these chemicals, your monitoring plan will simply state "samples collected by the TCEQ's contractor" or words to that effect. This language is provided in the generic monitoring plan outlines, appendices B through F.

4.1. Setting Entry Point Sample Sites

An entry point is any point where a treated source of water first enters the distribution system. You must have a sample site for every entry point.

The sampling site for the entry point does not have to be at exactly the same location as the entry point itself. What is necessary is that the water collected at the entry point sampling site be representative of the water at the actual entry point. This water should represent what folks are drinking—in terms of materials such as iron or arsenic that don't decay over time.

There can be some confusion because the sampling site where the entry point sample is collected can vary, depending on the system. For example, the site may be at a wellhead, or it may be at the end of a long transfer pipe, but before the first customer. Entry point samples might be taken at a plant, at a well pump station, at a storage tank, or at clearwells. The sampling site should always be after treatment (and preferably after storage), but before the first connection.

Your existing entry points should already have numbers assigned to them by the TCEQ, and you should already have sampling sites. Entry point numbers are assigned to treated water from a single plant, a well, a well field, a spring, or a purchased-water source that enters at a specific place in distribution. If you add a new potable water source, you need a new entry point number assigned by the TCEQ.

Once an entry point number has been assigned, it will apply to that source of water, no matter what happens to the source. If a source of water is abandoned, the entry point number is also deleted.

For example, if you have an old Well 1, called EP001, and you abandon it, the number EP001 will be abandoned also. It is like retiring a football player's number. If you drill a new well with its own chlorinator, feeding the distribution system at a new point, the new well would be numbered EP002.

Only entry points from operational wells, demand wells, or treatment facilities are required to be monitored. If a well or treatment facility is not used to produce potable water—such as, for example, an irrigation well—you don't need to sample the water that it produces. You are responsible for ensuring that the TCEQ's data reflects the correct status of water sources and entry points associated with the public water system under your control.

Example of Multiple Sources or Plants with One Entry Point

Sometimes water from multiple wells or water treatment plants blends together before reaching the distribution system. In this case, even though there are multiple sources of water, there is still only one entry point and therefore only one sampling site.

Example of Entry Point Numbering

Now, let's say you have a well and a surface water treatment plant that both feed an entry point that is numbered EP001. If you abandon the well, but not the treatment plant, you should still label that entry point EP001. Even if you then drill a new well, if this new well also feeds entry point EP001, there is still no need to change the monitoring plan.

However, if you connect this new well into the system at a new entry point, the TCEQ will assign the next entry point number—in this case, EP002. You will be communicating with the TCEQ when you add the new well; make sure you get the new entry point number from the TCEQ and update your monitoring plan accordingly.

In any case, you should keep a record of the unused well so that future operators can understand the chain of events.

Example of Multiple Sources with Multiple Entry Points

If there are multiple wells or water treatment plants that send water to the distribution system at different places, these are multiple entry points (see Figure 4.3). In this case, a sampling site must be designated for each entry

point, and the monitoring plan must include a clear description of the location of each sampling site and which water source it represents. It is important that all sources of water, including purchased water, be identified.

4.2. EP Sample Site Table and EP, Plant, and Source Table

Every monitoring plan should include an Entry Point (EP) Sample Site Table and an EP, Plant, and Source Table. These tables should include the official entry point numbers. If you need help figuring out what your entry point number is, you can look on your most recent survey; contact the TCEQ Public Drinking Water Section at 512-239-4691, or contact your TCEQ regional office. You can see the data that the TCEQ has for your entry points online through Texas Drinking Water Watch (DWW). Go to <dww.tceq.texas.gov/DWW/>, then get a PWS Fact Sheet report for your system.

The Entry Point Sample Site Table may be very simple or very complicated. It must include a list of all the sample sites for all the entry points that the system uses or has ever used. It should also include a good description of where the sample site is for each entry point.

Table 4.1. Field Definitions for the Entry Point Sample Site Table

Entry Point (EP) Number	EP Sample Site (Entry Point Name)
Entry points are numbered sequentially and numbers are never reused.	This should be a very short description of the entry point sampling site.

The example shown in Table 4.2 lists entry points for a public water system that has three entry points.

Table 4.2. Example of an Entry Point Sample Site Table

Entry Point	EP Sample Site (Entry Point Name)
001	Tap at pressure tank (Elm St)
002	Filtered water sample tap (in process lab)
003	Hose bibb next to entry gate

New! The Entry Point, Plant, and Source Table is a new requirement. In conversations with systems since the first version of this guide was published, we have learned that systems often have questions about the TCEQ's data for their system. Our data must be recorded in a way that we can report to the EPA.

The linkages between entry points, plants, and sources are described in Table 4-3.

Table 4.3. Field Definitions for an Entry Point, Plant, and Source Table

Entry Point (EP) Number	Plant	Source Description	Source ID	Comments
List the EP number, just like in the EP Sample Site Table.	Describe the “plant” that feeds that entry point.	List all sources that are associated with that plant.	List the source ID(s).	Describe circumstances that affect source, plant, or entry point usage.

Table 4.4 shows how the Entry Point, Plant, and Source Table can be very easy to produce for a system that is not very complicated.

Table 4.4. Example of an Entry Point, Plant, and Source Table for a Simple System with One Well and Chlorination

EP Number	Plant	Source Description	Source ID	Comments
EP001	Chlorinator (Hypo)	Well 1	G1234567A	

The example in Table 4.5 shows a more complex system. You can see how there may be many wells feeding one entry point, or there may be many entry points being served by a single well or other source of water.

4.3. Entry Point Map and Schematic

The monitoring plan should include a map of the area served, showing sampling sites, entry points, tanks, and interconnects with other water systems. The map needs to be of normal resolution or scale—like a road map. In fact, for systems that do not have advanced mapping capabilities, a map from an Internet map service is adequate; two examples are MapQuest and Google Maps. You can also photocopy a road map for this purpose.

The map should also show any related geopolitical boundaries, such as city limits, extraterritorial jurisdiction (ETJ) boundaries, district limits, or Certificate of Convenience and Necessity (CCN) boundaries. The TCEQ’s website includes helpful information about CCN maps at www.tceq.texas.gov/goto/ud_publist.

Additionally, the monitoring plan should include a schematic that shows how water flows in and out of the system as a whole—not necessarily an actual map, and not necessarily drawn to scale. Figures 4.1 through 4.5 show some acceptable entry point schematics for two different public water systems: one with one well and a purchased-water source, and the other with seven wells but only two entry points.

Table 4.5. Example of an Entry Point, Plant, and Source Table for a Complex System

EP Number	Plant	Source Description	Source ID	Comments
001	n/a	Murphy's Well	G2550001A	Plugged in 1989
002	Chlorinator (at 1st and Main)	Well 1	G2550001B	
		Well 2	G2550001C	
003	Chlorinator (at 123 Elm St.)	The good well	G2550001D	Demand Entry Point
004				Operational Entry Point
005				Operational Entry Point
006				Emergency Entry Point on Nob Hill
007	Reverse osmosis unit	The bad well	G2550001E	Demand Entry Point
008	Old Meter at City Hall	Frio WSC purchased water	P2550001A	No longer used
009	Meter vault north of VFD	City of Aguadulce purchased water	P2550001B	1 MGD contract – Aguadulce PWSID 3210111
010	Vended RO water at City Hall	City water	n/a	For compliance with Fluoride Compliance Agreement (CA)
011	Marley Memorial Surface Water Treatment Plant	Rio Bravo	S2550001A	Active May through October

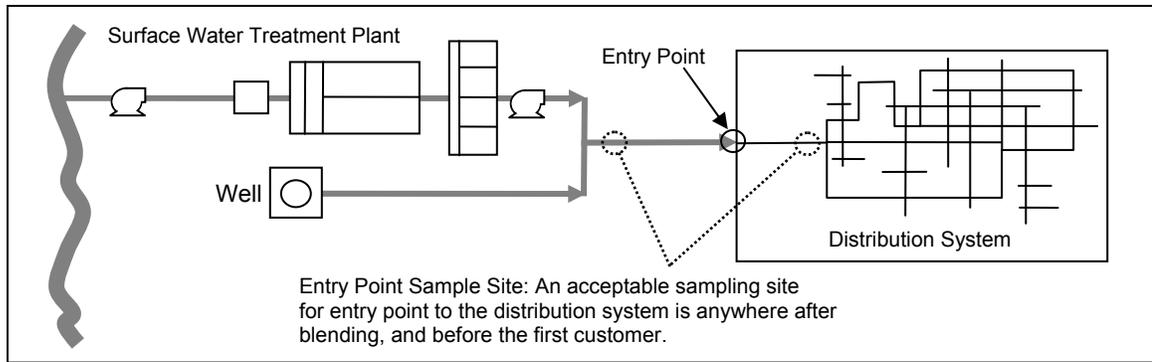


Figure 4.1. Distribution Schematic for a PWS with Multiple Sources and One Entry Point to the Distribution System

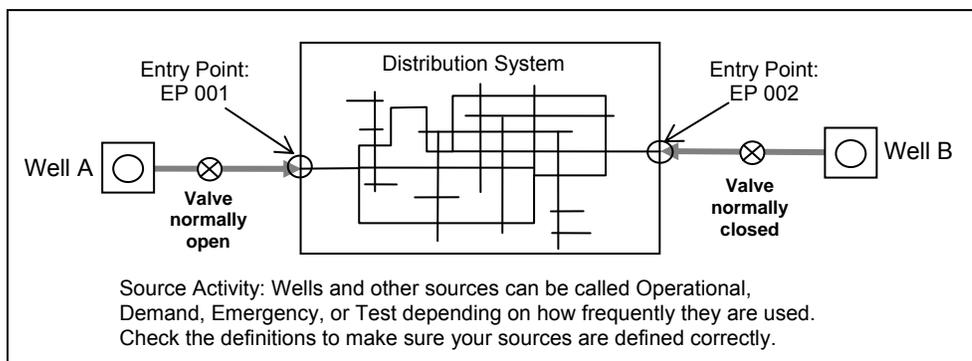


Figure 4.2. Distribution Schematic for a System with Wells that Are Not Continuously Used

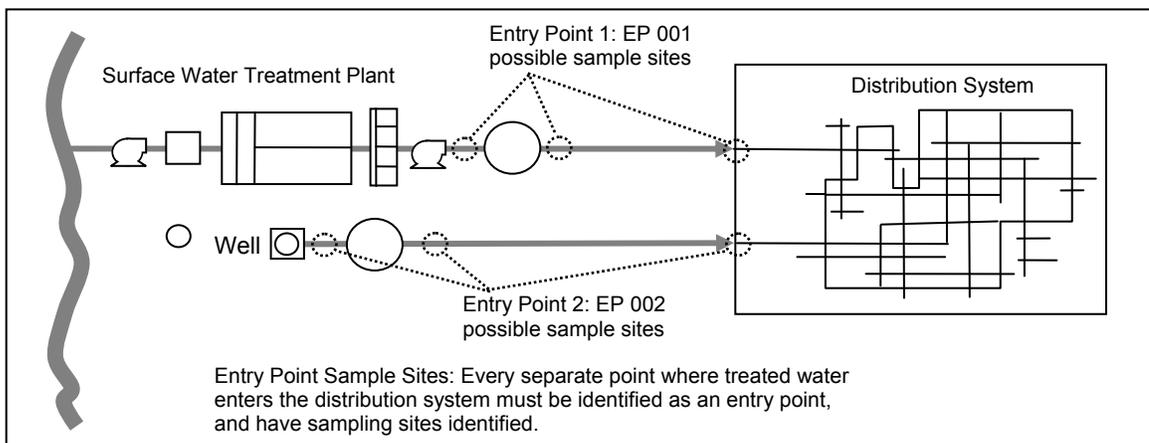


Figure 4.3. Distribution Schematic for a System with Multiple Sources and More than One Entry Point

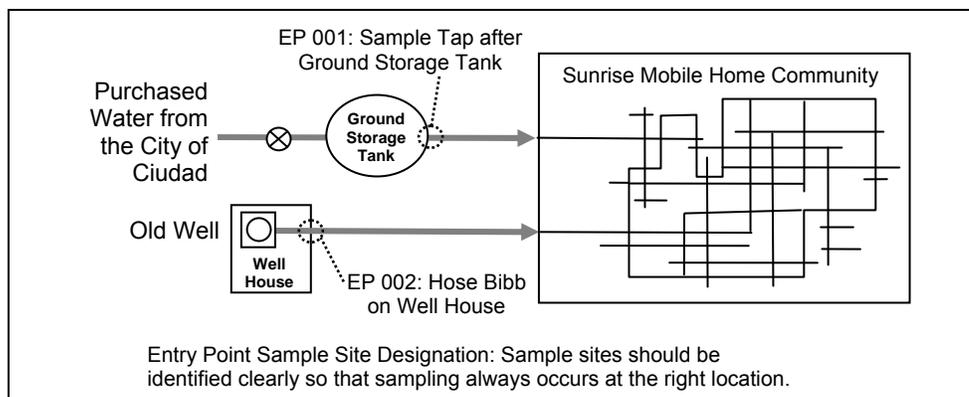


Figure 4.4. Simple Distribution Schematic for a System with Two Entry Points

4.4. Entry Point Disinfectant Residual Sampling (30 TAC 290.110)

SW and GUI treatment systems must measure the disinfectant residual of the water entering the distribution system. Groundwater and purchased-water systems are required to maintain a disinfectant residual, but are not required to monitor at the entry point. Systems that use free chlorine must measure free chlorine at the entry point, while systems that use chloramines must measure total chlorine at the entry point. Your system is directly responsible for measuring and reporting the disinfectant residual at the entry point; these samples are not collected by the TCEQ's sampling contractor.

Frequency

A SW or GUI system must measure the disinfectant residual at the entry point continuously if it meets either of the two following criteria:

- serves more than 3,300 people
- provides water wholesale (to any number of customers)

A system that serves fewer than 3,300 people (and does not sell water wholesale) must also measure the disinfectant residual, but can do it either continuously or by grab sample. If you are using grab samples, refer to Table 4.6 for the number of grab samples that must be collected as a function of system size.

The samples should be taken at intervals during the time the plant is in operation, not all at the same time. If the residual is low in one sample, you must test at four-hour or shorter intervals until the residual has been restored.

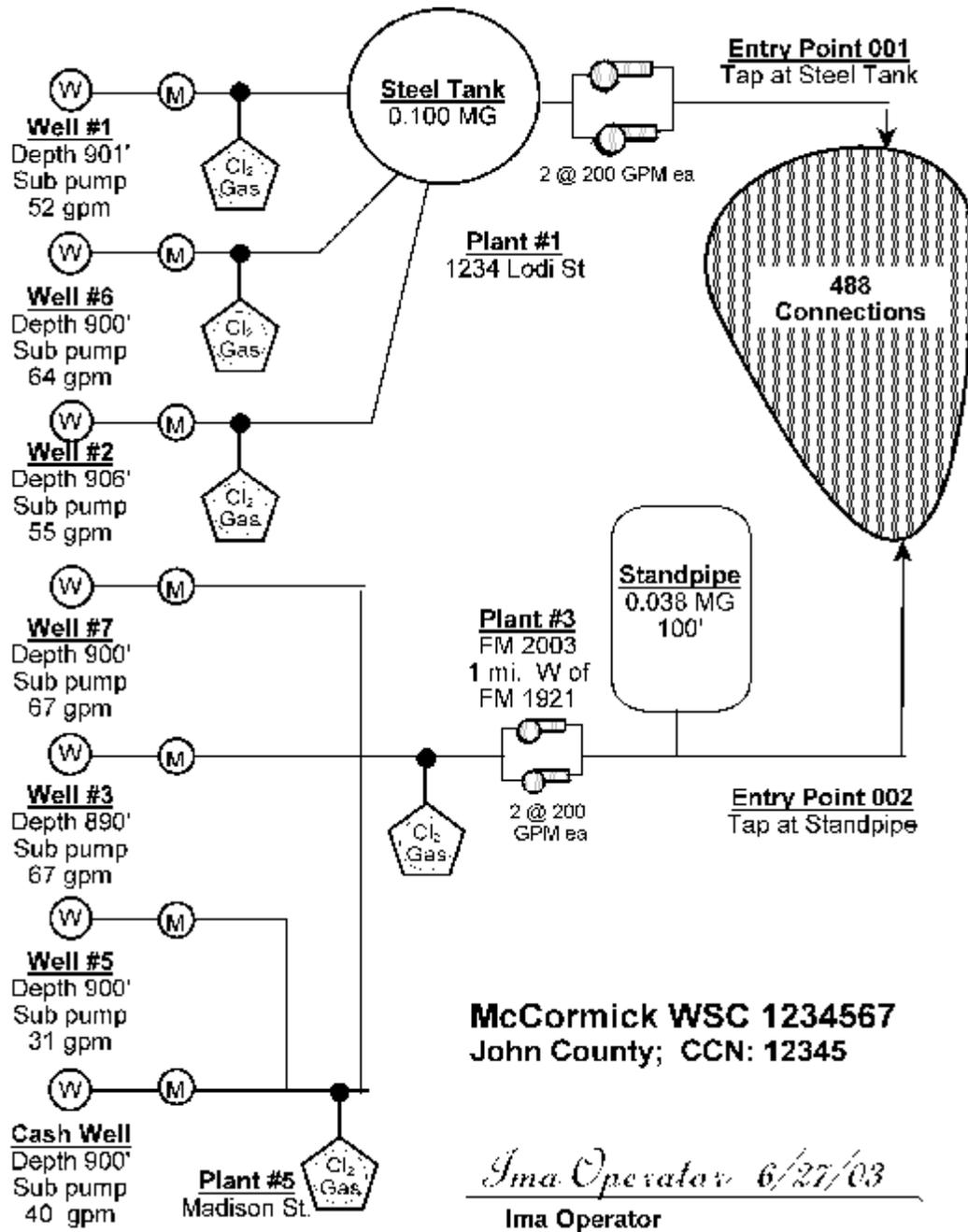


Figure 4.5. Simple Schematic for a System with Seven Wells

Table 4.6. Number of Disinfectant Residual Entry Point Grab Samples for SW and GUI Systems Serving Fewer than 3,300 People

If your system serves this many people . . .	Then you must collect this many grab samples per day:
500 or fewer	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

Many systems that purchase water or operate wells choose to monitor the disinfectant residual at the entry point. By following this practice, these systems ensure that there is enough disinfectant entering the system. For this reason, the TCEQ strongly encourages this practice. If your system does monitor entry point disinfectant residual, you should include it in your monitoring plan.

Location

Disinfectant residual samples must be taken at each entry point.

Sampling for Systems that use Monochloramine

Some systems are allowed to use monochloramine as a disinfectant, in addition to or as a replacement for free chlorine. These systems are granted that permission through a case-by-case exception from the TCEQ. If your system uses monochloramine, you should include a description in your monitoring plan of how you ensure that the correct ratio of chlorine to ammonia is applied. More information is provided in Appendix I of this manual.

4.5. Entry Point Chemical Sampling Rule Requirements

Many of the samples taken at the entry point are collected by the TCEQ's sampling contractor. Sometimes, miscommunication may occur among the TCEQ, its contractors, and the public water system about the location of an entry point sampling site. The monitoring plan is a useful tool to address this problem and to promote understanding.

The requirements for routine sampling of inorganic contaminants apply to all community and non-transient non-community (NTNC) systems. The requirements for nitrate, nitrite, and secondary contaminant sampling also apply to transient non-community (TNC) systems. The TCEQ may need to have TNC systems do additional sampling to determine whether contamination exists.

A Note on Contractor-Collected Samples

When samples are being collected by TCEQ contractors, the TCEQ Public Drinking Water Program staff schedules the sampling. The TCEQ will inform you if a change is made to the sampling schedule. You should keep a copy of any scheduling change letters from the TCEQ with your monitoring plan. The TCEQ's contractor (currently the Texas Rural Water Association) collects all the samples for disinfection byproducts as well as for inorganic and general organic chemical groups. If you have any questions about sample scheduling, call a member of our Public Drinking Water Section at 512-239-4691 or contact us by e-mail at <PDWS@tceq.texas.gov> (do not type the brackets).

Nitrate and Nitrite (30 TAC 290.106)

Nitrate and nitrite are inorganic chemicals. They can cause blue baby syndrome. Source water can be high in nitrate because of natural occurrence, fecal contamination, or contamination by fertilizers that contain nitrate compounds.

The requirements for routine sampling of nitrate and nitrite apply to all public water systems, including transient non-community (TNC) systems.

Frequency

TCEQ contractors will collect these samples. Your monitoring plan should simply include a statement that the TCEQ collects these samples. The TCEQ contractor will take a disinfectant residual sample immediately before taking the nitrate sample. All active entry points are monitored at least annually for nitrate and nitrite.

If your system ever detects nitrate levels above 5 mg/L, your system's sampling schedule will be increased to quarterly entry point monitoring. When the results of four consecutive quarterly samples are reliably and consistently below the MCL (for example, four samples in a row less than 5 mg/L), monitoring may be reduced to once a year.

Because every system in Texas is required to use a disinfectant in the distribution system, nitrite (NO₂) in a water system is normally converted into nitrate (NO₃) through a chemical reaction called oxidation.

Location

Samples must be taken at each entry point, as described in section 4.1.

Fluoride (30 TAC 290.106)

Fluoride is an inorganic chemical. In some places it is added to water to promote strong teeth. In other places it occurs naturally. If children under the age of nine are exposed to doses above 2.0 mg/L, mottling of the teeth can occur. People get fluoride from other sources besides drinking water, like toothpaste or other dental products.

The requirements for routine sampling of fluoride apply to all systems including transient non-community (TNC) systems, because there are both primary and secondary standards for fluoride.

Frequency

TCEQ contractors will collect these samples. Your monitoring plan should simply include a statement that the TCEQ collects these samples. The TCEQ contractor will take a disinfectant residual sample immediately before taking the fluoride sample.

- *Surface Water Sources.* Surface water entry points are routinely monitored annually for fluoride.
- *Groundwater Sources.* Groundwater entry points are routinely monitored once every three years for fluoride.

If your system ever detects fluoride levels above 2 mg/L, your system's sampling schedule will be increased to quarterly entry point monitoring. When the results of a series of consecutive quarterly samples are below 2 mg/L, monitoring may be reduced. The TCEQ will inform you of a change in sampling frequency, and you should keep copies of those letters with your monitoring plan.

Location

Samples must be taken at each entry point, as described in section 4.1.

Monitoring Organic Chemicals (30 TAC 290.107)

Two specific groups of organic chemicals are monitored at the entry point: synthetic organic chemicals (SOCs) and volatile organic chemicals (VOCs).

If a water source is not likely to have certain organic chemicals in it, the TCEQ may reduce the sampling frequency for those chemicals. Some systems are allowed monitoring waivers for organic chemicals based on the TCEQ's

technically defensible assessments of the vulnerability and susceptibility of the water source. This process is called vulnerability assessment. Geology, well construction, land use, and potential sources of contamination are all considered in vulnerability assessment. Some wells are vulnerable, and some are not. Surface water is all inherently vulnerable. For further information call a member of the TCEQ Source Water Assessment and Protection Team at 512-239-4691.

The requirements for routine sampling of organic contaminants apply to all community and non-transient non-community (NTNC) systems. The requirements for nitrate, nitrite, and secondary contaminant sampling also apply to transient non-community (TNC) systems. The TCEQ may need to have TNC systems do additional sampling to determine whether contamination exists.

Synthetic Organic Chemicals (30 TAC 290.107)

One of the organic chemical groups that is currently monitored for is the synthetic organic chemical group 5 (SOC5). SOC5 is the TCEQ designation for the EPA Method 525, which analyzes for chemicals such as atrazine, metolachlor, and PCBs. The remaining SOC groups have been waived for statewide assessments because the first round of sampling showed that the chemicals were not present, or that the water sources in Texas were not vulnerable to these other groups.

Frequency

TCEQ contractors will collect these samples. You will be informed if your schedule is changed. As you will see in the monitoring plan outlines (Appendices A through F), your monitoring plan should simply include a statement that the TCEQ collects these samples.

- *Surface Water Sources.* Surface water entry points are monitored for the chemical group SOC5 biennially in the first and second quarters of the calendar year. This schedule allows monitoring at the most vulnerable time of the year for runoff of chemicals such as atrazine.
- *Groundwater Sources.* Groundwater sources vary in vulnerability. Entry points that the TCEQ finds not to be vulnerable are not routinely monitored for SOC5. If the TCEQ has determined that an entry point is vulnerable and if the area around the well has had historical crop or orchard use, that entry point must be monitored once every three years for SOC5. A relatively small number of very vulnerable entry points sample SOC5 annually just like the surface water systems listed above.

The monitoring frequency increases if certain contaminants are detected. The TCEQ will send a letter informing you of the change. You should keep this letter with your monitoring plan.

Location

Samples must be taken at each entry point, as described in section 4.1.

Volatile Organic Chemicals (30 TAC 290.107)

Volatile organic chemicals are typically analyzed using EPA methods 524 or 502. VOCs include common petroleum chemicals such as benzene, ethylbenzene, toluene, xylenes, and MTBE, and solvents such as tetrachloroethene, carbon tetrachloride, and trichloroethene.

Frequency

The TCEQ's contractor will collect these samples. You will be informed if your schedule is changed. As you will see in the monitoring plan outlines (Appendices A through F), your monitoring plan will simply include a statement that the TCEQ collects these samples.

- *Surface Water Sources.* Surface water entry points must be monitored for VOCs annually, in either the second or third quarter. This flexible schedule allows monitoring at the most vulnerable time of the year for methyl-tert-butyl ether (MTBE), a gasoline additive that often contaminates water sources. This monitoring frequency increases if certain contaminants are detected, or if MCLs are exceeded.
- *Groundwater Sources.* Groundwater sources vary in vulnerability. Entry points that are assessed by the TCEQ as not being vulnerable are monitored once every three years for VOCs. Vulnerable entry points are sampled annually for VOCs. A relatively small number of extremely vulnerable entry points are monitored for VOCs on the same schedule as surface water systems.

The monitoring frequency increases if certain contaminants are detected. The TCEQ will send you a letter informing you of any change. You should keep this letter with your monitoring plan.

Location

Volatile organic chemical samples must be taken at each entry point, as discussed in section 4.1.

Metals and Minerals: Inorganic Chemicals (30 TAC 290.106)

Your system must sample for several inorganic chemicals (IOCs) that are either metals or minerals. Some of the chemicals in this group have proven to be risks to public health, so they have maximum contaminant levels (MCLs). Other chemicals make drinking water smell or taste bad, but don't cause illness; these chemicals have secondary constituent limits (SCLs).

Asbestos is another inorganic contaminant, but it comes from some pipes, not from water sources. Therefore, samples are taken in the distribution system, not at the entry point. See Chapter 5 of this guide for a discussion of asbestos monitoring.

The requirements for routine sampling of inorganic contaminants apply to all community and non-transient non-community (NTNC) systems. The requirements for nitrate, nitrite, and secondary contaminant sampling also apply to transient non-community (TNC) systems. The TCEQ may need to have TNC systems do additional sampling to determine whether contamination exists.

Most of the secondary contaminants are measured by entry point monitoring for minerals and metals. The most common secondaries that systems have issues with are fluoride, iron, and manganese. Systems that have fluoride over the SCL must notify their customers of those levels annually. Systems that have iron or manganese over the maximum contaminant levels may be required to remove it. Secondary constituents may also be measured in the distribution system, usually as a result of customer complaints.

Frequency

The TCEQ's contractor will collect these samples. Your monitoring plan will simply include a statement that the TCEQ collects these samples.

- *Surface Water Sources.* Surface water entry points are monitored annually for minerals and metals.
- *Groundwater Sources.* Groundwater entry points are monitored once every three years for minerals and metals and annually for nitrate.

The TCEQ will increase the monitoring frequency if certain contaminants are detected. The TCEQ will send you a Sample Cost Estimate letter every year informing you of your sampling schedule. This letter will include an estimate of projected sampling costs, but is not a bill. You should keep this letter with your monitoring plan.

Location

Metal and mineral samples must be taken at each entry point, as described in section 4.1.

Radiochemicals (30 TAC 290.108)

The regulated radiochemicals can cause cancer over a long period of time. They include uranium, gross alpha, radium 226, and radium 228. The requirements for radiochemicals apply to community public water systems as well as to both transient non-community (TNC) and non-transient non-community (NTNC) systems.

Frequency

Entry points are sampled once every three years. If a system exceeds the MCL for radiochemicals, quarterly samples will be collected to determine compliance.

Location

Radiochemicals are sampled at each entry point where groundwater is present.

Bromate (for Ozonating Systems; 30 TAC 290.114)

Bromate is an undesirable disinfection byproduct formed when bromide-containing water is ozonated.

Any system must have TCEQ approval to use ozone for disinfection. To seek approval, contact the TCEQ's Technical Review and Oversight Team at 512-239-4691.

Frequency

Systems that use ozone must collect their own bromate samples at the entry point to the distribution system. Samples must be taken every month, and analyzed at a TCEQ-certified lab. The results must be submitted monthly to the TCEQ's Public Drinking Water Section.

Location

Bromate samples must be taken at each entry point, as discussed in section 4.1.

Chapter 5. Distribution System Sampling

This chapter summarizes the sampling that is required within potable water distribution systems. Sections 5.1 and 5.2 contain general information. Section 5.3 contains distribution system sampling requirements for each constituent. Additional information for each constituent is contained in the Drinking Water Standards (30 TAC 290.102–122).

Applicability

All public water systems that operate a distribution system have sampling requirements. If you have a distribution system, but you do not treat water, you still have to sample because you provide water to the public. That is why you must check the disinfectant residual, microbial quality, and disinfection byproducts in your system.

Samples are collected in the distribution system for constituents that change as the water flows through the pipes. For instance, chlorine is used up as it disinfects (by inactivating microorganisms).

The number in parentheses after the title for each constituent is the section of the regulations that describes the requirements for that constituent.

5.1. Distribution Coliform Sampling (30 TAC 290.109)

Bacteriological samples, usually called coliform samples, are the samples most people think of when they think of distribution system samples. Remember, you must measure the disinfectant residual (chlorine or chloramines) every time you take a coliform sample. For more information about the Total Coliform Rule (TCR) monitoring requirements, please see the TCEQ's publication *Coliform Sampling for Public Water Systems* (RG-421).

These TCR requirements apply to all public water systems, including transient non-community (TNC) systems.

Frequency

The minimum sampling frequency for public water systems, depending on your population, is shown in Table 5.1, below. The population of non-community (NTNC or TNC) systems must be based on the maximum number of persons served on any given day during the month. The population of community systems will be based on the data reported during the most recent comprehensive compliance investigation (CCI) of the public water system.

The population should reflect the actual current number of meters and/or census of the system, modified to account for growth.

The samples must be taken in the month that is the reporting period. For example, samples taken in May cannot be used for June reporting.

Table 5.1. Required Number and Frequency of Coliform Samples

If your system serves this many people . . .	Then you must collect at least this many coliform samples:	And your sampling events must occur at least this frequently:
1 to 1,000	1	Once each month, rotating through 5 representative sampling sites.
1,001 to 2,500 2,501 to 3,300 3,301 to 4,100 4,101 to 4,900	2 3 4 5	Once a month—or twice a month at regular intervals—rotating through 5 representative sampling sites.
4,901 to 5,800 5,801 to 6,700 6,701 to 7,600 7,601 to 8,500 8,501 to 12,900	6 7 8 9 10	Twice a month at regular intervals.
12,901 to 17,200	15	3 times a month at regular intervals.
17,201 to 21,500 21,501 to 25,000	20 25	4 times a month at regular intervals.
25,001 to 33,000 33,001 to 41,000 41,001 to 50,000 50,001 to 59,000 59,001 to 70,000 70,001 to 83,000 83,001 to 96,000 96,001 to 130,000 130,001 to 220,000 220,001 to 320,000 320,001 to 450,000 450,001 to 600,000 600,001 to 780,000 780,001 to 970,000 970,001 to 1,230,000 1,230,001 to 1,520,000 1,520,001 to 1,850,000 1,850,001 to 2,270,000 2,270,001 to 3,020,000 3,020,001 to 3,960,000 3,960,001 or more	30 40 50 60 70 80 90 100 120 150 180 210 240 270 300 330 360 390 420 450 480	Daily. If you have any questions about the TCEQ's interpretation of "daily sampling," call the Public Drinking Water Section at 512-239-4691 and ask for the Coliform Monitoring Group.

If you collect fewer than five routine samples per month, and you have one or more total coliform-positive samples, you must collect at least five routine samples during the following month. Obviously, for systems that usually collect fewer than five monthly samples, you must take extra routine samples the month after a positive sample.

The TCEQ may require additional samples in the distribution system for raw source water to ensure the protection of public health.

Location

Samples for microbial quality must be collected at either active service connections or at locations adjacent to active connections. The set of sampling locations must be representative of the whole distribution system, and you must sample each location regularly. If you take fewer than five samples at a time, don't use the same location each time. Instead, rotate through your full set of sampling locations.

Every public water system should already have a list of coliform sampling sites that can be used as part of the monitoring plan. You should also identify locations upstream and downstream to be used to collect repeat samples if a routine sample result is positive or "coliform-found."

Table 5.2. Required Number of Routine Distribution System Coliform Sample Sites

If your system serves this many people . . .	Then you must collect at least this many coliform samples each month:	And you must have at least this many ¹ routine distribution coliform sample sites:
1–4,900	1–5	5 (sample each location regularly)
4,901–33,000	6–30	1 site per sample—for example, if you collect 6 samples, then you must have at least 6 sample sites
33,001–50,000	40–50	At least 30 sites
50,001 or more	60–480	Half the number of samples—for example, if you collect 210 samples, then you must have at least 105 sample sites

1. This is the minimum required number of sample sites; however, you may designate more if you want. The sample sites must represent the whole distribution system. And you must identify sites upstream and downstream of each routine sample site for collection of repeat samples.

Table 5.3. Requirements for a Table of Coliform Sample Sites

Site Code or Letter	Address of Routine Distribution Sample Site	Sample Schedule	Comments
Use a number or letter that corresponds to the site on your distribution system map.	Provide a street address for the sample site. If it is a sample station, provide a description of its location.	List the days or weeks that sampling should occur for each site or group of sites.	Make any notes relating to sampling schedule or locations.

Table 5.4. Example of a Coliform Sample Site Table

Site	Address	Schedule	Comments
A	2468 Kyle St.	Jan, June, Nov	Hose bibb on Mayor Kolache's house
B	357 Buda Rd.	Feb, July, Dec	Tap on pink house next to elevated storage
C	6432 Hays Way	Mar, Aug	Hose bibb
D	731 Wood Creek	April, Sep	New sample station 2
E	22222 Henly Heights	May, Oct	Sample station 1

5.2. Disinfectant Residual: Free or Total Chlorine (30 TAC 290.110)

A system that uses free chlorine must measure free chlorine in the distribution system. A system that uses chloramines must measure total chlorine in the distribution system. For more information about disinfectant residual monitoring and reporting, please see the TCEQ's publication *Disinfectant Monitoring for Public Water Systems* (RG-407).

Surface water systems currently must submit information about chlorine residual on the Surface Water Monthly Operating Report (SWMOR). (Entry point disinfectant monitoring for systems that treat SW or GUI is discussed in Chapter 4 of this guidance.)

Location

Disinfectant residual must be measured at the same location (and time) as coliform samples are taken. For convenience, you can pick additional disinfectant sites that are representative of the whole distribution system.

Frequency

Disinfectant residual must be measured at the same time that samples are collected for coliform testing.

If a system uses SW or GUI, you must also measure disinfectant residual daily at representative locations within the distribution system.

If you use only groundwater or purchased water but serve at least 250 connections, or 750 people, you must still measure the disinfectant residual daily at representative locations within the distribution system.

If you use only groundwater or purchased water and serve fewer than 250 connections or 750 people, you must measure the disinfectant residual at representative locations within the distribution system at least once every seven days.

Table 5.5. Requirements for a Disinfectant Residual Sample Site Table

Site Code or Letter	Address of Routine Distribution Sample Site	Sample Schedule	Comments
Use a number or letter that corresponds to the dot showing the site on your distribution system map.	Provide a street address for the sample site. If it is a sample station, provide a dummy address or a description of its location.	List the days or weeks that sampling should occur for each site or group of sites.	Make any notes relating to the sampling schedule or locations.

Table 5.6. Example of a Disinfectant Residual Sample Site Table for a Community System Required to Have Five Sites

Site	Address	Schedule	Comments
A	2468 Kyle St.	Monday, Saturday	Hose bibb on Mayor Kolache's house
B	357 Buda Rd.	Tuesday, Sunday	Tap on pink house next to elevated storage
C	6432 Hays Way	Wednesday	Hose bibb
D	731 Wood Creek	Thursday	New sample station 2
E	22222 Henly Hts.	Friday	Sample station 1

Table 5.7. Example of a Disinfectant Residual Sample Site Table for a Non-transient Non-community (NTNC) System Required to Have Five Sites and Sample Daily

Site	Location	Schedule	Comments
A	Lab tap	Monday	Licensed Lab tech collects on 1st shift. Standard Operating Procedure is in QC manual (SOP QC-007).
B	Men's washroom by office	Tuesday	
C	Main break room sink	Wednesday	
D	Eye wash by process unit A	Thursday	
E	Safety shower by machine 1	Friday	
A	Lab tap	Saturday	1st shift overtime lab crew supervisor collects.
B	Men's washroom by office	Sunday	Sunday 3rd shift mfg. supv. collects sample.

Table 5.8. Example of a Disinfectant Residual Sample Site Table for a Transient Non-community (TNC) System Required to Have Five Sites and Sample Weekly

Site	Location	Schedule
A	Coffee dispensing area sink	1st Monday of month
B	Spigot out by gas pumps	2nd Monday of month
C	Women's bathroom sink	3rd Monday of month
D	Hose bibb in back of store	4th Monday of month
E	Water dispensing unit in parking lot	5th Monday (if there is one)

Sampling for Systems that Use Monochloramine

Some systems are allowed to use monochloramine as a disinfectant, in addition to or as a replacement for free chlorine. These systems are granted that permission through a case-by-case exception from the TCEQ. If your system uses monochloramine, you should include a description in your monitoring plan of how you ensure that nitrification is not causing a loss of residual in the distribution system. More information is provided in Appendix I of this manual.

5.3. Disinfection Byproducts: Total Trihalomethanes and Haloacetic Acids (30 TAC 290.113)

The TCEQ's sample contractor collects trihalomethane (THM) and haloacetic acid (HAA) samples in the distribution system. It is the system's responsibility to identify sample sites and coordinate with sample collectors to ensure that the required samples are collected.

Transient non-community systems (TNCs) do not have to do this sampling. All other systems (community and NTNC) do.

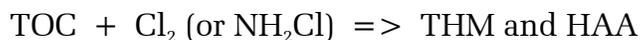
Setting DBP compliance monitoring sites now requires TCEQ approval. Site names are kept as data, and data quality is very important. In order to change sample sites, you must get TCEQ approval. The best way to do this is to contact the TCEQ as soon as you are aware that a change must be made. You can contact the DBP rule coordinators at 512-239-4691, or by e-mail at <DBP@tceq.texas.gov>.

Three kinds of sample sites are discussed in this section:

- DBP1 sites. DBP1 sites are required by the Stage 1 Disinfectants and Disinfection Byproducts Rule (DBP1).
- IDSE sites
- DBP2 sites

Disinfection Byproducts (THM and HAA): Formation and History

Disinfection byproducts are potentially carcinogenic chemicals that are formed as an unfortunate side effect of disinfection. Trihalomethanes (THMs) and haloacetic acids (HAAs) are disinfection byproducts that are formed when chlorine or monochloramine react with naturally occurring organic matter (total organic carbon, TOC). Roughly speaking:



Total organic carbon plus chlorine or monochloramine forms trihalomethanes and haloacetic acids. This reaction forms a lot of other byproducts, but THMs and HAAs are the principal groups and the easiest to analyze for.

THM and HAA formation varies, depending on a number of factors:

- Contact time between the disinfectant and the water. More time generally increases the concentration of THMs and HAAs.
- Temperature. Higher temperature causes more, and more rapid, DBP formation.
- Disinfectant concentration. More disinfectant leads to more DBPs.

- Type of disinfectant. Chlorine forms significantly more THMs and HAAs than chloramines.
- Concentration of total organic carbon (TOC). This is more of a surrogate measurement for humic acids and fulvic acids that are disinfection byproduct precursors—generally there is a lot more TOC in surface water than in groundwater.
- pH. There are different impacts for different disinfectants.
- Biological activity. HAAs may be biodegraded, but THMs are not.
- Bromide concentration. Bromide interacts with chlorine or chloramine and causes rapid formation of relatively heavy THMs and HAAs. Texas has a lot of bromide in the groundwater.

Aspects such as contact time and temperature vary across the distribution system. Therefore the concentration of THMs and HAAs will vary throughout the distribution system. For this reason, DBP sampling is conducted in the distribution system. The most important question from a public health and rule standpoint is: Where are the levels highest? Levels will be the highest where organic matter has been in contact with the disinfectant for the longest time. That is why there is an emphasis on “maximum water age” sample points.

Trihalomethanes in the distribution system will increase over time regardless of biological activity. However, it is sometimes possible for the natural distribution system biofilm to biodegrade haloacetic acids.

The first maximum contaminant level (MCL) of 0.10 mg/L (100 µg/L) for total trihalomethanes (TTHM) was set in 1979 under the Total Trihalomethane Rule (TTHMR). TTHM is the sum of four species of trihalomethanes. The Stage 1 Disinfectants and Disinfection Byproducts Rule (DBP1) was adopted by the EPA in 1998. It changed the MCL for TTHMs to 0.080 mg/L (80 µg/L), and applies to all community and NTNC systems in Texas. DBP1 added the MCL of 0.060 mg/L (60 µg/L) for HAA5. Most recently, the Stage 2 Disinfectants and Disinfection Byproducts Rule (DBP2) was adopted by the EPA in January 2006, and incorporated into Texas Administrative Code in January 2008.

DBP2 maintains the same MCLs. The main components of the DBP2 rule are: (1) it introduces the concept of the combined distribution system (CDS), (2) it requires many systems to do Initial Distribution System Evaluation (IDSE) sampling, (3) it will require systems to set new DBP2 sample sites in 2011, and (4) it will change the way that compliance is calculated to the locational running annual average (LRAA).

A primary concept within DBP2 is to do early monitoring to find out where THM and HAA levels—and therefore risk—is greatest, and focus sampling in those areas. Early monitoring (IDSE sampling) will be used to find these locations and set new compliance monitoring sites and frequencies. In 2012 or 2013, based on the combined system population, compliance with the MCLs will be based on LRAAs at each site, instead of on the running annual average (RAA) of results from all sites within the distribution system.

The TCEQ adopted the DBP2 rule requirements into state law in January 2008. PWSs are not required to submit any information directly to the EPA; all material should be sent directly to the TCEQ.

DBP1 (Stage 1 Disinfectants and Disinfection Byproducts Rule) Sample Site Locations

For DBP1, the number of sample sites is based on the size (population) of the system, the type of water, and the number of “treatment plants” at the system. The number of treatment plants at the system is defined as the number of entry points. This is logical, because an entry point is the place where a different mix or blend of freshly treated water comes into the system, but it can result in inequitable sampling requirements. Consider the example of a small system with multiple wells contrasted with a huge city that has a single surface water plant and entry point. Additional sites may be required for hydraulically separate areas.

The TCEQ’s DBP Rule coordinators can help you to determine the correct number and location of DBP1 sites.

Table 5.9 shows the minimum number of sample sites, based on entry points and system population.

Table 5.9. Required Routine Sites for DBP1

Type of System	Size of System	Minimum DBP1 Sites
S or U or a blend of S, U, and G ¹	≥ 10,000 people	4 per S or U entry point ² (may be reduced to 1 site if levels are low)
S or U or a blend of S, U, and G	0 to 9,999	1 per S or U entry point ²
G only	any size	1 per G entry point ²

1. S = Surface, U = Groundwater under the direct influence of surface, G = Ground.

2. For purposes of the DBP1 rule, as well as for scheduling purposes, “plant” is defined as “entry point.”

The sample sites must reflect the “worst-case” of what people are drinking.

- If the system has only one DBP1 sample site, it must be at the longest detention time (maximum water age).
- If the system has more than one DBP1 sample site, at least one quarter of all the sites must be at the longest detention time (maximum water age), and the remaining samples must represent the average detention time in the distribution system.

For systems that have “demand” sources, the required number of sample sites chosen will be as if the demand source was in production.

For systems that treat or purchase SW or GUI and serve at least 10,000 customers, four DBP1 sample locations must be identified for each treatment plant or source of surface water (or GUI). One must be at the longest detention time in the distribution system. The others must represent the average detention time in the distribution system.

For systems that treat or purchase SW or GUI and serve up to 10,000 people, and all groundwater systems, a single DBP1 sample point must be identified for each source of water. That sample site must be at a point where the water has been in the distribution system for the longest time (called maximum detention time, or maximum water age). You can estimate where the maximum water age in your distribution system is by looking at your chlorine residual data. Chlorine (or monochloramine) decays over time, so, roughly speaking, the point where you have the most difficulty maintaining a residual can represent the maximum water age point.

Early confusion in selecting sample sites may result in some systems having identified a site near an entry point, at less than the average detention time. This should be resolved through new regulations such as DBP2, additional oversight, and field reports.

Table 5.10. Routine DBP1 Sampling Frequency for TTHM and HAA5

Type of System (worst-case entry point)	Minimum Monitoring Frequency¹
Surface water or groundwater under the direct influence of surface water serving at least 10,000 persons	Four water samples per quarter per treatment plant (or source of surface water)
Surface water or groundwater under the direct influence of surface water serving from 500 to 9,999 persons	One water sample per quarter per treatment plant (or source of surface water)
Surface water or groundwater under the direct influence of surface water system serving fewer than 500 persons	One sample per year per treatment plant (entry point) during summer
System using only groundwater not under the direct influence of surface water, using chemical disinfectant, and serving 10,000 persons or more	One water sample per quarter per treatment plant (entry point) during summer
System using only groundwater not under the direct influence of surface water, using chemical disinfectant, and serving fewer than 10,000 persons	One sample per year per treatment plant (entry point) during summer

1. If sampling shows levels of DBPs in your system, the TCEQ may increase the frequency of monitoring for your system.

DBP1 (Stage 1 Disinfectants and Disinfection Byproducts Rule) Sampling Frequency

TCEQ sample contractors collect the TTHM and HAA5 samples. Table 5.10 shows the initial frequency of sampling, depending on the raw water source and the size of the system (as determined by the population served). Your monitoring plan just needs to state that the contractor will collect the samples.

If samples are taken quarterly, they will be collected regardless of whether the demand source is producing water or not. If annual samples are taken, the sampler should take the sample when the demand source is in production, usually during the summer.

DBP1 samples must be collected under normal operating conditions. If you are planning to shock a chloraminating system with free chlorine, e-mail us at <DBP@tceq.texas.gov> and inform us of that. Be sure to provide the PWSID, the system name, and a contact person should we need to discuss the burnout. Reverting to free chlorine or shocking for a period longer than four weeks will be considered normal operating conditions, and no delay in sampling will be allowed.

Any sample invalidation request (for example, shock treatment at the time of the sample collection or an off-line plant) must be directed to a DBP Rule coordinator. Requests for sample invalidation must be made in writing and include appropriate supporting documentation.

All DBP1 monitoring will remain in effect until the implementation of Stage 2 DBP monitoring. Samples collected at DBP1 sites will be used to determine compliance during the phase-in of DBP2. Some DBP1 sites may eventually be used as DBP2 sites.

Table 5.11 lists some information you should be able to provide for your DBP1 sampling locations. Tables 5.12, 5.13, and 5.14 provide examples of sample site lists that public water systems of various sizes and types could develop.

Table 5.11. Requirements for a DBP1 THM and HAA Sample Site Table

Site Code or Letter	Address of DBP1 Site	Source Represented	Site Type
Use a number or letter that corresponds to the dot showing the site on your distribution system map.	Provide a street address for the sample site. If it is a sample station, provide a dummy address or a description of its location.	Say what source of water is represented by this site, if you have more than one entry point.	Designate each site as either "Max Water Age" or "Average."

Table 5.12. Example of a DBP1 THM and HAA Sample Site Table for a System Serving More than 10,000 People, with One SW Source

Site Code or Letter	Address of DBP1 Site	Source Represented	Site Type
A	99100 FM 963	EP001	Max Water Age
B	123 Main Street		Average
C	456 Elm Street		Average
D	789 Oak Street		Average

Table 5.13. Example of a DBP1 THM and HAA Sample Site Table for a System Serving Fewer than 10,000 People, with One Purchased SW Source and One Well

Site	Address of DBP1 Site	Source Represented	Site Type
A	Tap on GST at Industrial Park	Purchased SW from City (EP001)	Maximum Water Age
B	9090 Hard Way (hose bibb)	Well (EP002)	Average

Table 5.14. Example of a DBP1 THM and HAA Sample Site Table for a System Serving Fewer than 10,000 People, with One Groundwater Source

Site	Address of DBP1 Site	Source Represented	Site Type
A	Tap at North Elevated Storage	Well (EP001)	Max Water Age

5.4. Stage 2 Disinfectants and Disinfection Byproducts Rule (DBP2) Requirements

For DBP2, the number of sample sites is based on the system's population and the type of water. The number of entry points or sources is not taken into consideration. This is a more appropriate way to monitor for DBPs, since it does a better job of geographically representing distribution systems.

The DBP2 Rule has two parts:

- Early implementation sampling through the Initial Distribution System Evaluation (IDSE) in 2007 through 2009.
- DBP2 compliance monitoring starting in 2012 and 2013, which means that systems must select new, final DBP2 sites by the end of 2011.

Systems will be scheduled for compliance starting with the largest systems and their purchasers, then moving on to smaller systems.

DBP2 introduces the concept of the combined distribution system (CDS) for scheduling purposes. A combined distribution system is a group of interconnected distribution systems under different ownership. This group includes all interconnected wholesalers, purchasers, and pass-through systems. The CDS will determine a systems timing for phase-in of DBP2 requirements. IDSE sampling began in 2007.

Combined Distribution Systems (CDS)

Scheduling for the DBP2 requirements is phased-in based on the size of the combined distribution system (CDS). A CDS is an interconnected group of systems. Groups are based on the population of the largest single system in the CDS, not on the sum of the populations of the interconnected systems. Table 5.15 shows the CDS groups for scheduling purposes.

Table 5.15. CDS Schedule Groups for DBP2

Scheduling Group Number	Population (not connections) of the largest system in the combined distribution system
Group 1	100,000 or more
Group 2	50,000 to 99,999
Group 3	10,000 to 49,999
Group 4	Fewer than 10,000

If a system is not interconnected with any other systems, its schedule is based on its own population. For example, a system with a population of 105,000 would be in Group 1. If it sold water to any other systems, those other systems would be in Group 1 for scheduling, too.

IDSE Sampling Requirements

IDSE sampling is conducted in addition to DBP1 sampling. The TCEQ shall not use the results of IDSE sampling for compliance. The purpose of IDSE sampling is to identify the worst-case locations for THM and HAA in the distribution system and to set new compliance monitoring locations for DBP2. Until the dates shown in Table 5.16, systems must continue to comply with DBP1.

Table 5.16. Date to Start Stage 2 Compliance

This type of system:	Must comply with Stage 2 starting:
Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system	
System serving 100,000 or more population	April 1, 2012
System serving 50,000 to 99,999 population	October 1, 2012
System serving 10,000 to 49,999 population	October 1, 2013
System serving fewer than 10,000 population if the system distributes only treated groundwater or potable water purchased from another system	October 1, 2013
System serving fewer than 10,000 population that treats surface water (or groundwater under the direct influence of surface water) if no <i>Cryptosporidium</i> monitoring is required under §290.111(b)(3)(B) of this title (relating to Surface Water Treatment)	October 1, 2013
System serving fewer than 10,000 population that treats surface water (or groundwater under the direct influence of surface water) if <i>Cryptosporidium</i> monitoring is required under §290.111(b)(3)(B) of this title	October 1, 2014
Systems that are part of a combined distribution system	
Consecutive system or wholesale system that is part of a combined distribution system	At the same time as the system with the earliest compliance date in the combined distribution system

Table 5.17 shows the schedule of IDSE phase-in based on the CDS scheduling group.

Starting in 2007, the TCEQ sent many systems—those with very low levels of DBPs and those with fewer than 500 in population—a waiver of the IDSE sampling requirements. If you received a waiver from the TCEQ, you must keep a copy of the waiver approval letter with your monitoring plan.

If you did not receive a waiver of the IDSE sampling requirements, you are required to have submitted an IDSE Sampling Plan to the TCEQ.

Systems that did not receive a waiver but that had extensive TTHM and HAA5 data or technical expertise to prepare a hydraulic model could fulfill their IDSE requirements with a System Specific Study. Systems that did not receive a waiver and did not choose to conduct a System Specific Study must complete standard IDSE monitoring, in addition to their existing DBP1 monitoring requirements, to identify areas of the distribution system with high TTHM and HAA5 levels.

Table 5.17. Timing of IDSE Sampling Activities: Federal DBP2 Requirements

Scheduling Group	The IDSE Sampling Plan is due by . . .	The TCEQ plans ¹ to schedule sampling to:	Finish IDSE sampling by:	IDSE Report due by:
Group 1	10/1/06	start by Q1-07 through Q3-08 at the latest ~ calendar year 2007	9/30/08	1/1/09
Group 2	4/1/07	start by Q2-07 through Q4-08 at the latest ~ mid 07 – mid 08	3/31/09	7/1/09
Group 3	10/1/07	start by Q1-08 through Q3-09 at the latest ~ calendar year 2008	9/30/09	1/1/10
Group 4	4/1/08	start by Q3-08 through Q1-10 at the latest ~ calendar year 2009	3/31/10	7/1/10
Systems with waivers	When the TCEQ determines that sampling is needed	When the TCEQ determines that sampling is needed	Scheduled on a case-by-case basis	Scheduled on a case-by-case basis

1. These are estimated time frames for planning purposes and are subject to change.

Note: Regardless of when it is scheduled, the standard IDSE period is one year of sampling. Also, even if your system previously received a waiver, the TCEQ may schedule IDSE sampling at your system if needed.

The TCEQ may schedule future IDSE sampling at systems that received a waiver. If a system has a different number of required sample sites for DBP2 than they did for DBP1, the TCEQ will work with the system to select the DBP2 sites. This may mean that a system that initially received a waiver for IDSE sampling must perform IDSE sampling in order to set DBP2 sites. The TCEQ will inform you if this additional sampling is required.

The number and type of IDSE sample sites is based on the population of the system and the type of water in the system. If there is any surface water in the system—purchased or produced—the system will be considered a surface water system for the purposes of this rule. Table 5.18 shows the required frequency and type of sample sites for a system distributing treated surface water. A system that produces water from a groundwater source under the direct influence of surface water is also included in the surface water source category.

Table 5.19 shows the required frequency and type of sample sites for a system distributing only treated groundwater.

Table 5.18. IDSE Sites and Frequency for Systems Using Surface Water

Population and Type of System	Number of IDSE Sites	Types of IDSE Sites				Schedule
		Near EP	Ave RT	Potential High THM	Potential High HAA	
Fewer than 500, receiving and redistributing water ¹	2	1	–	1	–	4 per year (quarterly)
Fewer than 500, treating and distributing water ¹	2	–	–	1	1	
500 to 3,300, receiving and redistributing water	2	1	–	1	–	
500 to 3,300, treating and distributing water	2	–	–	1	1	
3,301 to 9,999	4	–	1	2	1	
10,000 to 49,999	8	1	2	3	2	6 per year (every other month, for a one-year period)
50,000 to 249,999	16	3	4	5	4	
250,000 to 999,999	24	4	6	8	6	
1 million up to 5 million	32	6	8	10	8	
5 million and more	40	8	10	12	10	

1. These systems should get a Very Small System (VSS) Waiver.

Table 5.19. IDSE Sites and Frequency for Systems Using Only Groundwater

Population and Type of System	Number of IDSE Sites	Types of IDSE Sites				Schedule
		Near EP	Ave RT	Potential High THM	Potential High HAA	
Fewer than 500, consecutive ¹	2	1	–	1	–	1 per year (summer)
Fewer than 500, nonconsecutive ¹	2	–	–	1	1	4 per year (quarterly)
500 to 9,999	2	–	–	1	1	
10,000 to 99,999	6	1	1	2	2	
100,000 to 499,999	8	1	1	3	3	
500,000 and more	12	2	2	4	4	

1. These systems should get a Very Small System (VSS) Waiver.

The results of IDSE sampling will be used to determine final DBP2 sample sites. Some DBP1 compliance monitoring sites may also feed into the selection of DBP2 sites. Systems must comply with DBP2 monitoring in 2012 or 2013, depending on their combined system population,

IDSE Sample Plan

Appendix G contains the instructions for selecting IDSE sample sites for standard monitoring. The TCEQ scheduled IDSE sampling for systems that did not receive a waiver. That standard sampling is expected to be completed by December 2009.

Future IDSE Sampling

Some systems that did not have to do standard IDSE sampling and did not conduct a System Specific Study will need to add or remove sample sites from their current DBP1 sample site list before DBP2 compliance sampling starts. The TCEQ will contact systems that did not undertake an IDSE that need to change their sample sites and provide specific direction. The TCEQ must approve all DBP sample sites. [30 TAC 290.115(c)(5)(B)(iii)]

5.5. Lead and Copper (30 TAC 290.117)

Frequency

All community (C) and non-transient non-community (NTNC) systems must comply with lead and copper sampling requirements. Transient non-community (TNC) systems—such as parks or convenience stores—do not have to sample for lead and copper in the distribution system.

All new or reactivated community and non-transient non-community water systems must submit the Lead and Copper Sample Site Selection and Materials Survey Checklist forms (TCEQ-Form 20467) by November 30 of each year before they sample in the following year. If your water system started lead and copper sampling during the original compliance monitoring period between 1992 and 1995, you have probably advanced to monitoring once every three years during the summer months. The TCEQ will ship bottles to you when your system is due to conduct monitoring. You may be on an alternate sampling schedule if your system became a public water system (PWS) after 1995, if your system ever exceeded the action levels for lead or copper, or if your PWS failed to monitor on time and went out of compliance. To confirm your schedule status, call our Lead and Copper Rule coordinator at 512-239-4691.

Some systems have received monitoring waivers of the sampling requirements from the TCEQ. If your system has received correspondence regarding a waiver, note that in this part of your monitoring plan.

Location

Lead and copper samples must be taken at customers' taps, where it is most likely that lead or copper may be corroding out of the pipes and entering the water. The monitoring plan must contain a list of the addresses where samples must be taken for lead and copper.

When you change sites, you must submit a new Sample Site Selection Form (TCEQ-20467) to the TCEQ's Lead and Copper Rule coordinator for approval. You can reach Drinking Water Rule coordinators at the main Public Drinking Water Section phone number (512-239-4691) or by e-mail at <PDWS@tceq.texas.gov> (do not type the brackets).

Table 5.20 shows the requirements for the lead and copper site table.

Table 5.20. Requirements for a Lead and Copper Sample Site Table

Site Code or Letter	Address of Lead and Copper Site	Type of Site	Comments
Use a number or letter that corresponds to the dot showing the site on your distribution system map.	Provide a home address for the sample site. These must be occupied residences.	You must say whether this is a Tier 1, 2, or 3 site.	You may want to list when each home was built.

Table 5.21. Example of a Lead and Copper Sample Site Table for a Small Community System

Site	Address of Lead and Copper Site	Type of Site	Comments
1	1001 Arbor Vitae Ln. (Mr. Smith, 456-1234)	Tier 1	Don't call before 10 a.m,
2	2222 Bittersweet St. (Ms. Brown, 456-5678)	Tier 1	
3	3456 Cedar Pl. (Mr. Jones, 456-9876)	Tier 2	Please call ahead.
4	4999 Elder Pl. (Ms. Kitty, 456-4357)	Tier 2	
5	5005 Forsythia Circle (Mr. Fido, 456-4321)	Tier 3	

Table 5.22. Example of a Lead and Copper Sample Site Table for a Small Non-transient Non-community (NTNC) System

Site	Address of Lead and Copper Site	Type of Site	Comments
1	Shop break room sink	Tier 3	See SOP 00321 for sampling procedure.
2	Water fountain in lobby	Tier 3	
3	Main building kitchen sink	Tier 3	
4	Water fountain in warehouse	Tier 3	
5	Lab tap	Tier 3	

New Water Systems

If your system is new, make sure you contact the Lead and Copper Rule coordinator so that you can do the required initial monitoring for lead and copper.

5.6. Asbestos (30 TAC 290.106)

All systems that have pipe made of asbestos cement need to be evaluated for asbestos vulnerability. This requirement also applies to systems that only purchase water. If corrosive water flows through asbestos-cement pipe, the asbestos can get into the water. Asbestos can also get into the water if the pipe is tapped and not flushed well enough afterwards.

You can determine whether your water is corrosive by using an index such as the Langelier corrosivity index. The Langelier corrosivity index is calculated based on chemical data taken at each entry point. If water from that entry point has a potential for corrosivity, then samples must be collected in distribution where asbestos fibers are most likely to occur.

Systems must keep a record of the location of their asbestos-cement pipe and the suitable sampling points.

Frequency

Once every nine years, systems are evaluated by the TCEQ for the presence of asbestos-cement pipe (A-C) and the potential for corrosivity. Systems with A-C pipe and the potential for corrosive water must monitor for asbestos fibers in the distribution where contamination is most likely to exist. Systems with no A-C pipe receive a waiver from monitoring. Systems that detect asbestos fibers will be monitored once every three-year period after the initial detection.

Systems that exceed or violate the MCL for asbestos must monitor quarterly. If the results of quarterly monitoring show that the water is reliably and consistently below the MCL, sampling will be reduced to annually.

Location

Systems must maintain distribution maps and indicate the location of asbestos-cement pipe. For those systems that must monitor, the TCEQ will work with the system to set the fewest number of sampling sites necessary to determine whether asbestos fibers have accumulated from one or more of the following sources or causes: corroding pipe, tapping, line breaks, and inadequate flushing.

Chapter 6. Laboratory Approval Form and Instructions

This chapter includes the Drinking Water Laboratory Approval Form, TCEQ-10450, and instructions for how to accurately complete and submit the form.

6.1. Who Must Complete the Laboratory Approval Form?

All community and non-transient non-community public water systems must complete the Drinking Water Laboratory Approval Form and include it with their Monitoring Plan. Water systems that treat surface water (SW) or groundwater under the influence of surface water (GUI) must submit their Monitoring Plan to the TCEQ for approval. Water systems that treat only groundwater (GW) or that purchase water (either GW or SW) must complete the form and include it with their Monitoring Plan. These systems are not required to submit the Monitoring Plan to the TCEQ for approval. However, these systems must produce the Drinking Water Laboratory Approval Form upon request or during Comprehensive Compliance Investigations (CCI) completed by regional investigators.

6.2. Laboratory Approval Procedure

In order for a public water system's lab to be approved, the public water system must complete the Drinking Water Laboratory Approval Form, indicating the methods and quality control procedures used at the system. Systems that treat surface water or groundwater under the influence of surface water must complete one form per treatment plant. Systems that treat groundwater or redistribute treated water must complete one form that lists all the methods used throughout the system. The form must be signed by the certified operator with responsibility for laboratory operations. The TCEQ will review this form upon receipt or during a CCI and notify the system if the form is incomplete or if the methods noted are not acceptable.

If the system sends any of the samples listed on the laboratory approval form to an outside lab that is not run by a public water system (in other words, a commercial lab), that lab must have commercial laboratory approval from the TCEQ to perform those analyses. For information on commercial laboratory approval, contact the TCEQ at 512-239-4691.

6.3. Types of Analytes

There are two classifications of analytes: approved-lab analytes and accredited-lab analytes. Public water systems may themselves perform analysis of approved-lab analytes, as long as they use methods approved by the EPA and the TCEQ. The laboratory approval form procedures are the TCEQ's way of making sure that systems use the right methods. On the other hand, public water systems cannot perform analysis of accredited-lab analytes; instead, these samples must be analyzed in a lab that is accredited by the TCEQ.

Analytes Run by Commercial Labs

Public water systems may have approved-lab analytes run by commercial labs or other water system labs, if that outside lab is approved or accredited by the TCEQ. When you fill out the lab approval form, write the name of the outside lab in the line for the analyte they measure. The outside lab should give the water system a copy of their lab approval form so that the system can attach it to their Monitoring Plan.

Approved-Lab Analytes

Public water systems must analyze samples at a laboratory approved by the TCEQ. The approved-lab analytes are as follows:

- free and total chlorine disinfectant residual
- turbidity and total organic carbon (TOC)
- pH
- temperature
- alkalinity
- chlorine dioxide and daily entry point chlorite
- calcium
- phosphate
- ultraviolet light absorbance at 254 nm (UV₂₅₄)

Most systems will get their lab approved and analyze these samples at their own lab. Systems that don't treat surface water or groundwater under the direct influence of SW don't have to submit their lab approval forms, but they must maintain them for possible review and submit them for approval upon request. The TCEQ's Public Drinking Water Section approves labs for these analyses.

Online Disinfectant Monitoring

Online disinfectant residual monitors must be set up, calibrated, and validated using the EPA method 334.0. This method was authorized in 2009 for use in

the continuous on-line analysis of residual chlorine (free or total) in drinking water. PWSs need to get approval for the use of any type of on-line chlorine analyzer for compliance monitoring. The on-line analyzer must be checked with a grab sample reference method that is approved for drinking water compliance monitoring, and is periodically verified and adjusted based on results from grab sample analysis. For more information please visit the TCEQ Monitoring Plans Web page, <www.tceq.texas.gov/goto/pws/monitoringplan>.

Accredited-Lab Analytes

Public water systems must have the following analyses performed by a lab that is accredited by the TCEQ:

- bacteriological (total coliform and fecal coliform)
- bromate and bromide
- monthly chlorite distribution system three-sample set
- inorganic chemicals (IOC)
- radiochemicals
- synthetic and volatile organic chemicals (SOC and VOC)
- total trihalomethanes (TTHM) and haloacetic acids (HAA5)

Except for the bacteriological samples, bromate, and monthly chlorite samples, all of the accredited-lab analyte samples used for compliance under the Safe Drinking Water Act are collected by the TCEQ's Drinking Water Compliance Sampling contractor, currently Delta Consultants. The contractor delivers the samples for analysis to the laboratories of either the Texas Department of State Health Services (DSHS) or the Lower Colorado River Authority. Only these two laboratories are permitted to analyze samples for compliance purposes.

For more information on lab accreditation, visit our "Laboratory Accreditation and Certification" Web page, at <www.tceq.texas.gov/goto/lab_accred>.

"Not Required" Analytes

The analytes that are listed on the form include all of those that must be analyzed at an approved lab. Your system may not be required to analyze for all of the analytes on the list. For example, if your system treats groundwater, you are not required to measure turbidity, and you should write "Not Required" on the form in the line for turbidity.

As another example, only systems that use chlorine dioxide must measure chlorite and chlorine dioxide. If you do not use chlorine dioxide, write the words "Not Required" in the spaces for chlorite and chlorine dioxide.

Calcium and phosphates are examples of other chemicals that a system may not have to measure. If you are not required to optimize corrosion control as

a result of the Lead and Copper Rule, write “Not Required” on the lines for calcium and phosphate.

6.4. Lab vs. Operator Sampling

At many systems, the laboratory does some sampling and the water plant operators do other sampling. If that is the case for your public water system, you may complete two separate forms. One form would list the analytes run by the commercial laboratory and be signed by the lab analyst and the other form would list the analytes run by the system operator and be signed by that operator.

6.5. Completing, Submitting, and Retaining the Form

This section describes the components or columns of the Drinking Water Laboratory Approval Form and how to complete them.

Completing the Form

Analyte

“Analyte” refers to the chemical or value that you are analyzing for. The heading of this column does not read “chemicals” because temperature, UV₂₅₄, and turbidity are not chemicals.

Method (and Analyzer Type)

Under “Method (and Analyzer Type),” you should fill in the method that you use to measure for each analyte (for example, Standard Method Cl-4500D). If you use some kind of analyzer, write that in this blank also (for example, Hach 1720D). You must use EPA-approved methods. See Table 6.1 at the end of this chapter for reference.

Accuracy

Report the number of decimal places to which you can accurately report the value for each analyte. Some analytes have required accuracy levels. See Table 6.1 at the end of this chapter for reference.

Calibration

You should report the frequency and the method with which you calibrate or verify the accuracy of your equipment. For some methods, the TCEQ has

rules about calibration or verification of accuracy. These include pH meters, turbidimeters, chemical disinfectant residual analyzers, and UV light disinfection analyzers. These rules can be found in the Texas Administrative Code, specifically in 30 TAC 290.46(s)(2). See Table 6.1 at the end of this chapter for reference.

Frequency. Under “Frequency,” you should state the frequency with which you calibrate or verify the accuracy of the equipment.

Method. Under “Method,” you should list the calibration or verification method you use for your equipment.

Submitting the Form

If you are required to submit your form to the TCEQ for approval, use the address below:

Attn: Laboratory Approval Coordinator
Public Drinking Water Section, Mail Code 155
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Record Retention

The TCEQ has rules about record retention. These rules are in the Texas Administrative Code, specifically in 30 TAC 290.46(f). The calibration records for laboratory equipment must be retained for at least three years. The *results* of chemical analyses must be retained for at least 10 years.

6.6. Attach a Copy to the Monitoring Plan

A copy of the Drinking Water Laboratory Approval Form, TCEQ-10450, must be attached to the system’s monitoring plan. For information on monitoring plans, contact the TCEQ’s Public Drinking Water Quality Team at 512-239-4691. On the monitoring plan, the system must attach documentation showing that any outside labs it uses are approved or accredited, as appropriate.

If you send approved-lab analytes to a commercial lab, that commercial lab must be TCEQ-approved in the appropriate analysis. Evidence of the commercial lab’s approval must be attached to the monitoring plan.

If you send approved-lab analytes to a different public water system’s lab, that public water system’s lab must be TCEQ accredited in the appropriate analyses. You must attach a copy of that public water system lab’s Drinking Water Laboratory Approval Form to your monitoring plan.

Table 6.1. Approved Methods, Calibration Frequency, and Minimum Accuracy

Analyte	Minimum Calibration Frequency	Minimum Accuracy	Methods			
			EPA	ASTM	SM	Other
Turbidity	Benchtop. Calibrate at least once every 90 days. On-line. Calibrate at least once every 90 days; check at least once every week.	± 0.05 NTU	180.1		2130 B	GLI Method 2
pH	Benchtop. Calibrate at least once daily. On-line. Calibrate at least once every 30 days; check at least once every week.	± 0.01 pH unit	150.1 150.2	D1293-95	4500-H+ B	
Temperature		± 0.5° C			2550	
TOC					5310 B 5310 C 5310 D	
UV ₂₅₄	Calibrate at least once a year; check at least once every month.				5910 B	
Alkalinity		± 0.05 mg/L		D1067-92B	2320 B	I-1030-85
Disinfectant						
Free Chlorine		± 0.1 mg/L		D 1253-86	4500-CI D 4500-CI F 4500-CI G 4500-CI-H	
Total Chlorine	Manual. Check at least once every 30 days.	± 0.1 mg/L		D 1253-86	4500-CI D 4500-CI E 4500-CI F 4500-CI G 4500-CI I	
Chlorine Dioxide		± 0.05 mg/L			4500-CIO ₂ D 4500-CIO ₂ E	
Chlorite			300.0 300.1		4500-CIO ₂ E	
Calcium			200.7	D511-93A D511-93B	3500-Ca D 3111 B 3120 B	
Phosphate		± 0.01 mg/L	365.1 300.0	D515-88A D4327-91	4500-P E 4500-P F 4110 B	I-1602-85 I-2601-90 I-2598-85

Drinking Water Laboratory Approval Form

Public Water
System Name: _____

Plant Name
or Number: _____

PWS ID No.: _____

Date: _____

I certify that I am familiar with the information contained in this report and that, to the best of my knowledge, this information is true, complete, and accurate.

Operator's Signature:* _____

Certificate No.
and Grade:* _____

* Or, for Labs, the Lab Analyst's signature, name, title, and phone number.

Analyte	Method (& Analyzer Type)	Accuracy	Calibration	
			Frequency	Method
Turbidity		± NTU		
pH		± pH unit		
Temperature		± C		
TOC		± mg/L		
UV₂₅₄		± cm ⁻¹		
Alkalinity		± mg/L		
Disinfectant				
Free Chlorine		± mg/L		
Total Chlorine		± mg/L		
Chlorine Dioxide		± mg/L		
Chlorite at point of entry		± mg/L		
Calcium		± mg/L		
Phosphate		± mg/L		

Please see reverse for brief instructions.

Back of Drinking Water Laboratory Approval Form**Filling Out the Form**

Method: If your system conducts the test, enter the method that you use or identify the make and model number of the instrument or test kit that you use to run the test. If you use multiple types of instruments in your system, please list them all. Space is limited—if needed, please attach another form to list additional methods. If samples are sent to an outside lab, enter the name of the lab that runs the test for you. If you are not required to run one or more of the tests, write “Not Required” next to those tests.

Accuracy: Some analytes have **minimum accuracy requirements**. See Table 6.1.

Frequency: Some analytes have **minimum calibration requirements**. See Table 6.1.

Free Chlorine: If your system does not add ammonia at any point during the treatment process, you must list a free chlorine method. If your system adds ammonia at any point during the treatment process, you should be able to run both Free and Total Chlorine tests.

Total Chlorine: If your system does not add ammonia at any point during the treatment process, you must list a free chlorine method. If your system adds ammonia at any point during the treatment process, you should be able to run both Free and Total Chlorine tests.

Chlorine Dioxide: If your system uses chlorine dioxide you must list the method used to measure these analytes.

Chlorite

(at point of entry): If your system uses chlorine dioxide you must list the method used to measure these analytes.

Calcium: Required only if your system is reporting water quality parameters for the Lead and Copper Rule.

Phosphate: Required only if your system is reporting water quality parameters for the Lead and Copper Rule.

Submitting the Form

To submit your form to the TCEQ for approval, use the following address:

Attn: Laboratory Approval Coordinator
Public Drinking Water Section, Mail Code 155
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Or submit via e-mail to:

PDWS@tceq.texas.gov

Chapter 7. Examples of Monitoring Plans

Example 7.1. Riley Glen's MHP: A Community System with One Well



Monitoring Plan for

Riley Glen's Mobile Home Park



Date of Monitoring Plan: Jan. 1, 2010
PWS ID# 2560001 - Algae County, Texas
Responsible Official: Riley Glen, Owner
Water Supply Contact: Bob Dobbs, Operator, 215-239-4691
P.O. Box 4691
Wassermann, TX 77555



Riley Glen's Mobile Home Park owns and operates one groundwater well. The water system serves 33 people with 15 connections.

A. RAW WATER SAMPLING

We are not required to collect raw water samples unless we get a distribution system coliform positive. There is a sample tap on the well head just in case.

Source Sample Site Table

Source	TCEQ Source ID	Sample Site
Edwards	G2560001A	Tap at well head

❖❖❖❖❖❖ **Example Monitoring Plan: Riley Glen's MHP** ❖❖❖❖❖❖

B. IN-PLANT SAMPLING

We have no treatment other than chlorination. We use hypochlorite to disinfect the water.

Treatment Table

Treatment Sequence	Treatment
1	Hypochlorite injection (solution)

C. ENTRY POINT SAMPLING

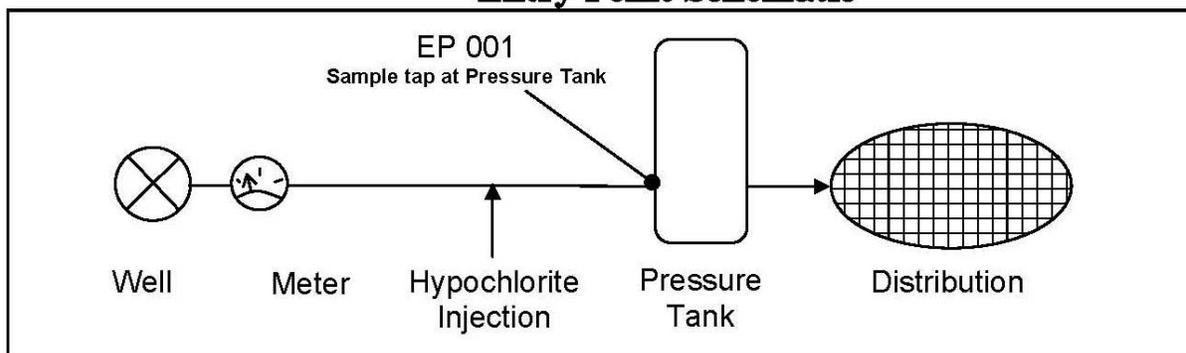
Entry Point Sample Site Table

Entry Point (EP) Number	EP Sample Site (Entry Point Name)
001	Sample tap on storage tank next to office

Entry Point / Plant / Source Table

EP Number	Plant	Source Description	Source ID	Comments
001	Chlorinator	Ogalalla	G2560001A	Drilled 1947

Entry Point Schematic



1. Disinfectant Entering the Distribution System

Our system uses free chlorine in the distribution system.

a–c. Frequency, Location, and Method:

We monitor chlorine residual and keep it at 1.0 mg/L. If it is off by 0.2 or more call the operator: Bob Dobbs, on his cell.

d. Compliance calculations:

“The system is in compliance if the free chlorine residual entering the distribution system is over 0.2 mg/L.”

❖❖❖❖❖❖ **Example Monitoring Plan: Riley Glen's MHP** ❖❖❖❖❖❖

2. Organic Chemicals, Inorganic Chemicals, and Radiochemicals

- a. Frequency:
The TCEQ's sampling contractor collects these samples. Letters informing us of changes in the sampling schedule are attached to the back of this monitoring plan.
- b. Location:
The contaminant concentrations for the entry point are measured at the sample tap on the storage tank.
- c. Method:
Samples are sent to a certified lab (LCRA) by the TCEQ's sampling contractor.
- d. Compliance calculations:
"If the concentrations of contaminants are less than the regulatory maximum contaminant levels, our system is in compliance. The TCEQ will inform us of violations. Copies of any letters informing us of violations will be attached in the back of this monitoring plan."

D. DISTRIBUTION SYSTEM SAMPLING

The distribution system consists of 15 connections.

1. Coliform Samples

- a. Frequency and Location:
The sample is taken from the outside tap on the following units:

Coliform Sample Site List and Schedule

Site Number on Map	MHP Unit	MONTH TO SAMPLE (first Monday)	Upstream Site	Downstream Site
Site A	Unit # 1	Jan & July	Office	#2
Site B	Unit # 4	Feb & August	#2	#3
Site C	Unit # 7	Mar & Sept	#6	#8
Site D	Unit # 10	Apr & Oct	#9	#11
Site E	Unit # 13	May & Nov	#12	#14
Site F	Unit # 15	June & Dec	#4	Office

- c. Method: Coliform samples are sent to a nearby accredited lab:
Bluebonnet Labs
Attn: Marguerita Huisache (512)555-1999
327 Dewberry Thicket
Acacia, Texas 77556

❖ ❖ ❖ ❖ ❖ ❖ **Example Monitoring Plan: Riley Glen's MHP** ❖ ❖ ❖ ❖ ❖ ❖

- d. Compliance calculations: The system is in compliance if:
- no repeat samples are fecal or E. coli positive,
 - no repeat following a fecal or E. coli positive routine sample is positive for total coliform,
 - no more than one of the routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.”

2. Disinfectant Residual—Free Chlorine

- a. Frequency and Location

The disinfectant residual is measured at the same time as coliform sample on the first Monday of the month. Then we follow the Disinfectant Residual Sample Site List and Schedule table below.

Disinfectant Residual Sample Site List and Schedule

Site	Location	When to sample
Site B	Unit 4	Mondays
Site C	Unit 7	Tuesdays
Site D	Unit 10	Wednesdays
Site F	Unit 15	Thursdays
Site G	Office	Saturday & Sunday

- b. Method:

Chlorine is measured using a colorimeter/DPD; Hach Pocket colorimeter.

- c. Compliance calculations:

“The system is in compliance with the minimum residual requirement if the free chlorine residual throughout the distribution system is always greater than 0.2 mg/L.”

“The system is in compliance with the maximum residual disinfectant level (MRDL) if the running annual average of all samples taken in the distribution system in less than 4.0 mg/L.”

3. Disinfection Byproducts (DBPs)—TTHM and HAA5

- a. Frequency:

The TCEQ's sampling contractor collects these samples. Letters informing us of changes in sampling schedule are attached to the back of this monitoring plan.

Example 7.2. City of Springfield: A Community System with Groundwater and Purchased Water

Monitoring Plan for the City of Springfield



Date of Monitoring Plan: Jan. 1, 2008

PWS ID 7654321 Wet County, Texas
Responsible Official: Pasa Dabuck. City Manager
PO Box 123, Springfield, TX 54321

Water Supply Contact: Homer J. Simpson, Supt., 512-555-0199

The City of Springfield owns and operates 15 wells, purchases treated groundwater from the City of Megalopolis, and sells water to the City of Ehler. The system serves 4,567 people, with 1666 connections.

A. Raw Water Sampling

The City of Springfield has 15 wells. We collect raw water coliform samples from Wells 6, 7, and 8 because the TCEQ is concerned about the well casing. The interim approval letter from the TCEQ is in the "Attachments" section.

*******Example Monitoring Plan: City of Springfield*******

Source Sample Site Table

Well	TCEQ Source ID	Sample Site	Comments/Status
1	G7654321A	Tap at well head	Active in summer (demand)
2	G7654321B	Sink in well house	
3	G7654321C		
4	G7654321D		
5	G7654321E		
6	G7654321F	Tap at well house	Monthly raw coliform samples first Monday each month
7	G7654321G	Tap at well house	
8	G7654321H	Tap at well house	
9	G7654321I		
10	G7654321J		
11	G7654321K		
12	G7654321L		
13	G7654321M		
14	G7654321N		
15	G7654321O		

a. Frequency

Raw water coliform samples from these three wells (6, 7, and 8) are collected once a month.

Starting 12/1/09, if we have a positive coliform sample anywhere in the distribution system, we have to collect E. Coli samples in all of our wells within 24 hours because of the new Ground Water Rule.

b. Location

Samples are collected at the raw water sampling taps in the well house for Wells 6, 7, and 8.

c. Method

Coliform samples are sent to this TCEQ-certified lab:

Wet County Department of Health, Attn: Clark S. Kent

123 Krypton St., Smallville, Texas, 77777 phone (512) 555-0812

d. Compliance

The City is in compliance with this monitoring requirement if samples are collected from each referenced well every month.

*******Example Monitoring Plan: City of Springfield*******

B. In-Plant Sampling

The City of Springfield operates two wells that have high levels of nitrate, in the Glen Rose Well Field. The water from these wells is treated by reverse osmosis (RO). In-plant sampling for total dissolved solids (TDS) is used to make sure the reverse osmosis units are working correctly. The brine water from the RO unit is sent to the sewer, in accordance with City Industrial Pretreatment standards.

<i>V. Ehlers Reverse Osmosis Plant</i>		
Seq.	Treatment	Comments
1	Reverse Osmosis	Water blends before RO unit. Half of flow goes through RO, half goes straight to chlorinator (entry point 002)
2	Liquid ammonia	
3	Gas chlorine	
4	Storage	East Ground Storage Tank

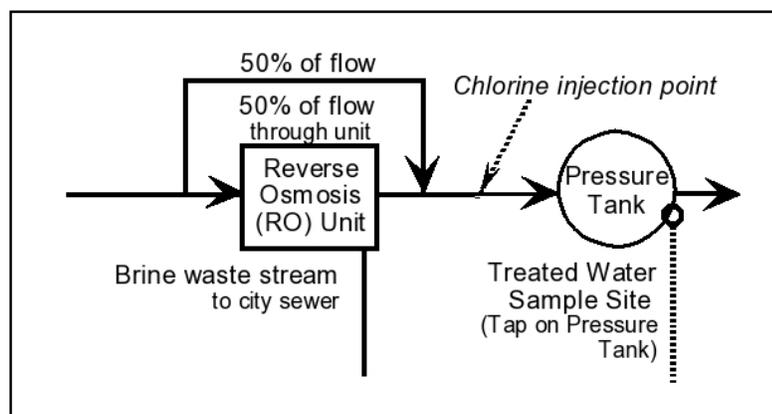


Figure 1: Schematic for Ehlers RO Plant

<i>Edwards Well Field</i>		
Sequence	Treatment	Comments
1	Liquid ammonia	
2	Gas chlorine	
3	Storage	West Ground Storage Tank

*******Example Monitoring Plan: City of Springfield*******

<i>L. Hulbert Pump House, Lab, Maintenance Facility, and Treatment Plant</i>		
Sequence	Treatment	Comments
1	Liquid ammonia	Disinfection facilities are provided for Trinity Wells 9, 10, and 11 upon an emergency basis
2	Gas chlorine	
3	Storage	Big Standpipe

We do required process control sampling on the V. Ehlers RO unit:

a. Frequency

The TDS samples are collected once a month.

b. Location

Raw water is sampled from the tap in the header after it blends. The RO treated water is sampled from the tap on the RO unit. The blended water that goes to the distribution system is sampled at the tap before the high-service pumps.

c. Method

These process control TDS samples are sent to:

City of Metropolis Drinking Water Lab
Attn: L. Luthor (512) 555-0991
5729 Lois Lane
Metropolis TX 77007

d. Compliance

The City of Springfield is required to do TDS sampling on the RO unit because of a Compliance Agreement (CA) with the TCEQ for the nitrate violation. As long as the City collects and records the raw and treated TDS once a month, the City is in compliance with the monitoring requirements of the CA (see attached CA).

*******Example Monitoring Plan: City of Springfield*******

C. Entry Point Sampling

Entry Point Sample Site Table

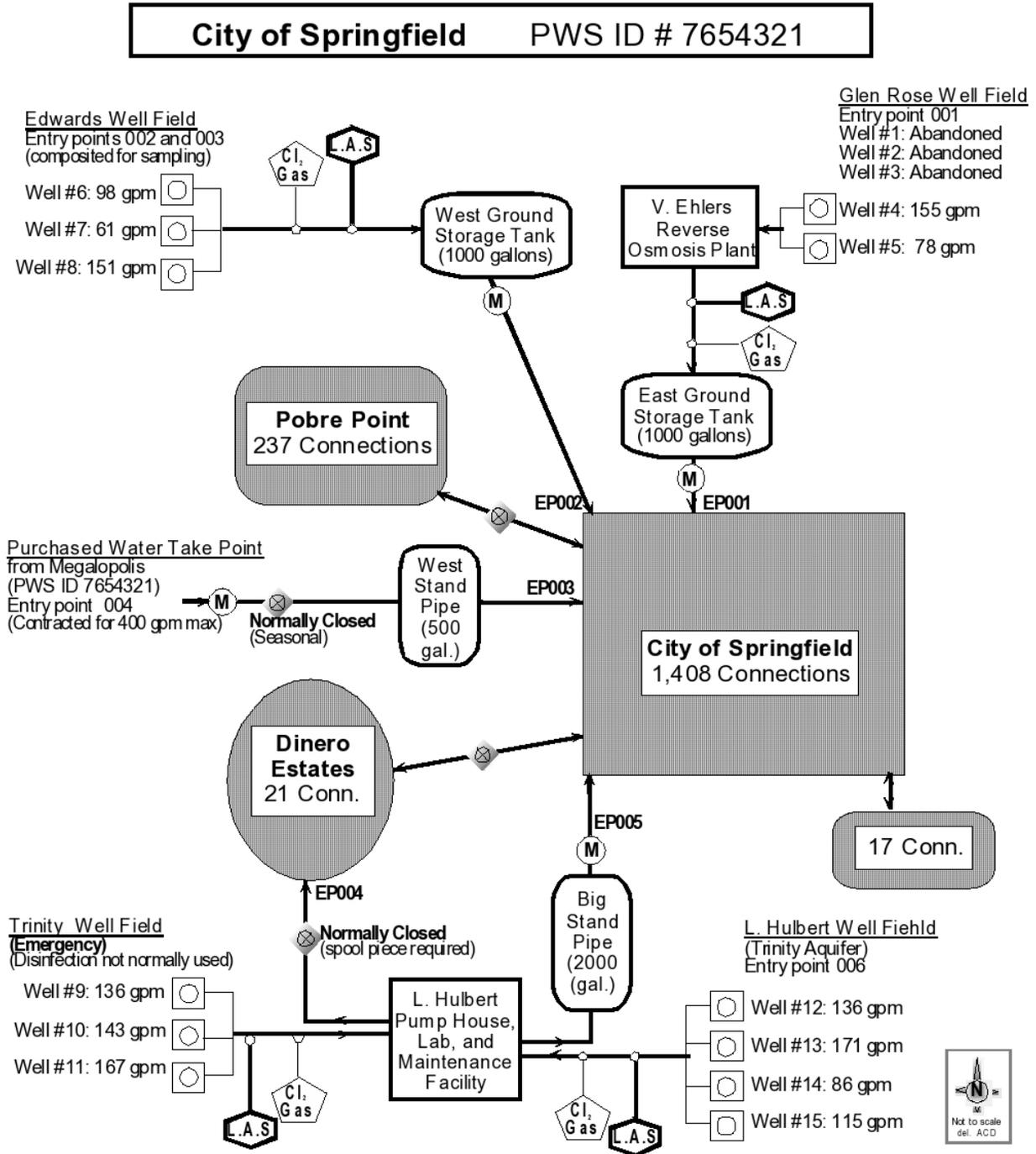
EP Number	EP Sample Site (Entry Point Name)	Comments
EP 001	Sample Tap at Ehler RO Plant	
EP 002	Hose Bibb on outside back wall of well house	
EP 003	Purchased-water meter vault	
EP 004	Hulbert lab sample tap 1	
EP 006		
EP 005	Hulbert lab sample tap 2	

Entry Point / Plant / Source Table

EP	Plant	Source Description	Source ID	Comments
EP 001	Ehler RO Plant	Glen Rose Aquifer	Well 1, Well 2, Well 3 (plugged)	
EP 002	Chlorinator at Edwards Well Field	Edwards Aquifer	Well 6, 7, 8	
EP 003	Chlorinator at Edwards Well Field	Edwards Aquifer	Well 4, Well 5	
EP 004	City of Megalopolis sample tap at take point - no treatment	Surface water from Rio Frio (Seasonal)	PWS	
EP 005	Hulbert lab building	Trinity Aquifer (Emergency)	Wells 9, 10, 11	
EP 006	Hulbert lab sample tap 2	Trinity Aquifer	Wells 12, 13, 14, and 15	

*****Example Monitoring Plan: City of Springfield*****

Entry Point Schematic



*****Example Monitoring Plan: City of Springfield*****

1. Disinfectant Entering the Distribution System

Our system uses chloramines in the distribution system. The target ratio is 4 parts chlorine to 1 part ammonia. There is both chlorine and ammonia injection at every well field. The City of Megalopolis provides water with a chloramine residual, but in summer, booster disinfection is used so that we can maintain a residual at the end of the distribution system.

a. Frequency

Although we are not required to do so by the TCEQ, disinfectant residual is measured 3 times a day (once a shift).

b. Location

The disinfectant residual is measured at each entry point. At EP004 (emergency), samples are collected only if the wells are operating.

c. Method

Entry points 002 and 004 are equipped with Hach CL17 continuous chlorine residual monitors. When EP003 or EP005 is supplying water, chlorine is measured using the Hach colorimetric method.

d. Compliance calculations

The system is in compliance if the total chlorine residual entering the distribution system is over 0.5 mg/L. We maintain a residual of at least 2.0 mg/L at each entry point.

2. Organic Chemicals, Inorganic Chemicals, and Radiochemicals

a. Frequency

The TCEQ's sampling contractor collects these samples. Letters informing the system of changes in sampling schedule are attached to the back of this monitoring plan. See the attached letters that require us to be sampled for nitrate every quarter at entry point 001.

b. Location

The contaminant concentrations at each entry point are measured at the applicable sampling site (see table below and schematic on next page).

c. Method

The TCEQ's sampling contractor sends the samples to a certified lab (Texas Department of State Health Services (DSHS) and the Lower Colorado River Authority Environmental Laboratory Services (LCRA)).

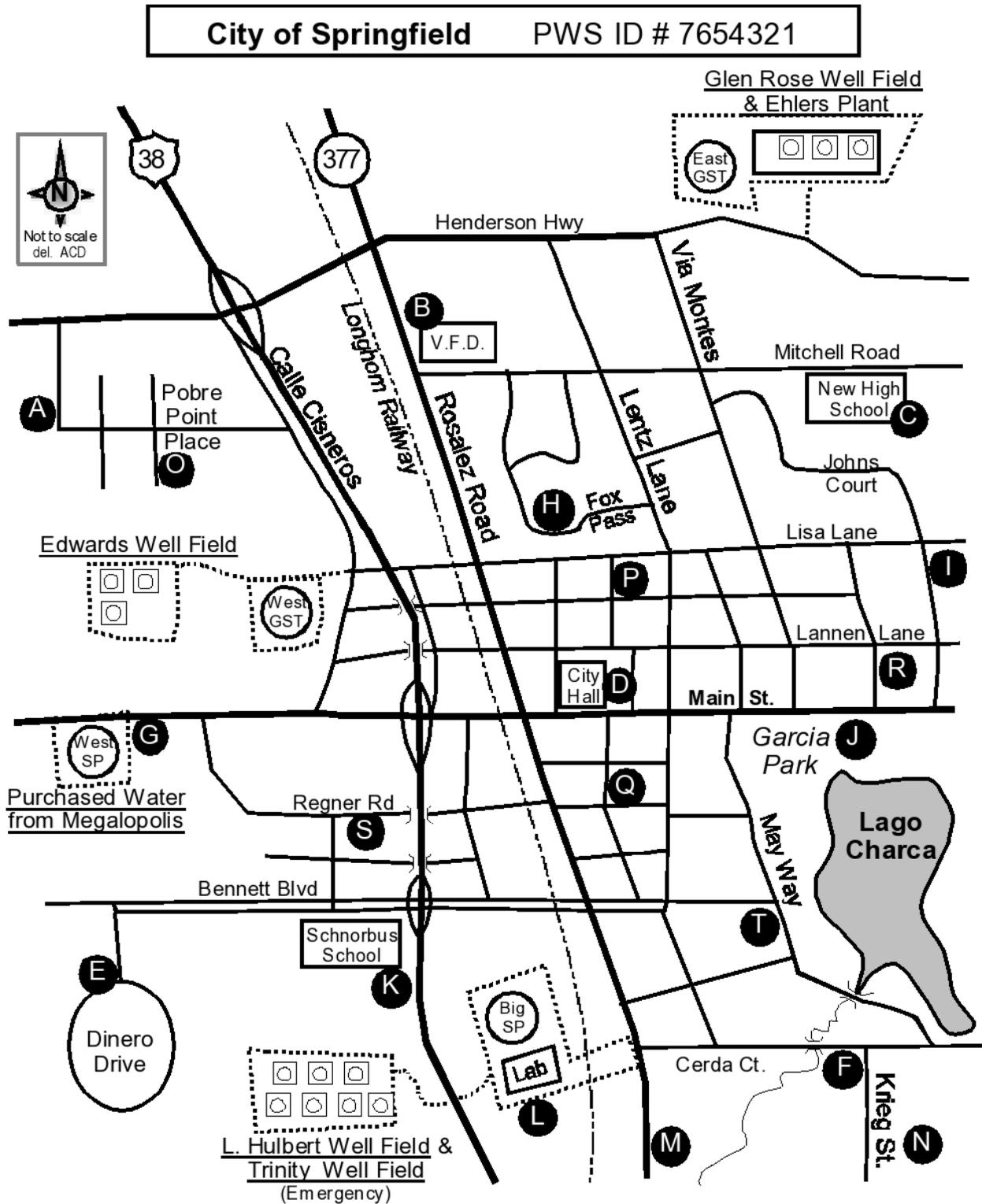
*******Example Monitoring Plan: City of Springfield********d. Compliance calculations*

If the concentrations of contaminants are less than the regulatory maximum contaminant levels, the system is in compliance. The TCEQ will inform the system of violations. Copies of any letters informing the system are attached in the back of this monitoring plan. The letters regarding our nitrate violation are attached to the back of this plan.

D. Distribution System Sampling

The main distribution system is the old City of Springfield. Three outlying areas also receive water: Dinero Estates development, Pobre Point development, and the new commercial area south of town. The City's Certificate of Convenience and Necessity (CCN) covers all these areas. The letters in the sample site tables correspond to letters on the attached distribution system map.

*****Example Monitoring Plan: City of Springfield***** Distribution Map



*******Example Monitoring Plan: City of Springfield*******

1. Coliform Samples

a. Frequency

We are required to take 2 coliform samples a month. We are required to have 5 coliform sample sites, but we use 6 to be sure we check the whole system.

b. Location

Samples are cycled as shown in the table below.

List of routine distribution coliform sampling sites

Site*	Address	Months Sampled for Coliform
A	765 Pobre Point Place	Jan / Apr / July / Oct
B	Corner of Rosalez and Mitchell (VFD)	
C	666 Mitchell Street (New High School)	Feb / May / Aug / Nov
D	10 Main Street (City Hall)	
E	901 Dinero Drive (Clubhouse/Office)	Mar / June / Sep / Dec
F	1133 Krieg Street	

* Corresponds to letter on schematic

c. Method

Coliform samples are sent to:

City of Megalopolis Drinking Water Lab
Attn: Hardly Worker (512) 555-0991
5729 Alder Place
Megalopolis TX 77777

d. Compliance calculations

“The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat following a fecal or E. coli positive routine sample is positive for total coliform, and
- no more than one of the routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.”

*******Example Monitoring Plan: City of Springfield*******

2. Disinfectant Residual—Free or Total Chlorine

a. Frequency

The disinfectant residual is measured at the same time as microbial samples. The disinfectant residual is also measured daily. Every week, samples are rotated through 14 sites as shown in the table above. If a coliform sample is collected the same day, the residual measured with the coliform sample can be recorded in the log book and used for compliance.

b. Location

The disinfectant residual is measured at the same place as microbial samples, plus eight additional sites representing the whole distribution systems. The sites are listed in the table below and shown on the distribution system schematic.

Disinfectant Residual Sampling Sites

Site No.	Address	Days Sampled for Total Chlorine
Week 1*:		
A	765 Pobre Point Place	Monday & Tuesday
B	Corner of Rosalez and Mitchell (Volunteer Fire Department)	
C	666 Mitchell Street (New High School)	Wednesday & Thursday
D	10 Main Street (City Hall)	
E	901 Dinero Drive (Club House/Office)	Friday & Saturday
F	1133 Krieg Street	
G	737 West Main Street (at West Stand Pipe)	Sunday
Week 2*:		
H	15 Fox Pass	Monday & Tuesday
I	Corner of Johns & Lisa (flush valve)	
J	606 East Main Street (Garcia Park Center)	Wednesday & Thursday
K	420 West Bennett (Schnorbus Elementary)	
L	1212 South Calle Cisneros (Hulbert Lab)	Friday & Saturday
M	2345 Rosalez Road (Wal Mart)	
N	5729 Trevor Way	Sunday

** Alternate the sites used every other week*

*******Example Monitoring Plan: City of Springfield*******

c. Method

Disinfectant residual is measured using the Hach colorimetric method.

d. Compliance calculations

The system complies with the reporting requirements for disinfectant residual by filling out Groundwater/Purchase Water Monthly Operating Reports every month, and providing these records to the TCEQ compliance investigator upon request and by sending in the Disinfectant Level Monthly Operating Report (DLQOR) every quarter.

- The system is in compliance with the minimum residual requirement if the total chlorine residual throughout the distribution system is greater than 0.5 mg/L.
- The system is in compliance with the maximum residual disinfectant limit (MRDL) if the running annual average of all samples taken in the distribution system is less than 4.0 mg/L.

3. Disinfection Byproducts (DBPs)—TTHM and HAA5

a. Frequency

The TCEQ's sampling contractor collects these samples. Notifications of changes in sampling schedule are attached to the back of this monitoring plan.

b. Location

Sites are shown on the distribution system schematic.

Stage 1 Disinfection Byproduct (DBP1) Sampling Sites

Site No.	Address
C	666 Mitchell Street (New High School)
B	Corner of Rosalez and Mitchell (Volunteer Fire Department)
D	10 Main Street (City Hall)
L	1212 South Calle Cisneros (Hulbert Lab)
T	5729 May Way

c. Method

Samples are taken to a certified lab by TCEQ's sampling contractor.

*******Example Monitoring Plan: City of Springfield*******

Compliance calculations

The system is in compliance if the running annual average of all samples is less than the maximum contaminant level. The TCEQ will notify us of any violation.

Lead-Copper

a. Frequency

The TCEQ informs the system when sampling must occur. The letter stating that we only have to sample every nine years is attached to this plan.

b. Location

We must have 10 sites.

List of Lead-Copper Sites

Site No.	Address	Type	Comments
1	765 Pobre Point Place	Tier 1	constructed 1985
2	1133 Krieg Street	Tier 1	constructed 1985
3	15 Fox Pass, Starbucks	Tier 2	constructed 1984
4	5729 South May Way	Tier 1	constructed 1987
5	505 Pobre Point Circle, Apt 33	Tier 2	constructed 1985
6	111 East Lisa Lane	Tier 1	constructed 1984
7	101 East Regner Road	Tier 3	constructed 1980
8	567 East Lannen Lane	Tier 1	constructed 1986
9	333 West Regner Road	Tier 3	constructed 1981
10	4444 South May Way	Tier 1	constructed 1986

c. Method

Per TCEQ instructions, samples are mailed to a certified lab. Our state certified laboratories are: Texas Department of State Health Services (DSHS) and the Lower Colorado River Authority Environmental Laboratory Services (LCRA).

*******Example Monitoring Plan: City of Springfield********d. Compliance calculations*

A system is in compliance with the lead-copper requirements if TCEQ does not inform the system that it is out of compliance. The TCEQ has not notified us that this system is out of compliance.

5. Asbestos

The TCEQ assessed our system in 1994 and found that it has no asbestos/cement pipe.

E. Lab Approval Form

A copy of our laboratory approval form is attached to this monitoring plan.

F. Attachments

Our "Initial Distribution System Evaluation" Plan is attached
Copies of our Cost Estimate Letter and other TCEQ correspondence that stated "Attach a copy of this letter to your Monitoring Plan" are attached.

*******Example Monitoring Plan: City of Springfield*******

IDSE Sample Plan (Group 4)

For: City of Springfield, PWS 7654321

This system has a retail population of 4567, and uses ground water. Based on this population and water type, the system must collect samples at 2 sites, four times during the one-year IDSE period.

Stage 1 Disinfection Byproduct Rule (DBP1) Sample Sites

These are the current, approved sample sites for compliance with DBP1:

Location	Type (Max Water Age or Average Water Age)
666 Mitchell Road (New High School)	Average Water Age
Corner of Rosalez and Mitchell (Volunteer Fire Department)	Average Water Age
10 Main Street (City Hall)	Average Water Age
1212 South Calle Cisneros (Hulbert Lab)	Max Water Age
5729 May Way	Max Water Age

Initial Distribution System Evaluation (IDSE) Sample Sites

The table below lists IDSE samples sites:

IDSE Sample Site (Please add address for Sample Site)	TYPE	JUSTIFICATION (Please see attachment for examples)
1 - 901 Dinero Drive	High TTHM	Low Water Use
2 - 765 Pobre Point Place	High HAA5	Low Chlorine Residual

Distribution System Schematic

A distribution system schematic is attached. It includes entry points, take points if there are any purchase water sources, storage tanks, booster stations, and the sample sites listed in the tables above. It shows that the IDSE sites represent the entire distribution system.

*******Example Monitoring Plan: City of Springfield*********Monitoring Plan**

I have attached a copy of this information to my system's Monitoring Plan, for review by TCEQ's Regional Investigator during Comprehensive Compliance Investigations, and to provide to the TCEQ's Sample Collection Contractor (Delta Environmental Consulting, and its subcontractors) during collection of routine chemical samples.

Certification

I hereby certify that the information contained herein is true and correct, and I have verified any data supplied by TCEQ before returning this form.

Signed:

Signature:	<u><i>Pasa Dabuck</i></u>
Printed Name, Title:	<u>Pasa Dabuck</u>
Address:	<u>PO Box 123 Springfield Texas 54321</u>
Phone Number:	<u>512- 555- 0199</u>
E- mail:	<u>pd@abcglobal.com</u>
Date:	<u>January 1, 2008</u>

Example 7.3. City of Bywater: A Community System Using Purchased Surface Water

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## MONITORING PLAN FOR



### City of Bywater Water Utility Department



PWS ID 1234567  
De Wet County, Texas

Responsible Official: Mayor Mary Mayer  
PWS Primary Contact: Sue Purvizer, Water Utilities Director  
Chief Operator: Trey Bajo (D license #12345678)

Mailing Address: 10 Main Street, Bywater TX 53712  
Phone: 409/555-1212  
E-mail: bywater@internet.com  
Revised: 1/16/09

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The City of Bywater operates a public water system that purchases treated surface water from the Verde River Water Authority and treated ground water from the City of Wholesaler. We have 249 meters (connections) with a calculated population of approximately 749.

A. Raw Water Sampling

The system has no raw water sources. There is a sample site at each purchased water take point so we can check to see if the seller is giving us enough chlorine. Under the new Ground Water Rule, starting 12/1/09, if we have a coliform positive in distribution, we must contact the City of Wholesaler at 512-239-4691 so they can sample their wells.

Example Monitoring Plan: City of Bywater



B. In-Plant Sampling

The system does not treat water, except for disinfection with chloramines.

- **City of Bywater Treatment Table for Purchased Water from City of Wholesaler**

Sequence	Treatment
1	Chlorine
2	Ammonia (not used yet)
3	Fluoride (not used anymore, but facilities still in place)



C. Entry Point Sampling

- **Entry Point Sample Site Table**

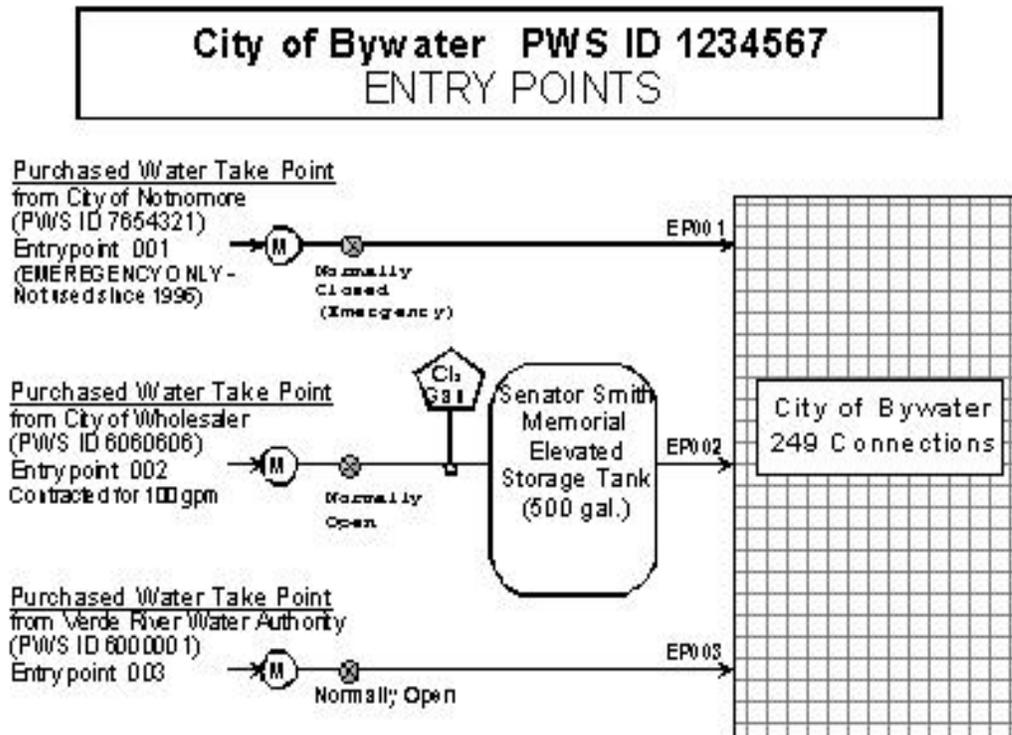
EP	Sample Site
001	Meter vault at take point for the City of Notnomore (this is not used, but the contract is still in place, and we could put in a spool piece in an emergency))
002	Hose bibb on Sen. Smith storage tank.
003	Meter vault at take point for Verde River Water Authority (VRWA)

- **Entry Point / Plant / Source Table**

EP #	EP Name	Plant	Source #	Source
001	City of Notnomore	meter	P2560001A	Verde River
002	Smith EST hose bibb	re-chlorinator	P2560001B	Verde River
003	VRWA	meter	P2560001C	Verde River

Example Monitoring Plan: City of Bywater

Entry Point Schematic:



1. Disinfectant Entering the Distribution System

Both the City of Wholesaler and the Verde RWA deliver potable water with a free chlorine residual. The City of Bywater operates a booster chlorination plant to chlorinate water from the Verde RWA.

a-c. Frequency, Location, and Method:

Purchased-water systems are not required to monitor disinfectant at the entry point. However, we pay a lot for the water so we like to keep an eye on this. We take daily samples for chlorine residual at the meter from each system using a Hach Pocket Colorimeter.

d. Compliance calculations:

"The system is in compliance if the free chlorine residual entering the distribution system is over 0.2 mg/L."

Example Monitoring Plan: City of Bywater



D. DISTRIBUTION SYSTEM SAMPLING

The diagram of our distribution system is shown at the back of this Monitoring Plan.

1. Coliform Samples

a. Frequency:

We collect 1 coliform sample every month.

b. Location:

The system has FIVE coliform sites. Sampling is rotated through the sites shown in Table 2.

Table 2. Coliform and Disinfection Monitoring Sites

Letter (see map)	Location	Comments
A	Mall and Cardenas (201 N. Mall Pkwy)	by Sears
B	1734 Devon Court	Superintendent's House
C	10 Main St.	
D	222 West Lee Ave.	Dog next door
E	Tejas and FM 1325 (Circle K hose bibb)	

c. Method:

Coliform samples are collected by the Operator and sent to:
 Wet County Health Department Lab
 Attn: Beverly Umbarger, R.S.
 1404 W. Union St.
 Springfield, TX 77777 (940-123-4357)

d. Compliance calculations:

Because the City of Bywater collects less than 40 samples a month, the City is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than one of the routine samples are total coliform positive and none of the repeats are fecal or E. coli positive."

Example Monitoring Plan: City of Bywater

2. Disinfectant Residual—Free or Total Chlorine

a. Frequency:

The disinfectant residual is measured at the same time as microbial samples. Also, because the system has less than 250 connections, the disinfectant residual is also measured weekly.

b. Location:

The disinfectant residual is measured at the same place as coliform samples. On weeks when we don't do a coliform sample, a sample is taken from the coliform sampling sites. Every month, sampling starts at Site 1, then goes through the list of sites in rotation.

c. Method:

The Hach CL-17 is used for all chlorine samples.

d. Compliance calculations:

"The system complies with the reporting requirements for disinfectant residual by filling out Groundwater/Purchase Water Monthly Operating Reports every month, and providing these records to the TCEQ compliance investigator upon request and by sending in the Disinfectant Level Monthly Operating Report (DLQOR) every quarter."

and "The system is in compliance with the minimum residual requirement if the free chlorine residual throughout the distribution system is always greater than 0.2 mg/L."

and "The system is in compliance with the maximum residual disinfectant level (MRDL) if the running annual average of all samples taken in the distribution system is less than 4.0 mg/L."

3. Disinfection Byproducts (DBPs)—TTHM and HAA5

a. Frequency:

"The TCEQ's sampling contractor collects these samples. Letters informing the system of changes in sampling schedule are attached to the back of this monitoring plan. TCEQ will schedule monitoring."

b. Location:

Because the system uses purchased surface water and purchased groundwater, and serves between 500 and 10,000 people, the system must sample four times a year for the surface water, and once in the summer for groundwater. We must have one sampling site for the surface water and one site for the City of Bywater water. The TCEQ allowed us to not sample for the City of Notnomore (see attached e-mail). Table 3 (on the following page) lists the DBP sampling sites.

Example Monitoring Plan: City of Bywater

Table 3. Current Stage 1 Disinfection Byproduct (DBP1) Sampling Sites

Letter (see map)	Address	Site Type
F	5103 Main St	Max Water Age (surface water)
I	6213 S. Lee Circle	Average Water Age (ground water)

c. Method:

"Samples are taken to a certified lab by TCEQ's sampling contractor."

d. Compliance calculations:

"The system is in compliance if the running annual average of all samples is less than the maximum contaminant level. The TCEQ will notify us of any violation."

4. Lead-Copper

a. Frequency:

"The TCEQ will inform us when sampling must occur. Letters stating the system's required sampling are attached to this monitoring plan." We attached the sample cost estimate letters TCEQ sent us to the back of this Monitoring Plan.

b. Location:

Our system is required to have 5 sample sites:

Table 4. Lead-Copper Sample Site Selection Form

Site (see Map)	Address	Site Type
A	201 N. Mall Parkway	Tier 1, 1983
B	1734 Devon Court	Tier 1, 1985
C	10 Main St.	Tier 2, 1985
D	222 West Lee Ave.	Tier 1, 1984
H	1616 Calle Cardenas	Tier 3, 1981

c. Method:

"Per TCEQ instructions, samples are mailed to an accredited lab" (Texas Department of State Health Services (DSHS) or the Lower Colorado River Authority Environmental Laboratory Services (LCRA).).

d. Compliance calculations:

"A system is in compliance with the lead-copper requirements if TCEQ does not inform the system that it is out of compliance."

Example Monitoring Plan: City of Bywater

5. Asbestos

The TCEQ has not informed us to monitor for asbestos, so we don't.



ATTACHMENTS

1. LAB APPROVAL FORM

Our laboratory approval form is attached. (Only the lines for pH and free chlorine are filled out for our system, because that is all we measure.)

2. LETTERS

SAMPLE COST ESTIMATE LETTERS

The Sample Cost Estimate letters that we get every year from the TCEQ are attached.

Coliform Letters

Letters about monitoring for coliform are attached. Before we took over the system, the previous owner failed to monitor and got NOVs.

CCRs

A copy of each Annual Drinking Water Quality Report or "Consumer Confidence Report" is attached.

3. CONTRACT

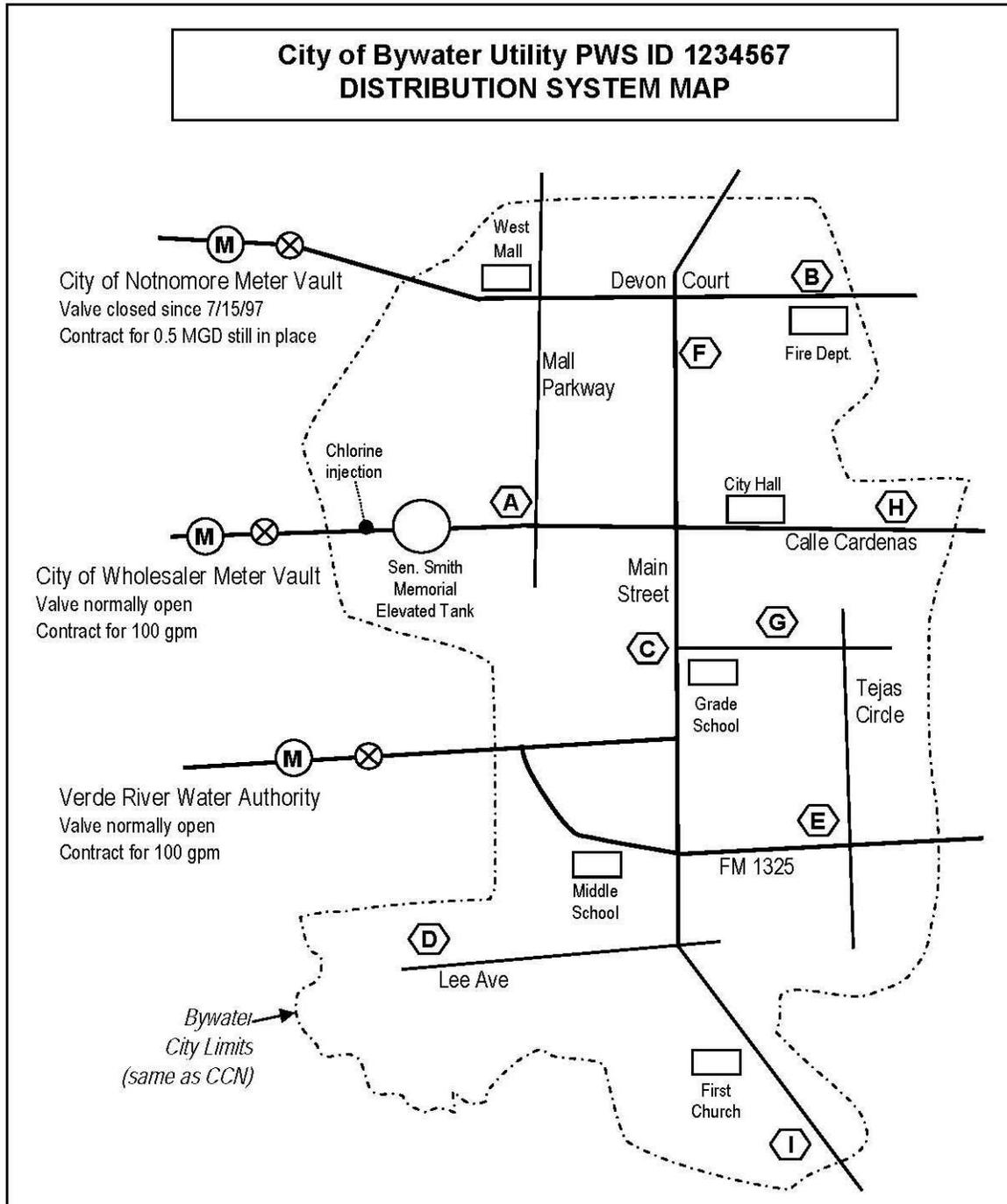
Copies of the contracts for purchasing water.

4. IDSE WAIVER

Copy of the correspondence for our Initial Distribution System Evaluation (IDSE) 40/30 Waiver.

Example Monitoring Plan: City of Bywater

Distribution Map:



Example 7.4. Nuts 'R' Us: A Non-transient Non-community (NTNC) System Using Purchased Surface Water



Peanut Oil Refinery and Nutty Comestibles

Public Water System Monitoring Plan
PWS ID 2560004

Filbert J. Nut, Esq., President, Nuts 'R' Us International, Inc.
Owner

Suite 101, Macadamia Building, 123 East Goober Drive, Macadamia Texas 70707
phone: (512) 239-4691 e-mail: prez@nutsrus.com

N. Sensato, P.E., Regulatory Compliance and Environmental Officer
Owner's Representative

Suite 101, Macadamia Building, 123 Goober Drive, Macadamia Texas 70707
phone: (512) 239-4691 e-mail: wet@nutsrus.com

Guy U. Duzzitall, Facility Manager

Chief Operator (C Ground License#: 1234567)

Suite 101, Macadamia Building, 123 Goober Drive, Macadamia Texas 70707
phone: (512) 239-4691 e-mail: wetter@nutsrus.com

Revised February 9, 2010

DESCRIPTION OF FACILITIES

We have 4,000 employees working three shifts, 365 days a year. In addition, we have 2,000 additional seasonal employees who work from approximately November 1 through December 31 each year in the peanut log rolling and shipping departments.

The City of Macadamia provides us with water originating from the Neches River, treated at their surface water treatment plant (SWTP) Per contract (attached), they deliver chloraminated water with an average residual of 0.65 mg/L total chlorine.

●● ●●● ●● **Example Monitoring Plan** ●● **Nuts ‘R’ Us** ●● ●●● ●●

We have plant facilities to achieve booster chloramination on site. We have an SOP for how to re-chloramine to get the right chlorine to ammonia-nitrogen (CL₂:NH₄) ratio.

Although we purchase potable water from the City of Macadamia we are still a public water system (PWS) because we retain sanitary control of our water system since we do not allow City plumbing inspectors to inspect our plumbing changes or installations, for fear that they could obtain our carefully-guarded, proprietary recipe for peanut logs. Because we distribute water to more than 25 of the same persons, for more than 60 days each year, we are classified as a non-transient non-community (NTNC) type of PWS. NTNC systems are subject to most of the same regulations as community (C) systems.

Facility managers and supervisors are required to get licensed as water operators. The plant currently employs 4 licensed operators.

In addition to distributing potable water to employees, we purchase water from the City of Macadamia to use in nut processing. We treat that water separately from the potable water system, and meet Federal Food and Drug Administration (FDA) regulations under the authority of the Texas Department of State Health Services (DSHS).



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●● ●●● ●● Example Monitoring Plan ●● Nuts ‘R’ Us ●● ●●●● ●●

1. Source Water Sampling

Nuts ‘R’ Us purchases potable water from the City of Macadamia (PWS ID 1019998)

Source Sample Site Table

Source	TCEQ Source ID	Sample Site	Notes
City of Macadamia	P2560004A	Tap by meter in HVAC building.	n/a

We are in compliance because we don’t have to do any source sampling. If we detect coliform in our water we do not have to contact the City, because they only use surface water and do not operate any wells.



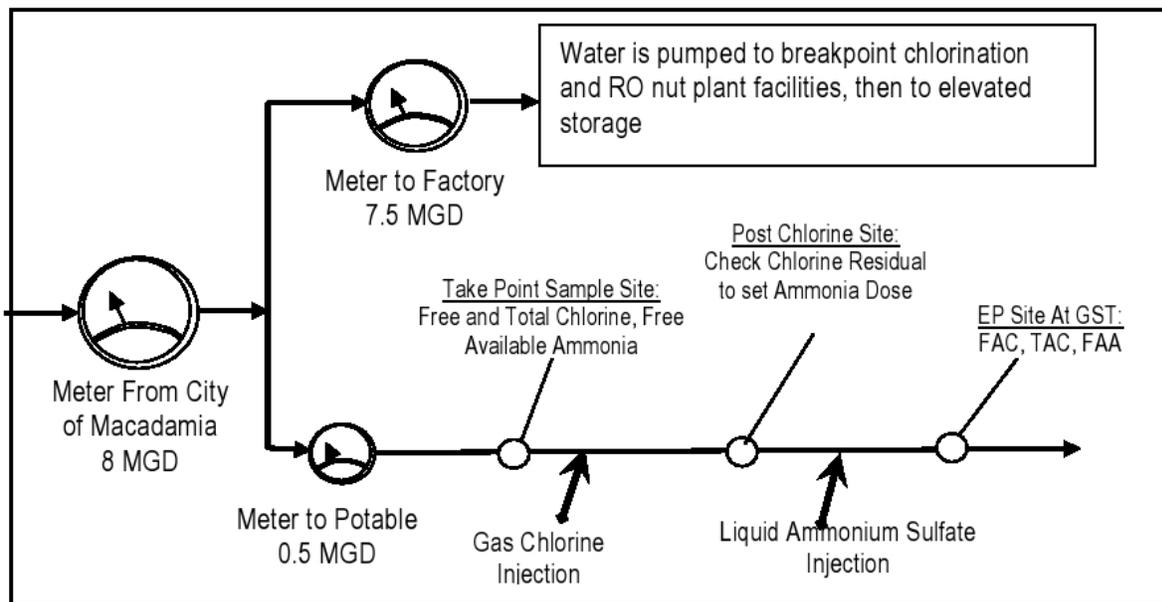
2. In-Plant Sampling

Nut ‘R’ Us has the capability to use booster chloramination. Therefore, we have the ability, and protocols, to determine that the amount of chlorine and ammonia fed are correct. The chloramination plant facilities are located in the HVAC Building. Booster chloramination is usually practiced in the warmer months.

Treatment Table

Treatment Sequence	Treatment
1	Gaseous Chlorination Injection
2	Liquid Ammonia Sulfate Injection

Treatment Schematic



●● ●●● ●● **Example Monitoring Plan** ●● **Nuts 'R' Us** ●● ●●●● ●●

● **Organics, Inorganics, and Radiochemicals**

The TCEQ's sampling contractor collects these samples. Letters informing the system of changes in sampling schedule are attached to the back of this monitoring plan.

Samples are taken to a certified lab by TCEQ's sampling contractor.

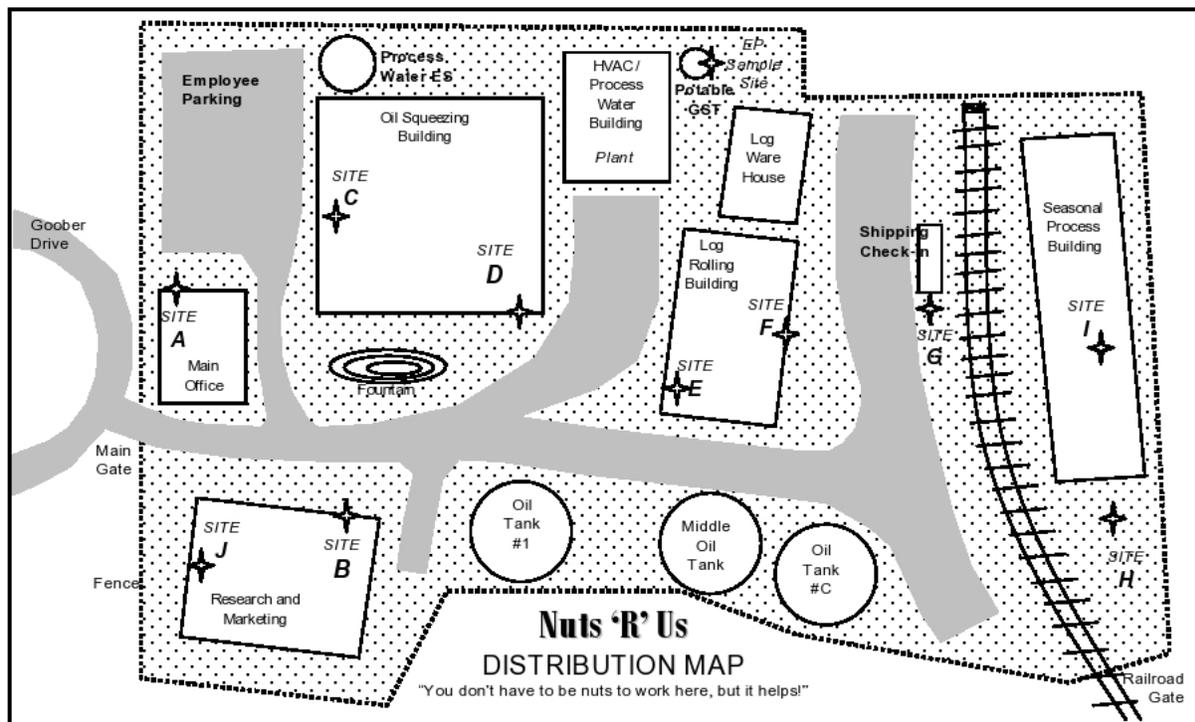
If the concentrations of contaminants are reliably and consistently less than the regulatory maximum contaminant levels, the system is in compliance. The TCEQ will inform the system of violations. Copies of any letters informing the system are attached in the back of this monitoring plan.



4. Distribution System

Potable water is distributed to the factory and the ornamental fountain.

Distribution System Map



●● ●●● ●● **Example Monitoring Plan** ●● **Nuts ‘R’ Us** ●● ●●● ●●

● **Coliform Sampling:**

We serve 4,000 people normally, so we must take 5 monthly coliform samples at 5 sites. Each shift’s Facility Supervisor is a certified operator, so they take the coliform samples. In November and December, our population served increases to 6,000 people, so we take an additional samples, to make up the necessary 6 samples for those months.

Coliform Sample Site & Schedule Table

Site Letter	Sample Site	Sample Schedule
A	Main Office	First Monday of the month (First shift)
B	Research and Marketing Building – Hose bibb at NE corner	
D	Oil Squeezin’ Building – Hose bibb on south side by stairs	
F	Log Rollin’ Building – Hose bibb on E side	Second Monday of the month (Second shift)
G	Truck water hook up south of Shipping and Receiving shack	
H	Fire hydrant south of Seasonal Process Building	November and December only, Second Monday of the month (Second shift)

Samples are sent to the certified lab at the City of Macadamia:

City of Macadamia Lab Supervisor: Peggy Pecan (512) 555-1212

Deliver samples immediately after collection to

Macadamia City Coliform Lab, 1717 Brazil Lane, Macadamia, TX 70707

They use the approved “Colilert” method.

We are in compliance as long as:

- no repeat samples are fecal or E. coli positive,
- no repeat following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than one of the routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

● **Disinfectant Sampling**

Because we serve more than 750 people, we must take disinfectant residual samples in the distribution system every day. Because we have a contract with the City of Macadamia to deliver more than 0.5 mg/L total chlorine residual, we take samples at the take point every day to make sure it is good. Because we often re-chloramine, we take samples at the entry point site every day.

●● ●●● ●● Example Monitoring Plan ●● Nuts ‘R’ Us ●● ●●● ●●

Disinfectant Residual Sample Site & Schedule Table

Site Letter	Sample Site	Sample Schedule
--	Source water take point at meter by HVAC building	Daily
--	EP sample site at GST Tap	
A	Main Office	Monday
B	Research and Marketing Building – Hose bibb at NE corner	Tuesday
C	Oil Squeezin’ Building – Breakroom sink	Wednesday
E	Log Rollin’ Building – Safety shower in SW corner of 2 nd floor	Thursday
G	Truck water hook-up south of Shipping and Receiving shack	Friday
H	Fire hydrant south of Seasonal Process Building	Saturday, Sunday

Whenever a sample is taken to determine microbes, the disinfectant residual must be determined in the field as the sample is taken. In addition, the disinfectant residual is also measured daily at sites representative of the distribution system.

The system complies with the reporting requirements for disinfectant residual by keeping records of disinfectant monitoring, providing these records to the TCEQ compliance investigator upon request, and by sending in the Disinfectant Level Quarterly Operating Report (DLQOR) every quarter.

The system is in compliance with the minimum residual requirement if the total chlorine residual throughout the distribution system is always greater than 0.5 mg/L. The system is in compliance with the maximum residual disinfectant level (MRDL) if the running annual average of all samples taken in the distribution system is less than 4.0 mg/L.

● Disinfection Byproduct (THM and HAA) Sampling

We have one surface water entry point and serve fewer than 10,000 people so we are required to have a single DBP1 sample site representing the maximum water age in the system. We are on annual monitoring as documented in our attached TCEQ letters.

THM and HAA Sample Site Table

Site Letter	Sample Site	Sample Schedule
H	Fire hydrant south of Seasonal Process Building	Annual

●● ●●● ●● **Example Monitoring Plan** ●● **Nuts ‘R’ Us** ●● ●●● ●●

The TCEQ’s sampling contractor collects these samples. Letters informing the system of changes in sampling schedule are attached to the back of this monitoring plan. Samples are taken to a certified lab by TCEQ’s sampling contractor. The system is in compliance if the running annual average of all samples is less than the maximum contaminant level. The TCEQ will notify us of any violation.

DBP2 IDSE NOTE: We are an NTNC less than 10,000 people so we don’t have to do IDSE. See attached e-mail from TCEQ.

● Lead/Copper

We serve between 3,301 and 10,000 people so we have to take 20 samples every 3 years. All of the facilities were built before 1960 so all sites are high risk.

Lead/Copper Sample Site Table

Site Letter	Sample Site	Sample Schedule
A	Main Office Break room	2 samples at each site
B	Research and Marketing Building – break room	
C	Oil Squeezin’ Building – Break room sink	
D	Oil Squeezin’ Building – Water fountain	
E	Log Rollin’ Building – Water fountain in SW corner of 2 nd floor	
F	Log Rollin’ Building – Water fountain	
G	Shipping and Receiving shack water fountain	
H	Seasonal Process Building – Water Fountain	
I	Research and Marketing Building –4 th floor break room sink	
J	Seasonal Process Building – break room sink	

The TCEQ will inform the system when sampling must occur. Letters stating the system’s required sampling are attached to this monitoring plan.

Per TCEQ instructions, samples are mailed to a certified lab. Our samples are sent to the Department of State Health Services. The phone number for DSHS is 512-458-7318.

A system is in compliance with the lead-copper requirements if TCEQ does not inform the system that it is out of compliance.

Example 7.5a. Dr. Z's Vacation Paradise: A Transient Non-community (TNC) System with One Well

**Monitoring Plan for
Dr Z's' "Vacation Paradise"
Public Water System Identification Number 2560005**



*Part of the Hermes Corp, Inc.
group of fine family recreational vehicle
and vacation oriented facilities*

Responsible Official: *Hubert Farnsworth, President and CEO*

Hermes Corp. Inc., Ste. 301, Zoidberg Building
123 Planet Expressway, New York, NY 10101
1-800-555-1212

Hermes Corp. Inc Contact: *Amy Wong, J.D., Executive Assistant*

Hermes Corp. Inc., Ste. 301, Zoidberg Building
123 Planet Expressway, New York, NY 10101
1-800-555-1212

PWS Primary Contact: *Dr. John A. Zoidberg*

Mail Route 1, Cubert, TX 77777, 409-123-4567

Revised January 19, 2007

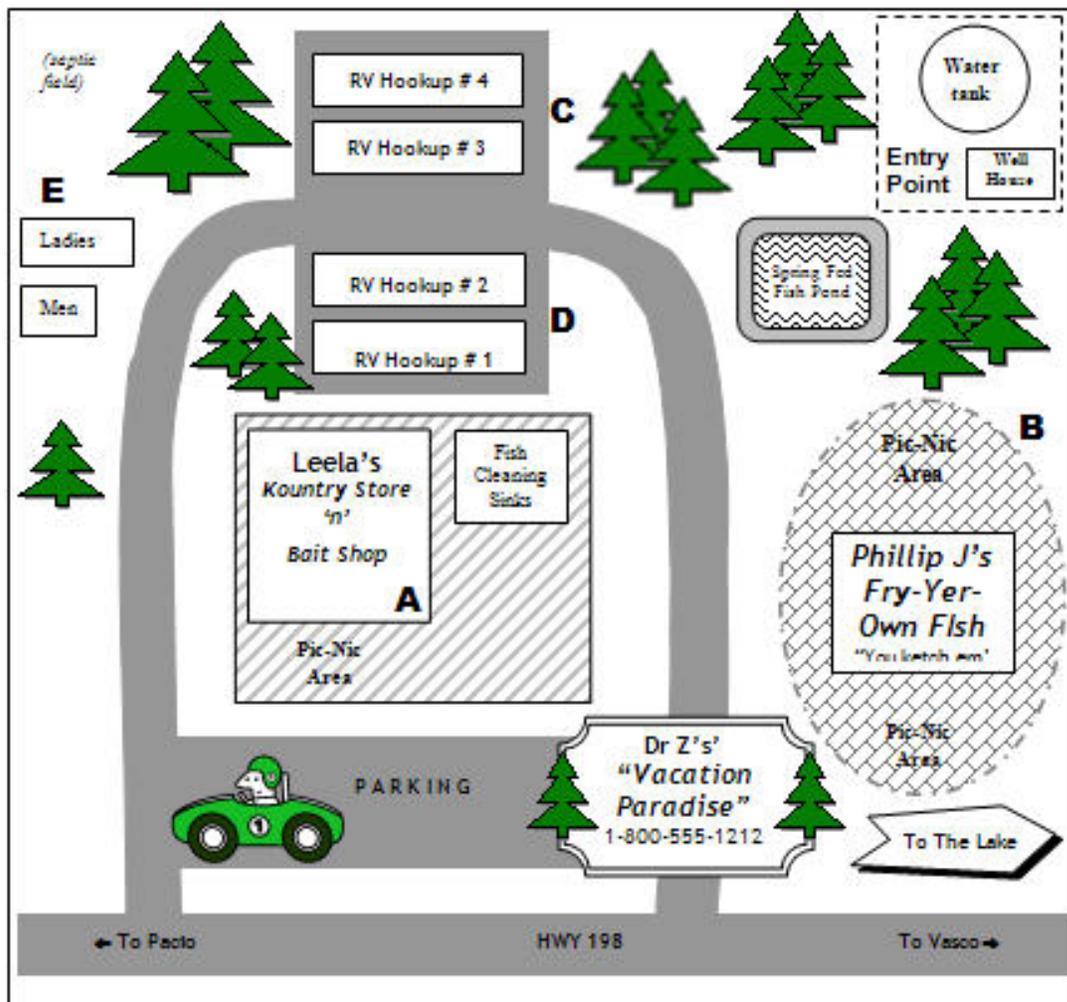
Hermes Corporation owns 732 recreation facilities throughout the United States including 14 in Texas. Dr Z's Vacation Paradise consists of one convenience store, a restaurant, a stock pool for fish, four RV hookups and public lavatories.

The store and restaurant meet Texas Department of State Health Services (DSHS) requirements for food preparation and sale. The fish pond meets Texas Parks and Wildlife Department rules (TPWD) for stock fish.

 **Example Monitoring Plan: Vacation Paradise** 

The on-site septic sewage system (OSSF) is permitted by TCEQ. Operators are licensed by TCEQ. The facility complies with all local and applicable plumbing and electrical codes.

The drinking water source is one 433' well into the Carrizo aquifer. The water is chlorinated.





A. Raw Water Sampling

There is one well, so there is one raw sample tap. The system is not required to take raw samples except if a distribution sample is coliform-positive (starting 12/1/09).

Example Source Sample Site Table

Source	TCEQ Source ID	Sample Site	Notes
Well	G2560005A	Well tap	watch for snakes

B. In-Plant Sampling

We have no treatment other than hypochlorination.

Treatment Table

Treatment Sequence	Treatment
1	Hypochlorite injection (solution)

C. Entry Point Sampling for GW System

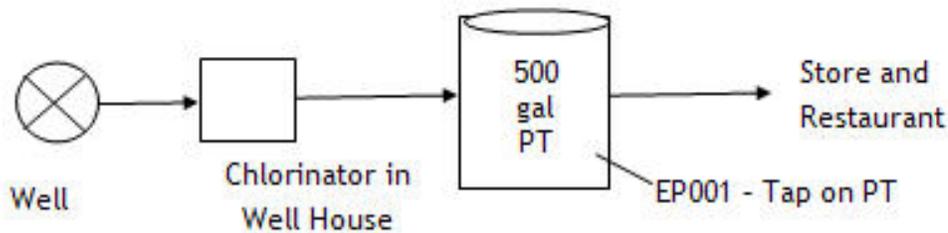
Entry Point Sample Site Table

Entry Point (EP) Number	EP Sample Site (Entry Point Name)
001	Tap on Pressure Tank by Well

Entry Point/Plant/Source Table

EP	Plant	Source Description	Source ID	Comments
001	Chlorinator at well behind the fish pond	Carrizo-Wilcox	G2334357A	100gpm


Example Monitoring Plan: Vacation Paradise

Entry Point Schematic

1. Disinfectant Entering the Distribution System

The system is in compliance if the free chlorine residual entering the distribution system is over 0.2 mg/L. We keep it at 1.0.

2. Organics, Inorganics, and Radiochemicals

a. Frequency

The TCEQ's sampling contractor collects these samples. Letters informing the system of changes in sampling schedule are attached to the back of this monitoring plan.

b. Location

The contaminant concentrations at each entry point are measured at the applicable sampling site.

c. Method

Samples will be sent to a certified lab by the TCEQ's sampling contractor.

d. Compliance calculations

If the concentrations of contaminants are reliably and consistently less than the regulatory maximum contaminant levels, the system is in compliance. Copies of letters from TCEQ are attached in the back of this monitoring plan.

D. Distribution System Sampling for GW System

Distribution System Map

The distribution system map is in the front of this Monitoring Plan.



1. Coliform Samples

a. Frequency and Location:

Routine Distribution Coliform Sample Site Table

Site	Address	Months to sample
A	Hose bibb at the back of Phil's restaurant	Jan, June
B	Hose bibb at the side of Leela's store	Feb, July, Nov
C	RV water hookup between RV spots 3 and 4	Mar, Aug
D	RV water hookup between RV spots 1 and 2	Apr, Sep, Dec
E	Tap at clean up area behind lavatories	May, Oct

b. Method

Samples are sent to the
 Bender County Lab, 10 West St, Cubert TX 77777
 Call: Zach Brannigan at 409-555-1212

c. Compliance calculations

The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than one of the routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

2. Disinfectant Residual—Free or Total Chlorine

a. Frequency

The disinfectant residual is measured at the same time and place as all coliform samples. The disinfectant residual is also measured daily inside the restaurant. If the level is under 0.5 or over 1.5 the operator is called.

*b. Location***Disinfectant Residual Sample Table**

Site	Address	Schedule
A	Hose bibb at the back of Phil's restaurant	Thursday
B	Hose bibb at the side of Leela's store	Friday
C	RV water hookup between RV spots 3 and 4	Saturday
D	RV water hookup between RV spots 1 and 2	Sunday

c. Method

Hach Colorimeter. Order packets at 1-800-123-4321

d. Compliance calculations

We keep chlorine residual measurements in the binder in Leela's office. We give these to the TCEQ investigator upon request, and by sending in the Disinfectant Level Quarterly Operating Report (DLQOR) every quarter.

The system is in compliance with the minimum residual requirement if the free chlorine residual throughout the distribution system is always greater than 0.2 mg/L.

The system is in compliance with the maximum residual disinfectant level (MRDL) if the running annual average of all samples taken in the distribution system is less than 4.0 mg/L.

E. Attachments

The annual Sample Cost Estimate letters from TCEQ are attached. Also e-mails from when we changed the mailing address.

Also attached is a copy of our letter from the health department about the restaurant.

Example 7.5b. Gas 'n' Git: A Transient Non-community (TNC) System with One Well

☆☆☆☆☆☆☆☆☆☆

Monitoring Plan for *Gas 'n' Git* a subsidiary of Gitengetgone Gasoline Group, Inc



PWSID 2560006

Responsible Official: *Amon E. Star*
190100 Ranch Road 1234

PWS Primary Contact: *Ronnie "Gitter" Dunn*,
Water Treatment Operator, D License 12345678
190101 RR 1234, *Sumwherin, Texas 76543*

915-519-1000-Office phone

915-519-9915-cell phone

Revised *June 28, 2008*

☆☆☆☆☆☆☆☆☆☆

KEEP THIS IN THE OFFICE

☆☆☆☆☆☆☆☆☆☆

★ Raw Water Sampling

The Gas 'n' Git has one well. The well drawings are in with the O&M manual in the Office. The well has high Total Dissolved Solids.

Source Sample Site Table

Source	TCEQ Source ID	Sample Site
Ogallala	G2560006A	Tap at well head

We don't usually have to do raw well monitoring. But whenever they found that toluene in there, TCEQ did monitor that. If we get a positive coliform sample in normal places, we have to sample the well for E. coli starting 12/1/09 because of the Ground Water Rule.

☆☆☆ Example Monitoring Plan: Gas 'N' Git ☆☆☆

Treatment Table

Treatment Sequence	Treatment
At the well house	Hypochlorite injection (solution)
In the equipment room	Reverse Osmosis (for drinks and ice machine)

☆☆☆☆☆☆☆☆☆☆☆☆☆☆

☉ Entry Point Sampling

Organics, Inorganics, and Radiochemicals

a. Frequency

The TCEQ's sampling contractor collects these samples. Letters informing the system of changes in sampling schedule are attached to the back of this monitoring plan.

b. Location

The contaminant concentrations at each entry point are measured at the applicable sampling site.

c. Method

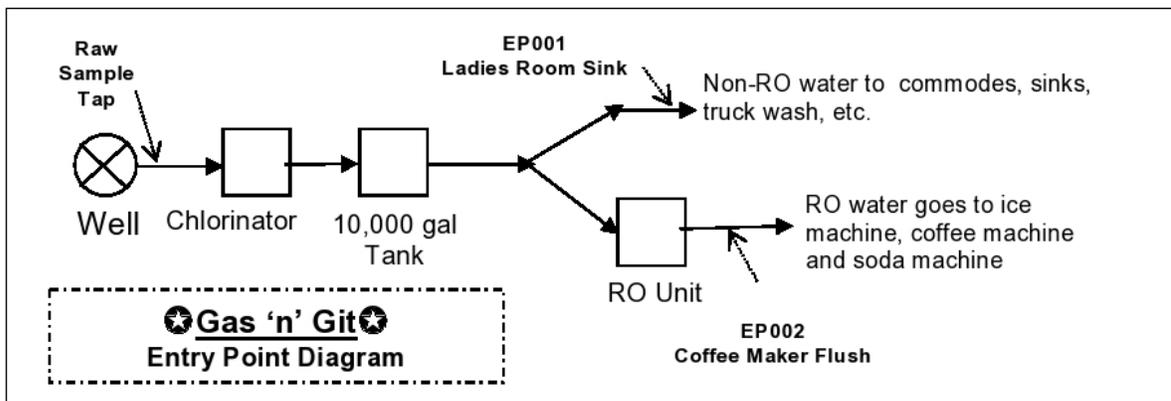
Samples will be sent to a certified lab by the TCEQ's sampling contractor.

d. Compliance calculations

If the concentrations of contaminants are reliably and consistently less than the regulatory maximum contaminant levels, the system is in compliance. The TCEQ will inform the system of violations. Copies of any letters informing the system are attached in the back of this monitoring plan.

Entry Point Sample Site Table

Entry Point (EP) Number	EP Sample Site	Notes
001	Ladies Room Sink	NORMAL sample point
002	Flush tap on Coffee Maker	Don't sample here normally – see the Sample Cost Estimate letter



☆☆☆ Example Monitoring Plan: Gas 'N' Git ☆☆☆

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

☼ Chlorine Monitoring

We have chlorine at the well head. We have an RO unit on the water line that feeds the ice maker, soda machines, and coffee makers because the water is really salty otherwise.

Disinfectant Sampling

a. Frequency

Person that opens the store on Saturday morning takes the Chlorine sample three places and logs it on the "Daily" sheet.

b. Location

Saturday "Opener" takes three samples:

- (1) a sample at the Ladies Room sink and
- (2) a sample at the hose for filling Semi Trucks and RVs
- (3) a sample at the well head

Write the numbers on the Daily Sheets in the blue binder and put them in the office for Mr. Dunn.

c. Method

Use the Hach CL17. It is stored in the equipment room by the RO unit. The Instruction Manual is in the O&M manual 3-ring binder.

Check the date on the powder pillow. Throw out old packets. Tell Mr. Dunn to order more when you are down to a Dozen powder pillows

d. Compliance calculations

Mr. Dunn sends in the Disinfectant Level Quarterly Operating Report (DLQOR) every quarter.

The system is in compliance with the minimum residual requirement if the free chlorine residual throughout the distribution system is always greater than 0.2 mg/L.

The system is in compliance with the maximum residual disinfectant level (MRDL) if the running annual average of all samples taken in the distribution system is less than 4.0 mg/L.

☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆☆

☼ Coliform Sampling

Coliform Samples

a. Frequency

Mr. Dunn picks up one sample a month, on the first Monday of the month.

The person Closing on Sunday must make sure to clean up good for him so the sample does not get contaminated.

☆☆☆ Example Monitoring Plan: Gas 'N' Git ☆☆☆

b. Location

There are five sample sites for coliform:

Routine Distribution Coliform Sample Site Table

Site	Location	Schedule	Comments
A	Ladies Room Sink	Jan, June, Nov	Knock first!
B	Hose Bibb towards well	Feb, July, Dec	
C	Truck fill hose	Mar, August	
D	Coffee maker flush	April, Sept	
E	Tap on Water Tank	May, Oct	

c. Method

Samples are analyzed at the County Health Department in the City of County Seat. Mr. Dunn drives them down there each Monday after he picks them up. Contact info for the lab is:

Mr. N. Alist
 CSCHD (County Seat County Health Department)
 10 Main St.
 City of County Seat, TX 76543
 Phone (office): 915-555-5555
 Emergency number: 915-555-0000

d. Compliance calculations

The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than one of the routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

☆☆☆☆☆☆☆☆☆☆☆☆☆☆

★ Lab Approval Form

Hach CL17 manual is attached

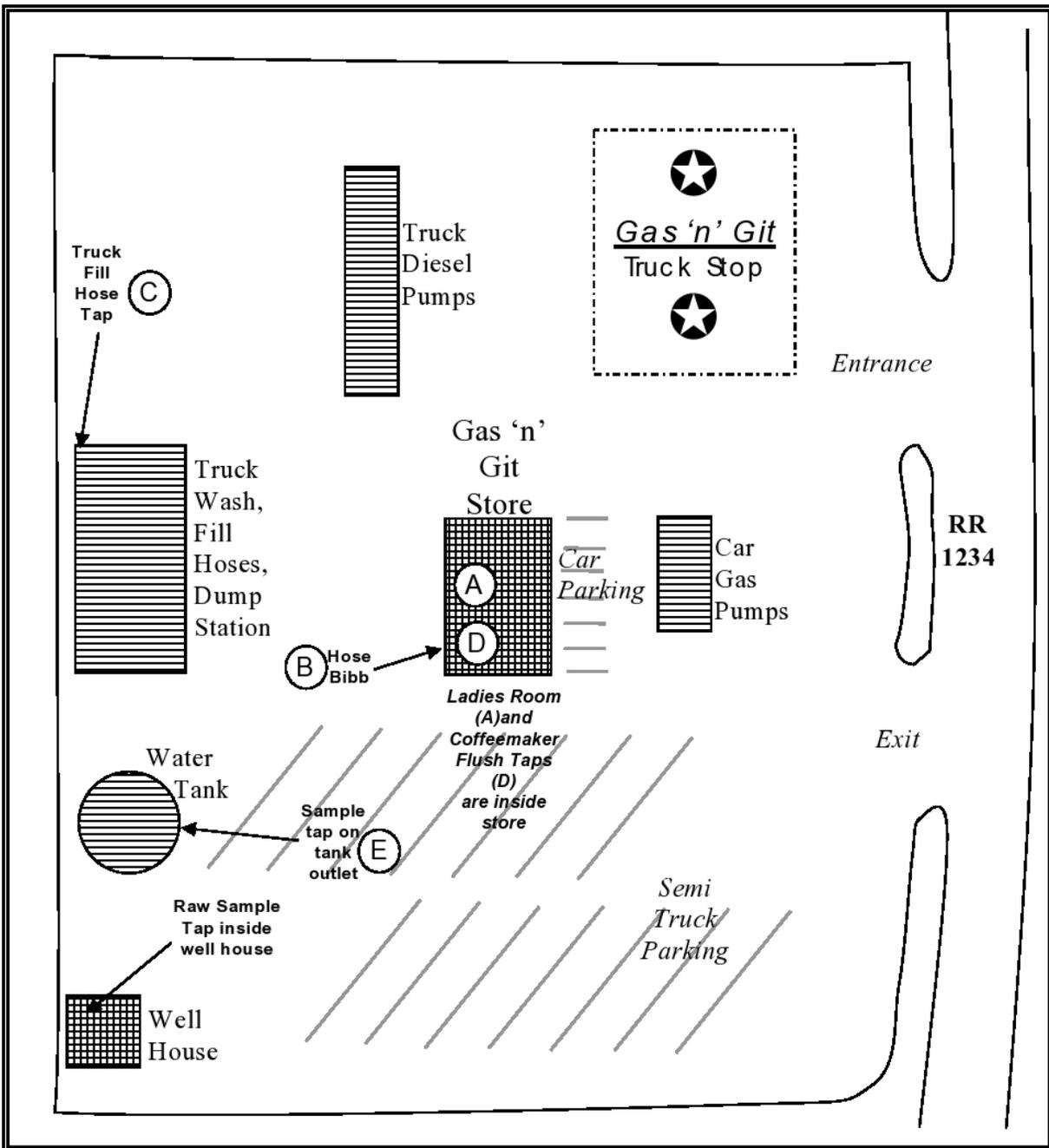
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★ Attachments

Sample Cost Estimate letters since 2002 are attached.

☆☆☆ Example Monitoring Plan: Gas 'N' Git ☆☆☆

Gas 'N' Git Distribution Map



☆☆☆☆☆☆☆☆☆☆☆☆☆☆

Example 7.6. Madame LeFleur's Academy: A Community PWS with Operating Agreement

Monitoring Plan for

Madame LeFleur's Academy



⊗ **Boarding School** ⊗
⊗ **for Young Ladies** ⊗

Previous PWS ID 2334357

– ***Consolidated with City of Modales – PWSID 2560666***

Responsible Official: Madame Jacolyn LeFleur, R.S.

15 Habeus Corpus Lane

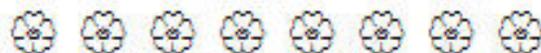
Office Phone: 409.777.7777

Maintenance Supervisor: Jeff A. Warden, R.S. (ext. 12)

Operator: Kramer Stephenson (ext. 13)

E-mail: beaucaza@yahoo.com, Pager: 409.777.6666

Created 1/20/09, Revised 2/9/10



 **Example Monitoring Plan: Mme. LeFleur's Academy** 

Academy Description

Madame LeFleur's Academy ("The Academy") provides resident high school teaching to young women referred by concerned parents, communities, or their representatives. On-site parole counselors are provided. Technical training is provided. Graduates of the facility have successfully entered mainstream society with productive, useful employment as gardeners, beauticians, manicurists and water utility operators.

The Academy has 400 student residents housed in four housing blocks: Rose House, Violet House, Daisy House, and Hyacinth House for grades 9, 10, 11, and 12, respectively. Classes are held in the LeFleur Castle, where the kitchen and dining facilities are also located. The facility has 220 employees including 50 (non-resident) maintenance, housekeeping and kitchen staff; 50 non-resident teachers, instructors, and counselors; 20 (resident) security supervisors; and 110 (non-resident) security enforcers on three shifts. The total population is 630 (The "Community" population of persons who reside on the premises is 420.)

Academy's Water System Description

The Academy purchases treated drinking water from the City of Modales for distribution to employees and residents. The City maintains sanitary control for implementing the TCEQ's rules and regulations for drinking water quality and operation through a Service and Operating Agreement between the City and the Academy. A copy of the Agreement is attached to this Monitoring Plan.

The Academy maintains a secure perimeter to ensure that the children in its care are inside, and any unauthorized personnel are outside. In order to maintain the secure perimeter, the Academy performs some monitoring on behalf of the City of Modales, and accompanies City personnel when they must sample the drinking water.



 **Example Monitoring Plan: Mme. LeFleur's Academy** 



A. Source Water Sampling

The Academy operates no wells. The single source is a 12" main from the City of Modales.

Academy Source Sample Site Table

Source	TCEQ Source ID	Sample Site	Notes
City of Modales	P2550666A	Tap in meter vault below EST outside West gate	Treated potable water

Although no source water sampling is required, the Academy measures chlorine residual daily at this location to ensure compliance of the City with the Agreement that they have to provide over 0.5 mg/L of monochloramine at all times.



B. In-Plant Sampling

The Academy performs no treatment and is not subject to any in-plant sampling requirements.




Example Monitoring Plan: Mme. LeFleur's Academy




C. Entry Point Sampling

The Academy has a single source of treated water from the City of Modales and has a single entry point.

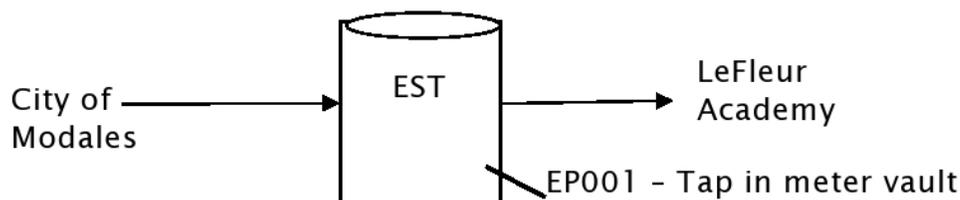
LeFleur Academy Entry Point Sample Site Table

Entry Point (EP) Number	EP Sample Site (Entry Point Name)
001	Tap in meter vault below EST outside West gate

LeFleur Academy Entry Point/Plant/Source Table

EP Number	Plant	Source Description	Source ID	Comments
001	City of Modales SWTP	Rio Remanante	S2550666A	A

Entry Point Schematic



1. Disinfectant Entering the Distribution System

Although no entry point water sampling is required by rule, the Academy measures chlorine residual daily at this location to ensure compliance of the City with the Agreement that they have to provide over 0.5 mg/L of monochloramine at all times.



☼☼☼ Example Monitoring Plan: Mme. LeFleur's Academy ☼☼☼



D. Distribution System Sampling

1. Coliform Samples

a. Frequency

The system collects one coliform sample each month, rotating through the 5 sites.

b. Location

Surface Water Coliform Sample Site Table

Site	Location	Sample Schedule
o B	Hose bibb at North East corner of Castle	Jan, June, Nov
o C	Hose bibb on West side of Teacher housing	Feb, July, Dec
o D	Hose bibb at bottom of Guard Tower	Mar, Aug
o E	Irrigation bibb in back of Exercise Yard (also dead-end flush point)	April, Sep
o F	Irrigation bibb West in Student Gardens (also dead-end flush point)	May, Oct

c. Method

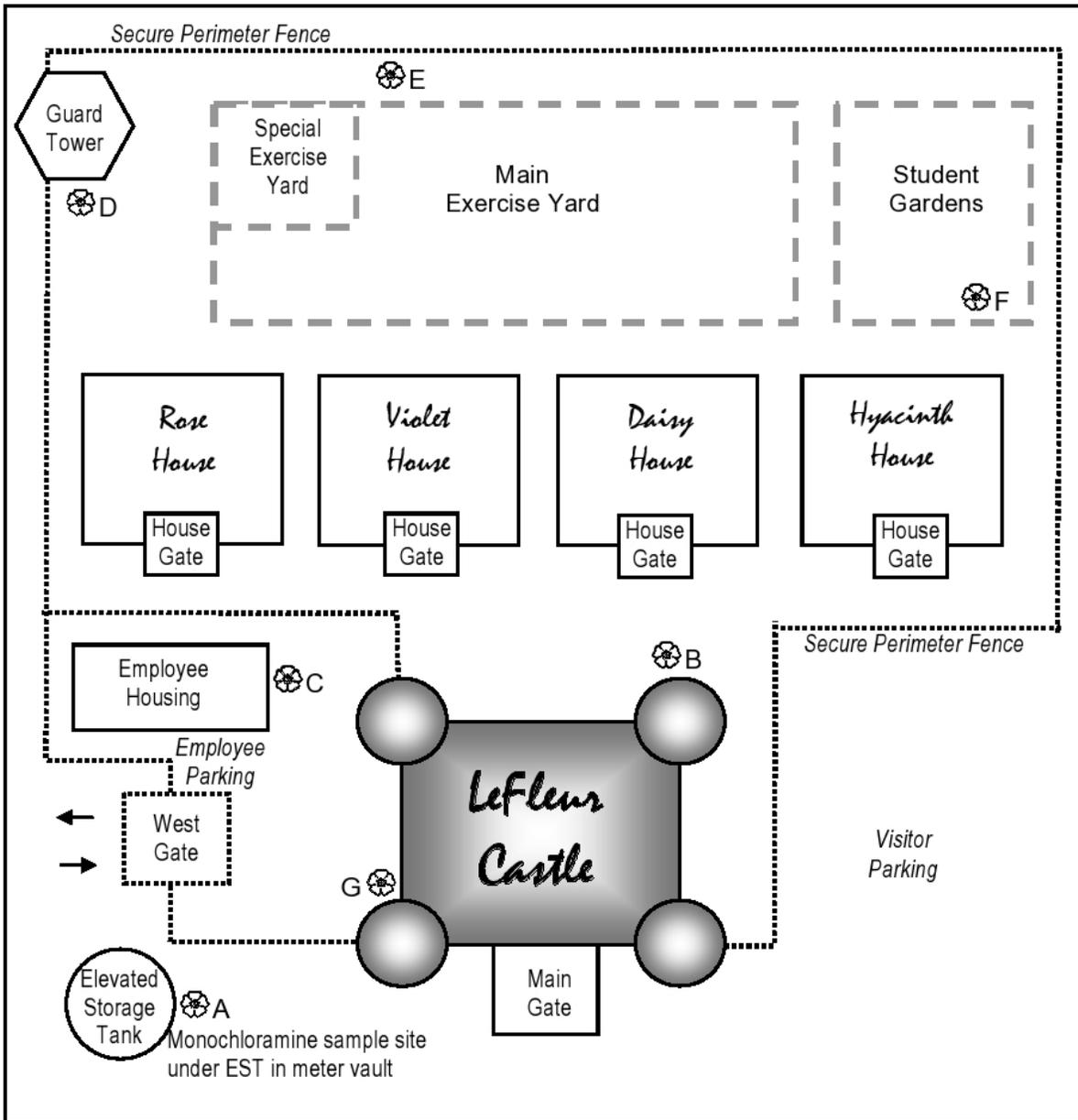
The City of Modales brings empty sample bottles. The Academy janitor and Class D operator collects the sample following directions provided. A City of Modales operator picks up the sample at the West Gate. The two City Operators are Flora Davis (cell 409-777-4444) and David Flores (cell 409-777-5555).

d. Compliance calculations

Compliance is determined by the City of Modales

Example Monitoring Plan: Mme. LeFleur's Academy

Distribution System Map




Example Monitoring Plan: Mme. LeFleur's Academy


2. Disinfectant Residual—Free or Total Chlorine

a. Frequency

The disinfectant residual is sampled weekly for compliance and at the same time and location as coliform samples. In addition we sample every day to be sure the residual is present, but do not report those results

b. Location

Disinfectant Residual Sample Site Table

Site	Location	Sample Schedule
 A	Tap in meter vault	Every day
 B	Hose bibb at North East corner of Castle	Monday - Compliance Sample
 C	Hose bibb on West side of Teacher housing	Tuesday
 D	Hose bibb at bottom of Guard Tower	Wednesday
 E	Irrigation bibb in back of Exercise Yard	Thursday
 F	Irrigation bibb West in Student Gardens	Wednesday
 G	Kitchen Sink	Every day (report to Dept. of Health)

c. Method

The Hach Pocket Colorimeter is used.

d. Compliance calculations

The system is in compliance with the minimum residual requirement if the total chlorine residual throughout the distribution system is always greater than 0.5 mg/L.

🌸🌸🌸 **Example Monitoring Plan: Mme. LeFleur's Academy** 🌸🌸🌸

3. Disinfection Byproducts (DBPs)—TTHM and HAA5

Samples will be collected by the TCEQ contractor as needed.

a. Frequency

The TCEQ's sampling contractor collects these samples. The City of Modales will notify us if sampling is needed.

b. Location

Academy THM/HAA Sample Site Table

Site	Address of DBP1 Site	Source Represented	Site Type
o F	Irrigation bibb West in Student Gardens	City of Modales	Maximum water age

c. Method

Samples are taken to a certified lab by TCEQ's sampling contractor.

d. Compliance calculations

State:

The system is in compliance if the running annual average of all samples is less than the maximum contaminant level. The City of Modales will notify us of any violation.

4. Lead-Copper

a. Frequency

State:

Samples are collected annually. The City of Modales will notify us when sampling is required and provide sample bottles.

b. Location

Lead & Copper Sample Site Table

Site	Address of DBP1 Site
o G	Kitchen Sink

 **Example Monitoring Plan: Mme. LeFleur's Academy** *c. Lead Copper Method*

Per TCEQ instructions, samples are mailed to a certified lab (the Lower Colorado River Authority at this time).

d. Compliance calculations

This system is in compliance with the lead-copper requirements unless the City of Modales informs us that it is out of compliance.

**E. Lab Approval Form**

The laboratory approval form is attached

**F. Attachments**

The City of Modales maintains compliance with the TCEQ requirements because there is a TCEQ-approved Sanitary Control and Operating Agreement between the City and the Academy that allows the City to maintain sanitary control over the Academy while minimizing the risk to any security breach by minimizing City or other staff entering the facility. That Agreement and the letter from TCEQ approving it are attached. The letter states that, should this agreement lapse or should TCEQ find that it is not being adhered to, that the Academy shall be identified as a stand-alone, active public water system.

Additionally, this monitoring plan is included as an attachment to the City's Monitoring Plan.

 **Example Monitoring Plan: Mme. LeFleur's Academy** 

Sanitary Control and Operating Agreement Madame LeFleurs's Academy and the City of Modales

I. PURPOSE.

The Madame LeFleur's Academy (the SYSTEM) purchases and redistributes potable water from the City of Modales (the CITY), Texas. The CITY personnel do not have the ability to enter the ACADEMY premises, except as noted herein. The ACADEMY is responsible for protecting the drinking water supply from contamination or pollution which could result from improper water distribution system construction or configuration. The CITY is responsible for collecting information, and in some cases, samples, from the ACADEMY and providing that to the TCEQ for compliance determination.

The ACADEMY meet's TCEQ's definition of a community public water system but through this agreement, permits and allows the CITY to take sanitary control to implement all applicable rules, regulations, and standards of the TCEQ. Therefore, the ACADEMY shall not be identified as an active public water system, but instead will be included in the CITY's monitoring plan and shall be subject to any applicable ordinances or other plumbing, irrigation, or other regulations established by the CITY for the protection of public health and maintenance of sanitary conditions.

II. RESTRICTIONS.

The ACADEMY agrees to refrain from following State-prohibited practices:

- A. No direct connection between the ACADEMY and a potential source of contamination is permitted. Potential sources of contamination shall be isolated from the ACADEMY by an air-gap or an appropriate backflow prevention device.
- B. No cross-connection between the ACADEMY and a private water system is permitted. These potential threats to the ACADEMY shall be eliminated at the service connection by the installation of an air-gap or a reduced pressure-zone backflow prevention device.

 **Example Monitoring Plan: Mme. LeFleur's Academy** 

- C. No connection which allows water to be returned to the ACADEMY is permitted.
- D. No pipe or pipe fitting which contains more than 8.0% lead may be used for the installation or repair of plumbing at any connection which provides water for human use.
- E. No solder or flux which contains more than 0.2% lead can be used for the installation or repair of plumbing at any connection which provides water for human use.
- F. Notwithstanding this agreement, under no circumstances shall the CITY be permitted entry to the ACADEMY's premises without the explicit permission of the ACADEMY.

III. SERVICE AGREEMENT.

The following are the terms of the service agreement between the CITY and ACADEMY:

- A. The CITY will maintain a copy of this agreement as long as the ACADEMY and/or the premises is connected to the CITY.
- B. The ACADEMY shall allow its property to be inspected for possible cross-connections and other potential contamination hazards. These inspections shall be conducted by the CITY or its designated agent prior to initiating new water service; when there is reason to believe that cross connections or other potential contamination hazards exist; or after any major changes to the ACADEMY facilities. The ACADEMY shall notify the CITY of such situations. The CITY shall request access to perform such inspections at least 24 hours before requiring access to the ACADEMY. These inspections shall be conducted during the ACADEMY's normal business hours.
- C. The CITY shall notify the ACADEMY in writing of any cross-connection or other potential contamination hazard which has been identified during any inspection.
- D. The ACADEMY shall immediately remove or adequately isolate any potential cross-connections or other potential contamination hazards on his premises.

 **Example Monitoring Plan: Mme. LeFleur's Academy** 

- E. The ACADEMY shall, at the ACADEMY's expense, properly install, test, and maintain any backflow prevention device required by the CITY. The ACADEMY shall provide copies of all testing and maintenance records to the CITY.
- F. If the ACADEMY fails to comply with the terms of this section, the CITY shall, at its option, either terminate service or properly install, test, and maintain an appropriate backflow prevention device at the service connection. In such conditions, the ACADEMY shall allow the CITY access to such facilities. Any expenses associated with the enforcement of this agreement shall be billed to the ACADEMY.

IV. MINIMUM ACCEPTABLE OPERATING PRACTICES

- A. The ACADEMY shall develop a monitoring plan for the ACADEMY's facilities in accordance with TCEQ publication 30 TAC §290.121 and RG-384 *How to Develop a Monitoring Plan for a Public Water System*. The monitoring plan shall be provided to the CITY and retained on site. The monitoring plan shall be provided to the CITY after any revision due to changes at the ACADEMY's facilities.
- B. The CITY shall provide the CITY's monitoring plan to the ACADEMY as needed upon request.
- C. The number of required monthly disinfectant residuals and microbiological samples collected on the ACADEMY premises shall be based the total population (total employees, maximum capacity residents), as verified with and approved by the TCEQ.
- D. The CITY shall notify the ACADEMY in writing of the names and contact information of any CITY employees who shall collect samples or reports from the ACADEMY. The ACADEMY shall provide samples and reports to these personnel and to no others.

 **Example Monitoring Plan: Mme. LeFleur's Academy** 

- E. The ACADEMY shall assure operation of the system by at least one trained and licensed water works operator in accordance with 30 TAC §290.46(e). The ACADEMY shall continuously employ operator(s) with valid license(s) of one level below the minimum licensed operator required for direct supervision of the ACADEMY, or at minimum a D License. The ACADEMY shall provide the name(s) of all licensed water works operator(s), license number and class of license held to the CITY using the form located in TCEQ publication RG-195 *Operator and/or Employment Notice* Appendix G annually, upon request, and when changes occur.
- F. The ACADEMY shall flush dead end mains at monthly intervals or as needed if water quality complaints are received or if disinfectant residuals fall below acceptable levels. Flushing shall be recorded on a flush log to include the date, location, main size, visual observation of water quality (start/finish), disinfectant residual, and volume of water used (flow, minutes flushed, gallons). The ACADEMY shall provide flushing reports to the CITY monthly for review by TCEQ during compliance investigations. The ACADEMY shall maintain flushing reports on-site least two years and make them available upon request.
- G. The ACADEMY shall purchase and maintain equipment for measurement and reporting of the disinfectant residual specified by the CITY that conforms to the analytical requirements of 30 TAC §290.110. Customer shall prepare a monthly disinfectant residual report using the applicable worksheet in Appendix B of TCEQ publication RG-407 *Disinfectant Residual Reporting for Public Water System*. Report shall be submitted to the ACADEMY to the CITY by the first normal business day of the following month. The ACADEMY shall retain a copy of this report on site for at least three years and is available upon request.
- H. The ACADEMY shall collect routine, special, and repeat bacteriological sample(s) in accordance with TCEQ publication 30 TAC §290.109 and RG-421 *Coliform Sampling for Public Water Systems*. The CITY shall notify the ACADEMY at least 24-hours in advance of requiring collection of bacteriological samples. The CITY shall provide approved sample containers for collection of bacteriological samples. The ACADEMY shall deliver samples to the CITY representative at a mutually convenient location outside of the ACADEMY's perimeter fence during the CITY's normal business hours. The CITY shall provide analytical results of these samples to the ACADEMY upon request.

Example Monitoring Plan: **Mme. LeFleur's Academy**

- I. The ACADEMY shall collect lead and copper monitoring samples upon request in approved sample containers provided by the CITY. The ACADEMY shall deliver samples to the CITY representative at a mutually convenient location outside of the ACADEMY's perimeter fence during the CITY's normal business hours. The CITY shall inform the ACADEMY of any required sampling at least 24-hours in advance.
- J. The ACADEMY shall allow the TCEQ or the TCEQ contractor to enter the ACADEMY's premises for collection of additional sampling to include TTHM, HAA5 and Asbestos as needed. The CITY shall inform the ACADEMY of any routine sampling required by TCEQ at least 24-hours in advance of that sampling. The 24-hour advance notice may be waived in case of emergency conditions including known drinking water contamination, but not excluding other emergency circumstances.
- K. The CITY shall provide materials for any required public notification, public education, or annual drinking water quality reports to the ACADEMY. The ACADEMY shall post and/or distribute notices and reports provided by CITY in accordance with 30 TAC Chapter 290.
- L. The CITY shall assume liability for payment of microbiological and chemical analysis required by 30 TAC Chapter 290 unless otherwise specified in this section.

ACADEMY'S SIGNATURE: Madame Jacolyn Lefleur, R.S.

DATE: Sept. 29, 2002

CITY'S SIGNATURE: Dr. Hazel Nutt, Mayor, City of Modales

DATE: 9/29/02

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Appendix A. Generic One-Page Monitoring Plan Outline

This is intended to serve as a handy, generic outline. See the extended outlines for more detail.

Section	Contents of Section	Details
	Title Page	Ownership and contact information Required for all systems
1 Raw Water Sample Sites and Schedule	Source Sample Site Table	Required for all systems with raw sources
		List of all raw water sample sites and sampling frequency
2 In-Plant Sample Sites and Schedule	Treatment Table	Required for all systems with treatment in addition to chlorine
		List of all in-plant sample sites and sampling frequency
	Plant schematic showing in-plant sample sites	Required only for systems with treatment in addition to chlorine
		Disinfectant and pH sample sites and schedule: —Required for SWTP or GW achieving 4-log viral CT
		Chlorine and ammonia injection points: —Required for systems with chloramination
		Chemical removal treatment monitoring —For example, required for systems with point-of-use devices like reverse osmosis
		Surface Water Treatment Rule compliance sampling for Combined Filter Effluent (CFE) turbidity sampling, Individual Filter Effluent (IFE) turbidity sampling, total organic carbon (TOC), and alkalinity —Required for surface water treatment plants (SWTPs)
3 Entry Point Sample Sites and Schedule	Entry point sample site table	Required for all systems with entry points
	Entry point/plant/source table	Required for all systems with entry points
	System schematic showing entry points, plants, sources, sample sites	Required for all systems with entry points
		Sample point(s) and frequency for disinfectant entering the distribution system
		Sample points organics, inorganics, and radiochemicals
4 Distribution System Sample Sites and Schedule	Distribution system map showing all distribution sample sites and associated tables	Required for all systems that distribute water to consumers
		Disinfectant residual sites
		Routine distribution coliform sample site list
		DBP1 trihalomethane (THM) and haloacetic acid (HAA) sample site list —Not required for TNCs
		Lead-Copper site list —Not required for TNCs
		Asbestos sites for all systems with asbestos-cement pipe
5 Attachments	System-specific information	Additional information describing sampling, requirement depends on type of system
	Lab Approval Form	Required for all systems
	Letters from TCEQ	Required for all systems
		Copy of annual Sample Cost Estimate Letter
		Copies of correspondence related to sampling
	Initial Distribution System Evaluation (IDSE) documents	Not required for TNCs
		Waiver letters, for systems that had IDSE waivers
		IDSE Sample Plan and Report for systems that did not have IDSE waivers
	Triggered Source Monitoring Plan	Only required for systems that have a Triggered Source Monitoring Plan for the Ground Water Rule
	Appendix for ozone	Only required for systems that use ozone
	Appendix for chlorine dioxide	Only required for systems that use chlorine dioxide
Appendix for point of use or whole house treatment sample scheduling	Only required for systems that use point of use or whole house treatment sample	

Appendix B. Monitoring Plan Outline for SW or GUI Treatment Plant

Regardless of whether you are a C, NTNC, or TNC, if you treat either surface water or GUI (groundwater that is under the direct influence of surface water) and do not use chlorine dioxide or ozone, follow this outline to prepare your monitoring plan. In following this outline, keep these points in mind:

- This outline includes all possible types of sampling (except chlorine dioxide).
- Use only the elements that apply to your system. If we have provided sample wording in this outline, use that wording for your monitoring plan.

Sample wording looks like this.

- If any elements do not apply to your system, either leave them out of your plan or mark that step “Not Applicable” in your plan.

Start with a Title Page

Every monitoring plan should include a title page that clearly shows the following information:

- the name of the water system
- the identification number of the water system
- the name and contact information of the person with responsibility for the water system
- the name and contact information of the emergency contact for the water system
- the date that the monitoring plan was produced (or revised)

For example:

Monitoring Plan for <i>[Name of Your System]</i>
Public Water System Identification Number <i>[PWS ID]</i>
Owner and Responsible Official: <i>[Name, address, and phone]</i>
<i>The Owner is the company that owns the public water system. The Responsible Official is the person who is in responsible charge of the system. For example, the mayor of a town, the manager of a factory, or the owner of a store could be the responsible official.</i>
Emergency Contact: <i>[Name, address, phone, and e-mail]</i>
<i>The Emergency Contact is the person that the TCEQ will be able to contact to provide assistance in case of an emergency such as a power outage or a hurricane.</i>
Revised <i>[Month, Day, Year]</i>

B.1. Raw Water Sampling

Every system is required to have sample taps available so that raw water samples can be collected from any source. Include a Source Sample Site Table including all your sources, like the following:

Table B.1. Example of a Source Sample Site Table

Source	TCEQ Source ID	Sample Site	Notes
<i>River or lake that SWTP gets water from</i>	<i>“S” followed by the PWSID, followed by a letter assigned by the TCEQ</i>	<i>Describe where to sample raw water. For example: “Raw water tap in SWTP laboratory”</i>	<i>Any pertinent notes that would affect sample scheduling</i>
Rio Wawa	S3210123A	Tap in lab	

B.2. In-Plant Sampling

Include a plant schematic showing sampling sites and disinfection zones (see Figure 3.3 for an example). You should include a list of treatments for each treatment train as shown in Example Table B.2. When you revise your plan, please add this table.

Table B.2. Example of a Treatment Table

Disinfection Zone	Treatment Sequence	Treatment
Before disinfection	1	Potassium permanganate (manganese control)
	2	Powdered activated carbon (for taste and odor events)
D1	3	Gaseous chlorination (pre)
	4	Alum (coagulant)
	5	Polymer (coagulant aid)
	6	Sedimentation
	7	Media filtration
D2	8	Gaseous chlorination (post)
	9	Ammonia injection
	10	Ground storage tank
	11	Fluoridation

1) Combined Filter Effluent (CFE) Turbidity Sampling

a) Frequency

State how often CFE compliance samples are taken. Minimum is every 4 hours while plant is running.

b) Location

Describe the sample point for CFE.

c) Method

List the analyzer(s) used and the sampling protocol.

d) Compliance calculations

State the following about turbidity readings, as measured by the nephelometric turbidity unit (NTU):

If 95% of the four-hour CFE turbidity readings are less than 0.3 NTU, and no reading is over 1.0 NTU, the plant is in compliance. The system submits SWMORs monthly.

2) Individual Filter Effluent (IFE) Turbidity Sampling

a) Frequency

Describe how often individual filter turbidity is measured.

b) Location

Describe the sampling points for individual filters.

c) Method

State the brand and type of turbidimeter used.

d) Compliance calculations

i) Large systems (serving at least 10,000 people) state:

If two consecutive 15-minute readings are never greater than 1.0 NTU, and are not greater than 0.5 NTU at four hours after the start of a filter run, the system is in compliance. If the filter turbidity exceeds those levels, but the system completes the required additional reporting described in 30 TAC 290.111(e), the system is in compliance.

ii) Small systems (serving fewer than 10,000 people) state:

If the system monitors individual filter turbidity once a day, the system is in compliance.

3) Disinfectant Sampling

Systems that operate SWTPs must have a current CT study, approved by the TCEQ, that accurately describes the disinfection protocol used at each plant. This requirement includes systems that treat groundwater and that achieve 4-log viral removal or inactivation through treatment.

The in-plant sampling should correspond to that described in the CT study; otherwise, the system should request a revision of the CT study from the TCEQ. A copy of the CT study can be attached to the monitoring plan. The TCEQ's Technical Review and Oversight Team (512-239-4691) can help with questions about CT studies. A copy of the CT study should be attached to the monitoring plan.

a) Frequency

State how often disinfection residual samples are taken. The minimum is once a day while the plant is running, preferably during the highest raw water flow that occurs during the day.

b) Location

Describe the sampling points for each disinfection zone.

c) Method

State the method used for analysis, or the type of on-line equipment used.

d) Compliance calculations

State:

If the inactivation ratio for the plant is over 1.0 for viruses, *Giardia*, and *Cryptosporidium*, the plant is in compliance.

4) pH Sampling

In-plant pH sampling is required as part of determining the microbial inactivation ratio for SWTPs. You may include information about pH sampling as part of the disinfectant sampling section, if you choose.

a) Frequency

State how often in-plant pH and disinfection residual samples are taken. (The minimum is once a day while the plant is running, preferably during the highest raw water flow that occurs during the day.)

b) Location

Describe the in-plant pH sampling locations. At a minimum, these should include the same points used for in-plant disinfection residual monitoring.

c) Method

State the method and equipment used.

d) Compliance calculations

There are no general compliance requirements for in-plant pH, except as included in the calculation of the inactivation ratio.

5) Total Organic Carbon (TOC)

TOC is a precursor to DBP formation. All conventional plants must measure and report TOC. Unconventional plants are also currently required to measure and report TOC.

- a) Frequency
State how often a TOC sample set is taken. (Minimum is once a month.)
 - b) Location
Describe where TOC compliance samples are taken (raw and finished water sample sites).
 - c) Method
State the method and equipment used. If samples are sent to an outside lab, give the name and phone number of the lab. If you use an outside lab, you should make sure that the lab is approved by the TCEQ. The Public Drinking Water Section (512-239-4691) can help labs that seek TCEQ approval.
 - d) Compliance calculations
State:
If the TOC removal meets the Step 1 requirement, the Step 2 requirement, or one of the alternative compliance criteria, the plant is in compliance. The TOC MOR is submitted monthly.
- 6) Alkalinity (for systems with full conventional treatment and for systems reporting water quality parameters)
- Alkalinity is measured as part of the TOC sample set. The Step 1 removal requirement for TOC is set based on raw water alkalinity. You may describe the alkalinity sampling together with the TOC sampling, if you choose.
- a) Frequency
State how often an alkalinity sample set is taken for compliance. Raw water alkalinity is reported daily on the TOC MOR and measured as part of the TOC sample set.
 - b) Location
Describe where alkalinity compliance samples are taken (raw water).
 - c) Method
State the method and equipment used.
 - d) Compliance calculations
State:
The system is in compliance if all required alkalinity samples are taken, and if the results are reported on the TOC MOR.

B.3. Entry Point Sampling

Include a list of entry points that defines each entry point, describes its sampling site, and tells which plants or wells contribute water to it.

Include:

- **An Entry Point Sample Site Table** (see section 4.2 for more information). This table describes where to sample for each entry point.

Table B.3. Example of a Surface Water Entry Point Sample Site Table

Entry Point (EP) Number	EP Sample Site (Entry Point Name)
<i>Entry points are numbered sequentially and numbers are never reused.</i>	<i>This should be a very short description of the entry point sampling site.</i>
001	Lab finished water tap

- **An Entry Point, Plant, and Source Table** (see section 4.2 for more information). This table describes which plants and sources feed each entry point.

Table B.4. Example of a Surface Water Entry Point, Plant, and Source Table

Entry Point (EP) Number	Plant	Source Description	Source ID	Comments
<i>List the EP Number.</i>	<i>List the plant that feeds that entry point.</i>	<i>List all sources associated with that plant.</i>	<i>List the Source ID(s).</i>	<i>For example, activity status</i>
001	City SWTP	Rio Grande	S1234567A	A

- **An Entry Point Schematic** (see section 4.3 for more information). This schematic shows graphically which plants and sources feed each entry point, and how the entry points feed the distribution system. It is a schematic, not a map. For very simple systems, a map may be acceptable.

1) Disinfectant Entering the Distribution System

State whether the system uses free chlorine or chloramines in the distribution system.

a) Frequency

State how often the disinfectant entering the distribution system is measured. The minimum is one sample daily up to continuous monitoring, depending on system size.

b) Location

Refer to the table that defines the point(s) of entry and sampling site(s). State:

The residual for each entry point is measured at the applicable sampling site shown on the map and listed on the table.

- c) Method
List the method and/or equipment used to measure disinfectant residual.
- d) Compliance calculations
- i) Systems using free chlorine state:
The system is in compliance if the free chlorine residual entering the distribution system is over 0.2 mg/L.
- ii) Systems using chloramines state:
The system is in compliance if the total chlorine residual entering the distribution system is over 0.5 mg/L.
- 2) Organics, Inorganics, and Radiochemicals
- a) Frequency
State:
The TCEQ's sampling contractor collects these samples. Letters informing the system of changes in the sampling schedule are attached to the back of this monitoring plan.
Attach the letters as described.
- b) Location
Refer to the table that defines the point(s) of entry and sampling site(s). State:
The contaminant concentrations at each entry point are measured at the applicable sampling site.
- c) Method
State:
Samples will be sent to a certified lab by the TCEQ's sampling contractor.
- d) Compliance calculations
State:
If the concentrations of contaminants are reliably and consistently less than the regulatory maximum contaminant levels, the system is in compliance. The TCEQ will inform the system of violations. Copies of any letters informing the system are attached in the back of this monitoring plan.
Attach those letters if you have any.

B.4. Distribution System Sampling

Include:

- **Distribution System Map**

This must be a map, not a schematic. It should show tanks, pumps, plants, and sample sites. It should show any appropriate geopolitical boundaries.

A map from an Internet mapping site or a copy of a road map is adequate. If you provide a large map, please fold it up to fit in a normal 8 1/2 by 11" folder. It should have labels coded to the sample site lists or tables. It should clearly show all geopolitical boundaries, such as city limits, Certificate of Convenience and Necessity (CCN) boundaries, nearby systems, and ownership.

1) Coliform Samples

Include a list of coliform (and disinfectant) addresses or locations that correlates to the distribution system map.

a) Frequency

State how many coliform samples the system collects each month, and when they are collected.

b) Location

List the addresses from which coliform samples are collected. If a cycle is used to choose the sampling site, describe that schedule.

- Routine Distribution Coliform Sample Site Table: This table lists the sites and is coded to show where those sites are on the distribution system map.

Table B.5. Example of a Surface Water Coliform Sample Site Table

Site Code or Letter	Address of Routine Distribution Sample Site	Sample Schedule	Comments
<i>Use a number or letter that corresponds to the dot showing the site on your distribution system map.</i>	<i>Provide a street address for the sample site. If it is a sample station, provide a dummy address or a description of its location.</i>	<i>List the days or weeks that sampling should occur for each site or group of sites.</i>	<i>Make any notes relating to sampling schedule or locations.</i>
A	2468 Kyle St.	Jan., June, Nov.	Hose bibb on Mayor Kolache's house
B	357 Buda Rd	Feb., July, Dec.	Tap on pink house next to elevated storage
C	6432 Hays Way	Mar., Aug.	Hose bibb
D	731 Wood Creek	April, Sep.	New sample station 2
E	22222 Henly Heights	May, Oct.	Sample station 1

c) Method

If samples are sent to a lab, state the name and phone number of that lab. If samples are analyzed in-house, state the method used, include the phone number of the in-house lab, and refer to the Drinking Water Laboratory Approval Form.

d) Compliance calculations

i) Systems that take more than 40 samples a month state:

The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat sample following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than 5% of routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

ii) Systems that take 40 or fewer samples a month state:

The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat sample following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than one of the routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

2) Disinfectant Residual: Free or Total Chlorine

a) Frequency

The disinfectant residual must be determined daily and whenever microbial samples are taken. State:

The disinfectant residual is measured daily. Whenever samples are taken to determine microbes, the disinfectant residual must be determined in the field as the sample is taken.

b) Location

Include a table showing sample sites:

- Disinfectant Residual Site List: This table lists the sites and is coded to show where those sites are on the distribution system map.

Table B.6. Example of a Surface Water Disinfectant Residual Sample Site Table

Site Code or Letter		Address of Routine Distribution Sample Site	Sample Schedule	Comments
<i>Code that corresponds to distribution system map</i>		<i>Provide a street address for the sample site.</i>	<i>The sampling days</i>	<i>Any notes</i>
Site	Address	Schedule	Comments	
A	2468 Kyle St.	Mon., Wed., Fri., Sat.	Hose bibb on Mayor Kolache's house	
B	357 Buda Rd		Tap on house next to elevated storage	
C	6432 Hays Way		Hose bibb	
D	731 Wood Creek	Tues., Thurs., Sun.	New sample station 2	
E	22222 Henly Ht.		Sample station 1	

c) Method

List the method and/or equipment used to measure disinfectant residual.

d) Compliance calculations

State:

The system complies with the reporting requirements for disinfectant residual by submitting the Surface Water Monthly Operating Report to the TCEQ every month. The system is in compliance with the maximum residual disinfectant limit (MRDL) if the running annual average of all samples taken in the distribution system is less than 4.0 mg/L.

i) If your system uses free chlorine, add:

The system is in compliance with the minimum residual requirement if the free chlorine residual throughout the distribution system is always greater than 0.2 mg/L.

ii) If your system uses chloramine (combined chlorine), add:

The system is in compliance with the minimum residual requirement if the total chlorine residual throughout the distribution system is always greater than 0.5 mg/L.

3) Disinfection Byproducts (DBPs): TTHM and HAA5

Samples will be collected by the TCEQ for systems serving fewer than 10,000 people starting in 2004. Larger systems already have these samples collected. Include a schematic with DBP addresses and locations and mark them clearly on the overall distribution system map.

a) Frequency

State:

The TCEQ's sampling contractor collects these samples. Letters informing the system of changes in the sampling schedule are attached to the back of this monitoring plan.

Attach the letters as described.

b) Location

Include addresses for the locations at which DBP samples should be taken. Make sure the addresses correspond clearly with the locations marked on the distribution system map.

- DBP1 THM and HAA Sample Site List: This table list the sites and is coded to show where those sites are on the distribution system map.

Table B.7. Example of a Surface Water DBP1 THM and HAA Sample Site Table

Site Code or Letter	Address of DBP1 Site	Source Represented	Site Type
<i>Use a number or letter that corresponds to the dot showing the site on your distribution system map.</i>	<i>Provide a street address for the sample site. If it is a sample station, provide a dummy address or a description of its location.</i>	<i>Say what source of water is represented by this site, if you have more than one entry point.</i>	<i>Designate each site as either "Max Water Age" or "Average."</i>
A	99100 FM 963	EP001	Max Water Age
B	123 Main Street		Average
C	456 Elm Street		Average
D	789 Oak Street		Average

c) Method

i) State:

Samples are taken to a certified lab by the TCEQ's sampling contractor.

ii) List the name and phone number of the sample collector. Delta's main number is 800-477-7411, but you may have a local number.

iii) List the name and phone number of the lab, either DSHS (888-963-7111, ext. 7318) or LCRA (800-776-5272, ext. 6022)

d) Compliance calculations

State:

The system is in compliance if the running annual average of all samples is less than the maximum contaminant level. The TCEQ will notify us of any violation.

4) Lead and Copper

a) Frequency

State:

The TCEQ will inform the system when sampling must occur. Letters stating the system's required sampling are attached to this monitoring plan.

Keep copies of those letters with your monitoring plan.

b) Location

Every system (except TNCs) should have an approved list of lead and copper sampling sites, submitted using the Lead and Copper Sample Site Selection and Materials Survey Checklist forms (TCEQ Form 20467; see Appendix H). Attach that list to your monitoring plan.

- **Lead and Copper Sample Site List:** This table lists the sites and is coded to show where those sites are on the distribution system map.

Table B.8. Example of a Surface Water Lead and Copper Sample Site Table

Site Code or Letter	Address of Lead and Copper Site	Type of Site	Comments
<i>Use a number or letter that corresponds to the dot showing the site on your distribution system map.</i>	<i>Provide a home address for the sample site. These must be occupied residences.</i>	<i>You should know whether this is a Tier 1, 2, or 3 site.</i>	<i>For lead and copper sites, you may want to list when each home was built.</i>
1	1001 Arbor Vitae Lane (Mr. Trevillion, 456-1234)	Tier 1	Don't call before 10 a.m.
2	2222 Bittersweet Street (Ms. King, 456-5678)	Tier 1	Red House
3	3456 Cedar Place (Mr. Green, 456-9876)	Tier 2	Deacon's house
4	4999 Elder Trail (Ms. Bolding 456-4357)	Tier 2	Barking dog, not biter
5	5005 Forsythia Circle (Mr. Saul, 456-4321)	Tier 3	1975 Mustang parked out front

Some systems are required to collect water quality parameters (WQPs): pH and alkalinity, plus orthophosphate (for systems that use phosphates); silica (for systems that use silicates); or calcium (when calcium carbonate is used). If the TCEQ has informed you that you must collect WQPs, call the Lead and Copper Rule coordinator at 512-239-4691 for clarification of the requirements. You can include instructions for collecting WQPs, including pH and alkalinity, under this section of the monitoring plan.

c) Method

State:

Per TCEQ instructions, samples are mailed to an accredited lab.

Systems that are required to collect WQPs: Specify the lab that analyzes silicate, calcium, or orthophosphates. State the methods and equipment used to analyze alkalinity and pH.

d) Compliance calculations

State:

This system is in compliance with the lead and copper requirements if the levels of lead and copper are less than the action levels, and we perform all required sampling and reporting.

5) Asbestos

All systems using asbestos-cement (A-C) pipe must be evaluated for asbestos vulnerability (see section 5.6 for more information) and must document the location of all their A-C pipe. Vulnerable systems must work with the TCEQ

for the selection and approval of asbestos sampling site locations and must indicate these locations on their distribution system map. The annual sample cost estimate letter includes verification of any asbestos sampling that is required for your system.

a) Frequency

State:

The TCEQ's contractor will collect samples for asbestos.

b) Location

Attach a list of approved sampling sites that correlates to the locations marked on the map. Note areas that have asbestos-cement pipe on the map.

c) Method

State:

The TCEQ's contractor will send asbestos samples to an accredited lab.

d) Compliance calculations

State:

The system is in compliance if the maximum contaminant level of 7 million fibers (longer than 10 mm) per liter is not exceeded. The TCEQ will notify us of any violation.

B.5. Lab Approval Form

Include a copy of your Drinking Water Laboratory Approval Form as an appendix to your monitoring plan.

B.6. Attachments

Include copies of your annual Sample Cost Estimate ("This is not a bill") letters. If you have not received those, contact the TCEQ to update your address information. Also attach copies of any other letters about drinking water sampling that the TCEQ sends. Attach a copy of your contracts for purchasing treated water, if they describe the quality of the water you purchase.

B.7. Chlorine Dioxide Monitoring Plan (for systems using chlorine dioxide)

If you do not use chlorine dioxide, do not include this section.

If you are using chlorine dioxide, it was approved by the TCEQ through the "exception" process. Attach a copy of all documentation related to that

approval to your monitoring plan. At a minimum, this will include the exception approval letter from the TCEQ. You must describe the frequency, location, and analytical methods used, as well as how you will determine if the system is in compliance.

B.8. Ozone Monitoring Plan (for systems using ozone)

If you do not use ozone, do not include this section.

If you are using ozone, it was approved by the TCEQ through the “exception” process. Attach a copy of all documentation related to that approval to your monitoring plan. At a minimum, this will include the exception approval letter from the TCEQ. You must describe the frequency, location, and analytical methods used, as well as how you will determine if the system is in compliance.

Appendix C. Monitoring Plan Outline for Systems that Operate Wells

Follow this outline to prepare your monitoring plan if your system operates wells and does not treat either surface water or groundwater that is under the direct influence of surface water (GUI). If your system treats surface water or GUI in addition to using other groundwater, use the outline in Appendix B instead. In following this outline, keep these points in mind:

- This outline includes all possible types of sampling (except chlorine dioxide).
- Use only the elements that apply to your system. If we have provided sample wording in this outline, use that wording for your monitoring plan.
 Sample wording looks like this.
- If any elements do not apply to your system, either leave them out of your plan or mark that step “Not Applicable” in your plan.

Start with a Title Page

Every monitoring plan should include a title page that clearly shows the following information:

- the name and identification number of the public water system
- the name and contact information of the person with responsibility for the water system
- the name and contact information of the emergency contact for the water system
- the date that the monitoring plan was produced (or revised)

For example:

Monitoring Plan for [Name of Your System]
Public Water System Identification Number [PWS ID]
Owner and Responsible Official: [Name, address, and phone]
<i>The Owner is the company that owns the public water system. The Responsible Official is the person who is in responsible charge of the system. For example, the mayor of a town, the manager of a factory, or the owner of a store could be the responsible official.</i>
Emergency Contact: [Name, address, phone, and e-mail]
<i>The Emergency Contact is the person that the TCEQ will be able to contact to provide assistance in case of an emergency such as a power outage or a hurricane.</i>
Revised [Month, Day, Year]

C.1. Raw Water Sampling for GW System

Every system is required to have sample taps available so that raw water samples can be collected from any well. Describe the location of the sample tap for each raw water source.

Include a Source Sample Site Table including all your sources, like the following:

Table C.1. Example of a Groundwater Source Sample Site Table

Source	TCEQ Source ID	Sample Site	Notes
<i>Aquifer that well gets water from</i>	<i>"G" followed by the PWSID, followed by a letter assigned by the TCEQ</i>	<i>Describe where to sample raw water.</i>	<i>Any pertinent notes that would affect sample scheduling</i>
Edwards	G3210123A	Tap at wellhead	Demand well

If your system is required to perform raw water monitoring, include a description of the raw water sampling site. Describe the frequency and type of raw water samples that your system is required to collect. For example:

“We collect raw water coliform samples every month.”

Or, as another example:

“We must collect radiochemical samples from Well B annually.”

Otherwise, if you don't have to collect raw water samples, state:

We collect raw water coliform samples after any distribution system positive coliform sample.

C.2. In-Plant Sampling for GW System

If you don't have any treatment other than disinfection, state the type of chlorine that you use.

Fill in the statement below with the correct type of chlorine you use.

“We have no treatment other than chlorination. We use gas chlorine or hypochlorite, or on-site chlorine generation.”

If your system has treatment in addition to disinfection, fill out the following table with the type of treatment you have. Also include a plant schematic that shows where treatment is done and your sampling sites, and describes your monitoring. See figures 3.1 and 3.2 for examples of acceptable GW system plant schematics.

Table C.2. Example of a Groundwater Treatment Table

Treatment Sequence	Treatment
1	Hypochlorite injection (solution)
2	Fluoride injection (Fluosilic acid)

Groundwater systems that treat the water must operate the treatment in accordance with TCEQ requirements. Describe the frequency and location of any process control sampling. If you have a letter describing those requirements, include it in your monitoring plan.

C.3. Entry Point Sampling for GW System

All groundwater systems have to perform some entry point sampling. Include:

Table C.3. Example of a Groundwater Entry Point Sample Site Table

Entry Point (EP) Number	EP Sample Site (Entry Point Name)
<i>Entry points are numbered sequentially and numbers are never reused.</i>	<i>This should be a very short description of the entry point sampling site.</i>
001	Tap on GST by Well 1

- **An Entry Point, Plant, and Source Table** (see section 4.2 for more information). This table describes which plants and sources feed each entry point.

Table C.4. Example of a Groundwater Entry Point, Plant, and Source Table

Entry Point (EP) Number	Plant	Source Description	Source ID	Comments
<i>List the EP Number.</i>	<i>List the plant that feeds that entry point.</i>	<i>List all sources associated with that plant.</i>	<i>List the Source ID(s).</i>	<i>For example, activity status</i>
001	Chlorinator at well 1	Carrizo-Wilcox	G1234567A	A

- **An Entry Point Schematic** (see section 4.3 for more information). This schematic shows graphically which plants and sources feed each entry point, and how the entry points feed the distribution system. It is a

schematic, not a map. For very simple systems, a map may be acceptable.

1) Disinfectant Entering the Distribution System

If your public water system treats groundwater or purchases treated water for resale, you must tell us your current disinfectant residual when we ask. If your system does monitor entry point disinfectant residual, then your monitoring plan should say so.

a) Frequency, Location, and Method (corresponds to “a” through “c” for other outlines)

Describe the frequency and location that you sample entry point disinfectant residual if your system does do this monitoring.

b) Compliance calculations

Groundwater systems state:

Our system uses only groundwater and is not required to monitor the disinfectant residual entering the distribution system.

2) Organics, Inorganics, and Radiochemicals

a) Frequency

State:

The TCEQ’s sampling contractor collects these samples. Letters informing the system of changes in the sampling schedule are attached to the back of this monitoring plan.

Attach the letters as described.

b) Location

Refer to the table that defines the point(s) of entry and sampling site(s). State:

The contaminant concentrations at each entry point are measured at the applicable sampling site.

c) Method

State:

Samples will be sent to a certified lab by the TCEQ’s sampling contractor.

d) Compliance calculations

State:

If the concentrations of contaminants are reliably and consistently less than the regulatory maximum contaminant levels, the system is in compliance. The TCEQ will inform the system of violations. Copies of any letters informing the system are attached in the back of this monitoring plan.

Attach those letters if you have any.

C.4. Distribution System Sampling for GW System

Include:

- **Distribution System Map**

This must be a map, not a schematic. It should show tanks, pumps, plants, and sample sites. It should show any appropriate geopolitical boundaries. A map from an Internet mapping site or a copy of a road map is adequate. (If you provide a large map, please fold it to fit in an 8 1/2 by 11" folder.) It should have labels coded to the sample site lists or tables.

1) Coliform Samples

a) Frequency

State how many coliform samples the system collects each month. Put the schedule here or in the site table.

b) Location

Include a table of sites for coliform sampling.

Table C.5. Example of a Groundwater Routine Distribution Coliform Sample Site Table for a System with Five Sites

Site	Address	Schedule	Comments
A	2468 Quinlan St.	Jan., June, Nov.	Hose bibb on Mayor's house
B	357 Lewisville Rd	Feb., July, Dec.	Tap on house by EST
C	6432 Pittsburg Way	Mar., Aug.	Hose bibb at chicken plant
D	731 Gladewater Ave.	April, Sep.	New sample station 2
E	22222 Sulfur Heights	May, Oct.	Sample station 1

c) Method

If samples are sent to a lab, state the name and phone number of that lab. If samples are analyzed in-house, state the method used, and include the phone number of the in-house lab.

d) Compliance calculations

i) Systems that take more than 40 samples a month state:

The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat sample following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than 5% of routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

ii) Systems that take 40 or fewer samples a month state:

The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat sample following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than one of the routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

2) Disinfectant Residual: Free or Total Chlorine

a) Frequency

i) The disinfectant residual must be determined whenever microbial samples are taken. State:

Whenever a sample is taken to determine microbes, the disinfectant residual must be determined in the field as the sample is taken.

ii) In addition, small systems may have to take daily or weekly disinfectant residual samples. If your system serves at least 250 connections or 750 people, additionally state:

The disinfectant residual is also measured daily.

iii) If your system serves fewer than 250 connections or 750 people, additionally state:

The disinfectant residual is also measured once every 7 days.

b) Location

Include a list or table of sites, keyed to the distribution map:

- Disinfectant Residual Sample Site List or Table, example shown:

Table C.6. Example of a Groundwater Disinfectant Residual Sample Site Table

Site	Address	Schedule
A	105 Strawberry Field	Monday through Friday
B	501 Penny Lane	
C	7900 Blue Jay Way	
D	9800 Norwegian Woods	Saturday and Sunday
E	12500 Market Place	

Also state:

The disinfectant residual is also collected whenever a coliform sample is taken.

In addition, describe the sampling schedule or cycle used.

c) Method

List the method and/or equipment used to measure disinfectant residual.

d) Compliance calculations

i) State:

The system complies with the reporting requirements for disinfectant residual by keeping records of disinfectant monitoring, providing these records to the TCEQ compliance investigator upon request, and sending in the Disinfectant Level Quarterly Operating Report (DLQOR) every quarter.

ii) If your system uses free chlorine, state:

The system is in compliance with the minimum residual requirement if the free chlorine residual throughout the distribution system is always greater than 0.2 mg/L.

iii) If your system uses chloramine (combined chlorine), state:

The system is in compliance with the minimum residual requirement if the total chlorine residual throughout the distribution system is always greater than 0.5 mg/L.

iv) In addition, state:

The system is in compliance with the maximum residual disinfectant level (MRDL) if the running annual average of all samples taken in the distribution system is less than 4.0 mg/L.

3) Disinfection Byproducts (DBPs): TTHM and HAA5

a) Frequency

State:

The TCEQ's sampling contractor collects these samples. Letters informing the system of changes in the sampling schedule are attached to the back of this monitoring plan.

Attach the letters as described.

b) Location

Include a table of DBP1 sample sites. This should be a list or table of addresses of the locations at which DBP samples should be taken keyed to the distribution map.

Table C.7. Example of a Groundwater DBP1 THM and HAA Sample Site Table for a System with One Site

Site	Address of DBP1 Site	Source Represented	Site Type
A	Tap at North Elevated Storage	Well (EP001)	Max Water Age

c) Method

State:

Samples are taken to a certified lab by TCEQ's sampling contractor.

d) Compliance calculations

State:

The system is in compliance if the running annual average of all samples is less than the maximum contaminant level. The TCEQ will notify us of any violation.

4) Lead and Copper

a) Frequency

State:

The TCEQ will inform the system when sampling must occur. Letters stating the system's required sampling are attached to this monitoring plan.

Keep copies of those letters with your monitoring plan.

b) Location

Include a Lead and Copper Sample Site table.

Table C.8. Example of a Groundwater Lead and Copper Sample Site Table for a Small Community System

Site	Address of Lead and Copper Site	Type of Site	Comments
1	1001 Arbor Vitae Ln. (Mr. Smith 456-1234)	Tier 1	Mean dog
2	2222 Bittersweet St. (Ms. Brown 456-5678)	Tier 1	
3	3456 Cedar Pl. (Mr. Jones 456-9876)	Tier 2	
4	4999 Elder Pl. (Ms. Kitty 456-4357)	Tier 2	
5	5005 Forsythia Circle (Mr. Fido, 456-4321)	Tier 3	

Every system should have an approved list of lead and copper sampling sites on their Lead and Copper Sample Site Selection and Materials Survey Checklist forms (TCEQ Form 20467; see Appendix H). Attach that list to your monitoring plan.

c) Method

State:

Per TCEQ instructions, samples are mailed to a certified lab.

Systems that are required to collect WQPs: Specify the lab that analyzes silicate, calcium, or orthophosphates. State the methods and equipment used to analyze alkalinity and pH.

d) Compliance calculations

State:

A system is in compliance with the lead and copper requirements if the TCEQ does not inform the system that it is out of compliance.

5) Asbestos

All systems using asbestos-cement (A-C) pipe must be evaluated for asbestos vulnerability (see section 5.6 for more information) and must document the location of all their A-C pipe. Vulnerable systems must work with the TCEQ for the selection and approval of asbestos sampling site locations and must indicate these locations on their distribution system map. The annual sample cost estimate letter includes verification of any asbestos sampling that is required for your system.

a) Frequency

State:

The TCEQ's contractor will collect samples for asbestos.

b) Location

Attach a list of approved sites.

c) Method

State:

The TCEQ's contractor will send asbestos samples to a certified lab.

d) Compliance calculations

State:

The system is in compliance if the maximum contaminant level of 7 million fibers (longer than 10 mm) per liter is not exceeded. The TCEQ will notify us of any violation.

C.5. Lab Approval Form

Include a copy of your Drinking Water Laboratory Approval Form as an appendix to your monitoring plan.

C.6. Attachments

Include copies of your annual Sample Cost Estimate ("This is not a bill") letters. If you have not received those, contact the TCEQ to update your address

information. Also attach copies of any other letters about drinking water sampling that the TCEQ sends. Attach a copy of your contracts for purchasing treated water, if they describe the quality of the water you purchase.

C.7. Chlorine Dioxide Monitoring Plan (for systems using chlorine dioxide)

If you do not use chlorine dioxide, do not include this section.

If you are using chlorine dioxide, it was approved by the TCEQ through the “exception” process. Attach a copy of all documentation related to that approval to your monitoring plan. At a minimum, this will include the exception approval letter from the TCEQ. You must describe the frequency, location, and analytical methods used, as well as how you will determine if the system is in compliance.

C.8. Ozone Monitoring Plan (for systems using ozone)

If you do not use ozone, do not include this section.

If you are using ozone, it was approved by the TCEQ through the “exception” process. Attach a copy of all documentation related to that approval to your monitoring plan. At a minimum, this will include the exception approval letter from the TCEQ. You must describe the frequency, location, and analytical methods used, as well as how you will determine if the system is in compliance.

Appendix D. Monitoring Plan Outline for C and NTNC Systems that Only Purchase and Redistribute Treated Water (“Consecutive” Systems)

Follow this outline to prepare your monitoring plan if your system purchases all of its water as finished water from a wholesale supplier. Do not use this outline if your system operates its own water treatment plant or well. In following this outline, keep these points in mind:

- This outline includes all possible types of sampling.
- Use only the elements that apply to your system. If we have provided sample wording in this outline, use that wording for your monitoring plan.
Sample wording looks like this.
- If any elements do not apply to your system, either leave them out of your plan or mark that step “Not Applicable” in your plan.

Start with a Title Page

Every monitoring plan should include a title page that clearly shows the following information:

- the name and identification number of the public water system
- the name and contact information of the person with responsibility for the water system
- the name and contact information of the emergency contact for the water system
- the date that the monitoring plan was produced (or revised)

For example:

Monitoring Plan for [Name of Your System]
Public Water System Identification Number [PWS ID]
Owner and Responsible Official: [Name, address, and phone]
<i>The Owner is the company that owns the public water system. The Responsible Official is the person who is in responsible charge of the system. For example, the mayor of a town, the manager of a factory, or the owner of a store could be the responsible official.</i>
Emergency Contact: [Name, address, phone, and e-mail]
<i>The Emergency Contact is the person that the TCEQ will be able to contact to provide assistance in case of an emergency such as a power outage or a hurricane.</i>
Revised [Month, Day, Year]

D.1. Source Water Sampling

Note that if you have any wells, even ones that are for emergency use only, those are raw water sources and you need to use the outline in Appendix C.

Otherwise, state:

This system has no raw water sources.

Include:

Table D.1. Example of a Source Site Table

Source	TCEQ Source ID	Sample Site	Notes
<i>List the system or systems that you get treated water from.</i>	<i>"P" followed by your PWSID (NOT the PWSID of the seller), followed by a letter assigned by the TCEQ.</i>	<i>Describe where to sample the treated source water, if that was needed. For example: "Meter vault at take point"</i>	<i>Any pertinent notes that would affect sample scheduling</i>
Wawa WSC	P2394691A	Tap in Meter Vault	Wawa WSC PWSID is 2394782

Describe the take point sample site in the table.

D.2. In-Plant Sampling

For a system that only distributes purchased water, state:

The system does not treat water, except to maintain disinfectant.

D.3. Entry Point Sampling

Include a list of entry points (see Example Table B.3). Include a schematic showing sampling sites for entry points to the distribution system. Define each entry point and its sampling site.

- **An Entry Point Sample Site Table** (see section 4.2 for more information). This table describes where to sample for each entry point.
- **An Entry Point, Plant, and Source Table** (see section 4.2 for more information). This table describes which plants and sources feed each entry point.
- **An Entry Point Schematic** (see section 4.3 for more information). This schematic shows graphically which plants and sources feed each entry point, and how the entry points feed the distribution system. It is a schematic, not a map. For very simple systems, a map may be acceptable.

Most of the sampling for possible contaminants is carried out by the seller or wholesaler, not the purchaser. However, the purchaser has to make sure water has disinfectant in it.

1) Disinfectant Entering the Distribution System

If your public water system purchases treated water and resells it, then you must tell us your current disinfectant residual when we ask. If your system does monitor entry point disinfectant level, then your monitoring plan should say so.

State whether the system uses free chlorine or chloramines in the distribution system.

State whether the system you purchase from uses free chlorine or chloramines in the distribution system.

State whether you have booster chlorination or chloramination within your system.

a) Frequency

b) Location

c) Method

(For all three) State:

Purchased-water systems are not required to monitor disinfectant at the entry point.

d) Compliance calculations

i) Systems using free chlorine state:

The system is in compliance if the free chlorine residual entering the distribution system is over 0.2 mg/L.

ii) Systems using chloramines state:

The system is in compliance if the total chlorine residual entering the distribution system is over 0.5 mg/L.

iii) Also state

The system complies with the reporting requirements for disinfectant residual by keeping records of disinfectant monitoring, providing these records to the TCEQ compliance investigator upon request, and sending in the Disinfectant Level Quarterly Operating Report (DLQOR) every quarter.

Note: Some purchased-water systems must get chemical samples collected at the entry point. If so, use the outline in Appendix C for groundwater systems.

D.4. Distribution System Sampling

Include:

- **Distribution System Map**

This must be a map, not a schematic. It should show tanks, pumps, plants, and sample sites. It should show any appropriate geopolitical boundaries. A map from an Internet mapping site or a copy of a road map is adequate. (If you provide a large map, please fold it to fit in a 8 1/2 by 11" folder.) It should have labels coded to the sample site lists or tables.

1) Coliform Samples

Include a schematic and list of coliform (and disinfectant) addresses or locations.

a) Frequency

State how many coliform samples the system collects each month, and when they are collected.

b) Location

List the addresses from which coliform samples are collected. If some cycle is used to choose which sites are samples, describe that schedule.

c) Method

If samples are sent to a lab, state the name and phone number of that lab. If samples are analyzed in-house, state the method used, and include the phone number of the in-house lab.

d) Compliance calculations

i) Systems that take more than 40 samples a month state:

The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat sample following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than 5% of routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

ii) Systems that take 40 or fewer samples a month state:

The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat sample following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than one of the routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

2) Disinfectant Residual: Free or Total Chlorine

a) Frequency

The disinfectant residual must be collected at the same time as microbial samples. In addition, small systems may have to take daily or weekly disinfectant residual samples. State:

The disinfectant residual is measured at the same time as microbial samples.

- i) If your system serves at least 250 connections or 750 people, additionally state:

The disinfectant residual is also measured daily.

- ii) If your system serves fewer than 250 connections or 750 people, additionally state:

The disinfectant residual is also measured once every 7 days.

Describe how you schedule sampling. For example “We sample on Monday.”

- b) Location

The disinfectant residual must be collected at the same place as microbial samples. Refer to the list of those sites and state:

The disinfectant residual is measured at the same place as microbial samples.

- c) In addition, if your system must take additional disinfectant residual samples and has designated sites for this additional sampling, include a list of addresses. Or you can provide a schematic showing the additional sampling points and describe that sampling protocol.

- d) Method

List the method and/or equipment used to measure disinfectant residual.

- e) Compliance calculations

- i) State:

This system complies with the reporting requirements for disinfectant residual by filling out the Groundwater/Purchased Water Monthly Operating Report every month, providing these records to the TCEQ compliance investigator upon request and sending in the Disinfectant Level Quarterly Operating Report (DLQOR) every quarter.

- ii) If your system uses free chlorine, state:

The system is in compliance with the minimum residual requirement if the free chlorine residual throughout the distribution system is always greater than 0.2 mg/L.

- iii) If your system uses chloramine (combined chlorine), state:

The system is in compliance with the minimum residual requirement if the total chlorine residual throughout the distribution system is always greater than 0.5 mg/L.

- iv) In addition, state:

The system reports the maximum residual disinfectant level (MRDL) by submitting the Disinfectant Level Quarterly Operating Report (DLQOR) to the TCEQ quarterly. The system is in compliance with the MRDL if the running annual average of all samples taken in the distribution system is less than 4.0 mg/L.

3) Disinfection Byproducts (DBPs): TTHM and HAA5

Starting in 2004, samples will be collected by the TCEQ for systems serving fewer than 10,000 people. Larger systems already have these samples collected.

Include a schematic with DBP addresses and locations if these are not clearly marked on the schematic for the overall distribution system.

a) Frequency

State:

The TCEQ's sampling contractor collects these samples. Letters informing the system of changes in the sampling schedule are attached to the back of this monitoring plan.

Attach the letters as described.

b) Location

Include addresses and a schematic of the locations at which DBP samples should be taken. Only one site is required for small systems (at maximum detention time). Up to four sampling sites are required per plant for large systems.

c) Method

State:

Samples are taken to a certified lab by the TCEQ's sampling contractor.

d) Compliance calculations

State:

The system is in compliance if the running annual average of all samples is less than the maximum contaminant level. The TCEQ will notify us of any violation.

4) Lead and Copper

a) Frequency

State:

The TCEQ will inform the system when sampling must occur. Letters stating the system's required sampling are attached to this monitoring plan.

Keep copies of those letters with your monitoring plan.

b) Location

Every system should have an approved list of lead and copper sampling sites. Attach that list to your monitoring plan. Some systems are required to collect water quality parameters (WQPs): pH and alkalinity, plus orthophosphate (for systems that use phosphates); silica (for systems that use silicates); or calcium (when calcium carbonate is used). If the TCEQ has informed you that you must collect WQPs, call the Public Drinking Water Section at 512-239-4691 for

clarification of the requirements. You can include instructions for collecting WQPs, including pH and alkalinity, under this section of the monitoring plan.

c) Method

State:

Per TCEQ instructions, samples are mailed to a certified lab.

Systems that are required to collect WQPs: Specify the lab that analyzes silicate, calcium, or orthophosphates. State the methods and equipment used to analyze alkalinity and pH.

d) Compliance calculations

State:

A system is in compliance with the lead and copper requirements if the TCEQ does not inform the system that it is out of compliance.

5) Asbestos

All systems using asbestos-cement (A-C) pipe must be evaluated for asbestos vulnerability (see section 5.6 for more information) and must document the location of all A-C pipe. Vulnerable systems must work with the TCEQ for selection and approval of asbestos sampling site locations and must indicate these locations on the distribution system map. The annual sample cost estimate letter includes verification of any asbestos sampling that is required for your system.

a) Frequency

State:

The TCEQ's contractor will collect samples for asbestos.

b) Location

Attach a list of approved sites.

c) Method

State:

The TCEQ's contractor will send asbestos samples to a certified lab.

d) Compliance calculations

State:

The system is in compliance if the maximum contaminant level of 7 million fibers (longer than 10 mm) per liter is not exceeded. The TCEQ will notify us of any violation.

D.5. Lab Approval Form

Include a copy of your Drinking Water Laboratory Approval Form as an appendix to your monitoring plan. For most purchased-water systems, only the lines for pH and free chlorine or total chlorine will be needed. Write “N/A” (not applicable) on the other lines.

D.6. Attachments

Include copies of your annual Sample Cost Estimate (“This is not a bill”) letters. If you have not received those, contact the TCEQ to update your address information. Also attach copies of any other letters about drinking water sampling that the TCEQ sends. Attach a copy of your contracts for purchasing treated water, if they describe the quality of the water you purchase.

Appendix E. Monitoring Plan Outline for Transient Non-community (TNC) Systems

The TCEQ recognizes that TNC systems may face significant challenges in complying with the requirements for public water systems. We can provide you with free, on-site assistance. Call 512-239-4691 and ask to speak with the Financial, Managerial, and Technical Assistance coordinator to arrange for a visit. The TCEQ currently has a contract with the Texas Rural Water Association to help you with the drinking water rules, including monitoring plan development.

For TNCs, compliance with the monitoring plan requirements will usually be determined by the regional investigator. All of the elements described in a monitoring plan are required by other rules as well. For example, every public water system has to have raw water sample taps. The monitoring plan provides a way to organize this information so that operators sample correctly. The sampling rules that apply to TNCs include:

- **Coliform sampling.** You must sample for coliform monthly in the distribution system in accordance with 30 TAC 290.109. Also, if a sample is coliform positive, you must sample at all your wells for *E. coli* (starting 12/1/09 under the new Ground Water Rule.) This rule requires that you have approved raw and distribution sample sites.
- **Disinfection.** You must maintain a disinfectant residual in your system. You must sample and report as described in 30 TAC 290.110. This rule requires that you have approved entry point and distribution sample sites.
- **Chemicals.** You must allow TCEQ samplers to collect, at a minimum, annual nitrate and nitrite samples at all entry points to the distribution system (30 TAC 290.106 et seq.). If needed, the TCEQ will require additional sampling. This rule requires that you have approved raw and entry point sample sites.

If your system has treatment in addition to chlorination, that will likely require additional in-plant sampling. Most TNCs only chlorinate. If you need assistance determining whether you need to do in-plant sampling, contact the Public Drinking Water Section, at 512-239-4691.

You can follow this outline to prepare your monitoring plan for a TNC system that treats well water or redistributes treated water. In following this outline, keep these points in mind:

- This outline includes all possible types of sampling (except chlorine dioxide).
- Use only the elements that apply to your system. If we have provided sample wording in this outline, use that wording for your monitoring plan.

Sample wording looks like this.

- If any elements do not apply to your system, either leave them out of your plan or mark that step “Not Applicable” in your plan.

The TCEQ recognizes that TNCs may be simpler systems than other public water systems. For that reason, your regional investigator may not require you to use the outline form in this guide under normal circumstances. However, if you have treatment, or if you have violations, it is highly likely that the TCEQ will require you to provide a monitoring plan that meets all of the elements described in this guide. If you have questions about what your specific requirements are, contact your regional office at the phone number provided in Appendix K.

Start with a Title Page

Every monitoring plan should include a title page that clearly shows the following information:

- the name and identification number of the public water system
- the name and contact information of the person with responsibility for the water system
- the name and contact information of the emergency contact for the water system
- the date that the monitoring plan was produced (or revised)

For example:

Monitoring Plan for [Name of Your System]
Public Water System Identification Number [PWS ID]
Owner and Responsible Official: [Name, address, and phone]
<i>The Owner is the company that owns the public water system. The Responsible Official is the person who is in responsible charge of the system. For example, the mayor of a town, the manager of a factory, or the owner of a store could be the responsible official.</i>
Emergency Contact: [Name, address, phone, and e-mail]
<i>The Emergency Contact is the person that the TCEQ will be able to contact to provide assistance in case of an emergency such as a power outage or a hurricane.</i>
Revised [Month, Day, Year]

E.1. Raw Water Sampling

Every system, including a TNC, is required to have sample taps available so that raw water samples can be collected from any source.

You should have a description of each raw (or treated) source water sampling site. Describe the frequency and type of raw water samples that your system

is required to collect. Include a Source Sample Site Table that lists all your sources. Here is an example:

Table E.1. Example of a Source Sample Site Table

Source	TCEQ Source ID	Sample Site	Notes
Well 1	G2550001A	none	Plugged, abandoned
Well 2	G2550001B	At the wellhead	Bill has the key

If you only have one well, and it is really obvious where it is, the regional investigator may waive this table. However, if they or if the TCEQ's central office request it, you must provide it.

Starting Dec. 1, 2009, all systems, including TNCs, are required to collect raw groundwater samples following any routine coliform positive sample collected in distribution. You should be aware of this requirement.

E.2. In-Plant Sampling

Include a plant schematic showing sampling sites if there is any treatment in addition to chlorination.

Table E.2. Example of a Treatment Table

Treatment Sequence	Treatment
1	Hypochlorite injection (solution)
2	Fluoride injection (Fluosilic acid)

In-Plant Disinfectant Sampling

If your TNC treats either SW or GUI, you must follow the outline in Appendix B for in-plant sampling.

If your TNC system is required to maintain 4-log viral inactivation under the Ground Water Rule, you must follow the outline in Appendix B for in-plant sampling. If you have letters from the TCEQ telling you what to do following a Ground Water Rule violation, keep those in a handy place—for example, attach them to your monitoring plan.

Most TNCs either treat well water or purchase and redistribute treated water. All public water systems, including TNCs, are required to keep track of how much chemical is used. *Note:* If you monitor weight of chlorine used, modify this section as needed.

E.3. Entry Point Sampling

Include a list of entry points that defines each entry point, describes its sampling site, and tells which plants or wells contribute water to it (see Example Table B.3). If you only have one entry point, and it is really obvious where it is, the regional investigator may waive this table. However, if they or if the TCEQ's central office request it, you must provide it.

Include:

- **An Entry Point Sample Site Table** (see section 4.2 for more information). This table describes where to sample for each entry point.
- **An Entry Point, Plant, and Source Table** (see section 4.2 for more information). This table describes which plants and sources feed each entry point.
- **An Entry Point Schematic** (see section 4.3 for more information). This schematic shows graphically which plants and sources feed each entry point, and how the entry points feed the distribution system. It is a schematic, not a map. For very simple systems, a map may be acceptable.

1) Disinfectant Entering the Distribution System

Every public water system must chlorinate. Some systems are allowed to use monochloramine instead of free chlorine. You should be able to document whether your system uses free chlorine or monochloramine in the distribution system. If your system uses chloramines, see Appendix I.

a) Frequency

State how often the disinfectant entering the distribution system is measured (minimum is one sample daily up to continuous monitoring, depending on system size).

b) Location

Refer to the table that defines the point(s) of entry and sampling site(s). If you have provided a sample site table, state:

The residual for each entry point is measured at the applicable sampling site.

c) Method

List the method and/or equipment used to measure disinfectant residual.

d) Compliance calculations

i) Systems using free chlorine state:

The system is in compliance if the free chlorine residual entering the distribution system is over 0.2 mg/L.

ii) Systems using monochloramine state:

The system is in compliance if the total chlorine residual entering the distribution system is over 0.5 mg/L.

2) Nitrate and Nitrite and other chemicals

Every public water system, including a TNC, is required to sample for chemicals at the time and location approved by the TCEQ. These samples are collected by the TCEQ's contractor—currently Delta and its subcontractors. At a minimum, TNCs are sampled for nitrate and nitrite annually. Refusal to sample, or failure to pay for analysis, constitutes a monitoring or reporting violation.

Every year, the TCEQ sends every public water system (including TNCs) a letter estimating the sampling for subsequent years and the costs for the following calendar year. This letter, like many of the TCEQ's letters, states "Keep this letter with your monitoring plan" or words to that effect. Keep those letters somewhere you can find them if your regional investigator should happen to ask for your monitoring plan during an investigation.

a) Frequency

State:

The TCEQ's sampling contractor collects these samples. Letters informing the system of changes in the sampling schedule are attached to the back of this monitoring plan.

Attach the letters as described. You get at least one every year.

b) Location

Refer to the table that defines the point(s) of entry and sampling site(s). State:

The contaminant concentrations at each entry point are measured at the applicable sampling site.

c) Method

State:

Samples will be sent to a certified lab by the TCEQ's sampling contractor.

d) Compliance calculations

State:

If the concentrations of contaminants are reliably and consistently less than the regulatory maximum contaminant levels, the system is in compliance. The TCEQ will inform the system of violations. Copies of any letters informing the system are attached in the back of this monitoring plan.

Attach those letters if you have any.

E.4. Distribution System Sampling

Include:

- **Distribution System Map**

If the TCEQ, represented by either your regional investigator or other staff, request it you must provide a map of your system. If requested, this must be a map, not a schematic. It should show tanks, pumps, plants, and sample sites. It should show any appropriate geopolitical boundaries. A map from an Internet mapping site or a copy of a road map is adequate.

1) Coliform Samples

Include a schematic and list of coliform (and disinfectant) addresses or locations.

a) Frequency

State how many coliform samples the system collects each month, and when they are collected.

b) Location

List the addresses from which coliform samples are collected. If a cycle is used to choose the sampling site, describe that schedule. Include:

- Routine Distribution Coliform Sample Site List

c) Method

If samples are sent to a lab, state the name and phone number of that lab. If samples are analyzed in-house, state the method used, and include the phone number of the in-house lab.

d) Compliance calculations

i) Systems that take more than 40 samples a month state:

The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat sample following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than 5% of routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

ii) Systems that take 40 or fewer samples a month state:

The system is in compliance if:

- no repeat samples are fecal or E. coli positive,
- no repeat sample following a fecal or E. coli positive routine sample is positive for total coliform,
- no more than one of the routine samples are total coliform positive and none of the repeats are fecal or E. coli positive.

2) Disinfectant Residual: Free or Total Chlorine

a) Frequency

The disinfectant residual must be determined daily and whenever microbial samples are taken. State:

The disinfectant residual is measured daily. Whenever samples are taken to determine microbes, the disinfectant residual must be determined in the field as the sample is taken.

b) Location

Include a table showing sample sites:

- Disinfectant Residual Site List

In addition, describe the sampling schedule or cycle used.

c) Method

List the method and/or equipment used to measure disinfectant residual.

d) Compliance calculations

i) State:

The system complies with the reporting requirements for disinfectant residual by keeping track of disinfectant levels on the Disinfectant Level Quarterly Operating Report (DLQOR) and keeping those on hand for review by the TCEQ investigator during the Comprehensive Compliance Investigation. The system is in compliance with the maximum residual disinfectant limit (MRDL) if the running annual average of all samples taken in the distribution system is less than 4.0 mg/L.

ii) If your system uses free chlorine, add:

The system is in compliance with the minimum residual requirement if the free chlorine residual throughout the distribution system is always greater than 0.2 mg/L.

iii) If your system uses chloramine (combined chlorine), add:

The system is in compliance with the minimum residual requirement if the total chlorine residual throughout the distribution system is always greater than 0.5 mg/L.

E.5. Laboratory Approval Form

Include a copy of your Drinking Water Laboratory Approval Form as an appendix to your monitoring plan if requested.

E.6. Attachments

Include copies of your annual Sample Cost Estimate (“This is not a bill”) letters. If you have not received those, contact the TCEQ to update your address information. Also attach copies of any other letters about drinking water sampling that the TCEQ sends. Attach a copy of your contracts for purchasing treated water, if they describe the quality of the water you purchase.

Appendix F. Monitoring Plan Outline for Systems Using Chlorine Dioxide or Ozone

F.1. Systems that Use Chlorine Dioxide

Chlorine Dioxide Sampling Requirements (for Chlorine Dioxide Systems; 30 TAC 290.110)

A system that uses chlorine dioxide must routinely measure the chlorine dioxide residual at the entry point. If your system uses chlorine dioxide, you must submit the Chlorine Dioxide Monthly Operating Report (ClO₂ MOR). You can get the ClO₂ MOR on the TCEQ website from the “Forms” link.

Although chlorine dioxide is very useful as a disinfectant, elevated chlorine dioxide residuals in the distribution system are undesirable because of the possibility of adverse effects on the development of children’s central nervous systems. Usually, this is not a problem because systems use chlorine dioxide to treat the raw water, and by the time the water leaves the plant, all the chlorine dioxide is removed.

To use chlorine dioxide in your system, you must have TCEQ approval. Call the TCEQ’s Technical Review and Oversight Team at 512-239-4691.

- *Frequency:* If your system uses chlorine dioxide, you must collect your own chlorine dioxide samples at the entry point to the distribution system. You must measure the chlorine dioxide residual at the entry point once every day for compliance. The chlorine dioxide concentration is reported on the ClO₂ MOR. If the concentration of chlorine dioxide at the entry point is over the MCL (0.8 mg/L), the operator must do additional sampling in the distribution system.
- *Location:* Samples must be taken at each entry point that has water treated with chlorine dioxide. (Read section 4.1 for the definition of an entry point.)

Chlorite Entry Point Sampling (for Chlorine Dioxide Systems; 30 TAC 290.114)

Chlorite is an inorganic byproduct of chlorine dioxide. It is regulated as a disinfection byproduct at all systems that use chlorine dioxide.

- *Frequency:* If your system uses chlorine dioxide, you must collect your own chlorite samples daily at the entry point to the distribution system. The daily chlorite concentration is reported on the Chlorine Dioxide Monthly Operating Report. Additionally, every month systems that use chlorine dioxide must take a three-sample set of chlorite samples in the distribution system. This three-sample set must be

analyzed by a certified lab. You can obtain a list of certified labs from the TCEQ's Quality Assurance Section at 512-239-5042.

- *Location:* Samples must be taken at each entry point, as described in section 4.1.

Distribution System Chlorine Dioxide (30 TAC 290.110)

A system that uses chlorine dioxide must measure chlorine dioxide in the distribution system if the entry point sample exceeds the MCL.

- *Frequency:* If the chlorine dioxide residual sample taken daily at the entry point exceeds 0.8 mg/L, the system must take three additional chlorine dioxide samples within the distribution system.
- *Location:* Systems must designate at least three sampling sites within the distribution system for chlorine dioxide sampling. If your system does not have rechlorination within the distribution system, a sample location must be designated near the plant that uses chlorine dioxide. If the system has rechlorination within the distribution system, sampling sites must be designated near the plant that uses chlorine dioxide, at the first service connection downstream of the rechlorination point, and at the far reaches of the distribution system.

Chlorine Dioxide Outline

1) Entry Point Chlorine Dioxide (for systems that use chlorine dioxide)

Only systems that use chlorine dioxide, regardless of whether its purpose is disinfection or taste and odor control, must monitor chlorine dioxide.

a) Frequency

State how often the chlorine dioxide residual is measured (minimum is once a day). In "Distribution System Chlorine Dioxide" (item 3 in this outline), describe the additional sampling required if a sample exceeds 0.8 mg/L.

b) Location

Refer to the table that defines the point(s) of entry and sampling site(s). State:

The residual for each entry point is measured at the applicable sampling site.

c) Method

State the method or equipment used for the daily amperometric titration to determine chlorine dioxide.

d) Compliance calculations

State:

The system is in compliance if the chlorine dioxide residual at an entry point does not exceed 0.8 mg/L.

2) Entry Point Chlorite (for systems that use chlorine dioxide)

Only systems that use chlorine dioxide, regardless of whether its purpose is disinfection or taste and odor control, must monitor chlorite.

a) Frequency

State how often the chlorite residual is measured at the entry point (minimum is once a day). The required monthly distribution sample set is discussed in the distribution system section of the monitoring plan.

b) Location

Refer to the table that defines the point(s) of entry and sampling site(s). State:

The chlorite concentration for each entry point is measured at the applicable sampling site.

c) Method

State the method or equipment used for the daily amperometric titration to determine chlorite.

d) Compliance calculations

State:

The system is in compliance if the chlorite entering the distribution system is monitored daily and reported monthly.

3) Distribution System Chlorine Dioxide (for systems that use chlorine dioxide)

Only systems that use chlorine dioxide, regardless of whether its purpose is disinfection or taste and odor control, must monitor chlorine dioxide. If your system has a bilateral agreement with the TCEQ regarding chlorine dioxide monitoring, continue to follow the terms of that agreement, and keep a copy of it in your monitoring plan.

a) Frequency

i) State:

If the chlorine dioxide concentration of an entry point sample exceeds 0.8 mg/L, then within the next 24 hours take three chlorine dioxide samples in the distribution system.

ii) If the system does not have rechlorination in the distribution system, state:

Chlorine dioxide distribution samples are collected within 2 hours from the time an entry point exceedance is noted, then, two or more following at 6- to 8-hour intervals.

iii) If the system has rechlorination in the distribution system, state:

Chlorine dioxide distribution samples are collected within 2 hours of noting the exceedance. Other distribution samples must be taken 6 to 8 hours after that.

b) Location

- i) If the system does not have rechlorination in the distribution system, describe the site that represents the service connection closest to the plant that had an entry point exceedance.
- ii) If the system has rechlorination in the distribution system, list the three sample sites: one location close to the plant, one location right after rechlorination, and one location at the maximum residence time.

c) Method

State the method and equipment used. Amperometric titration may be used for distribution system chlorine dioxide measurements.

d) Compliance calculations

State:

The system has an acute violation if the entry point sample and any of the follow-up distribution system samples exceed 0.8 mg/L. The system has a nonacute violation if the entry point sample exceeds 0.8 mg/L but none of the follow-up samples exceeds 0.8 mg/L.

4) Distribution System Chlorite (for chlorine dioxide systems)

Only systems that use chlorine dioxide, regardless of whether its purpose is disinfection or taste and odor control, must monitor chlorite.

a) Frequency

State how often chlorite is measured in the distribution system (minimum is one sample at three places, per month). Also state:

Chlorite is also monitored in the distribution system within 24 hours if an entry point sample exceeds 1.0 mg/L.

b) Location

List the sample locations. The three monthly samples are taken at one location close to the plant, at one location with average detention time, and at one location with the maximum detention time.

c) Method

Samples must be sent to a TDH-certified lab. If samples are analyzed in-house, state the method and equipment used. If the system sends samples to a certified lab, state the name and phone number of the lab. Distribution system chlorite samples must be measured using ion chromatography.

d) Compliance calculations

State:

The system is in compliance if the average of any three sample sets in the distribution system is less than 1.0 mg/L.

F.2. Systems that Use Ozone

Bromate (for systems that use ozone)

Only systems that use ozone, regardless of whether its purpose is disinfection or taste and odor control, must monitor bromate.

a) Frequency

State when bromate samples are taken (minimum is monthly).

b) Location

Refer to the table that defines the point(s) of entry and sampling site(s). State:

The bromate concentration for each entry point is measured at the applicable sampling site.

c) Method

State the method number and equipment used. If samples are sent to an outside lab, give the name and phone number of the lab.

d) Compliance calculations

State:

If the bromate level is reliably and consistently less than the regulatory maximum contaminant levels, the system is in compliance. The TCEQ will inform the system of violations. Copies of any letters informing the system are attached in the back of this monitoring plan.

Attach those letters if you have any.

Appendix G. Initial Distribution System Evaluation (IDSE) Sampling Plan Instructions

Explanation of Combined Distribution System or Scheduling Groups

The Stage 2 Disinfectants and Disinfection Byproducts Rule (DBP2) is scheduled by system size. The new scheduling method under DBP2 is basing the schedule on interconnected groups of systems called Combined Distribution Systems (CDSs). A CDS includes all of a group of interconnected water systems. The size of the largest system in a CDS determines the group number for scheduling. If you are not interconnected to any other systems, your system is scheduled based on its own population. The four groups are as follows:

Table G.1. CDS Groups

Group Number	Population Based on system size or size of largest system in Combined Distribution System
Group 1	100,000 or more
Group 2	50,000 – 99,999
Group 3	10,000 – 49,999
Group 4	Less than 10,000

If you don't know why you are in a particular group, please contact us (TCEQ) to discuss it.

1. Confirm Population and Water Type

The Initial Distribution System Evaluation (IDSE) sampling is based on the population and water type at your system. The population listed in the IDSE Sample Plan is based on the TCEQ's current data from your most recent Comprehensive Compliance Investigation (CCI). Changes to population can only be made with the concurrence of the TCEQ's regional investigators. On the IDSE Sample Plan, verify that the population shown is correct.

2. Confirm DBP1 (Stage 1 Disinfectants and Disinfection Byproducts Rule) Sample Sites

A list of the addresses of your current, approved sample sites for DBP1 compliance is on the draft IDSE Sample Plan. The DBP1 rule requires that

at least one out of every four sample sites be at a location that represents maximum water age. The other three sites out of four must be at average water age (or longer). The DBP1 sites are supposed to represent all water sources. The list looks like this:

Table G.2. DBP1 Sample Site List

DBP1 Compliance Sample Site	Type (fill in)
The most recent addresses visited are listed in this column. Make sure that these are right. If they are wrong, cross out the wrong site, and write in the correct site.	There are two types of DBP1 sites: Max Water Age or Average Water Age. Write the type next to each site.

Next to each site, write in whether it is a maximum or average water age site. If the sample sites shown are not correct, draw a single line through the incorrect data, write in the correct data, and submit the plan.

3. Select and List Initial Distribution System Evaluation (IDSE) Sample Sites

Select IDSE sample sites. Fill in the table on the IDSE Sample Plan. Your IDSE sites should *not* be the same as your DBP1 sites. The number and type of sites you need are listed on the IDSE sample plan. There are four possible types of sample sites: potentially High THM, potentially High HAA, Average Water Age, and Near Entry Point. We have shown examples of the locations that you should use for each type of sampling site. These descriptions should be used for the justification portion of the table.

Table G.3. IDSE Sample Site Descriptions

Potential High THM (Maximum Water Age)	Potential High HAA	Average Water Age	Near Entry Point
<ul style="list-style-type: none"> - downstream of tank - dead end, but prior to last customer and prior to last hydrant - hydraulic dead ends and mix zones - downstream of booster chlorination - difficulty maintaining residuals - low water use - high historic levels (from extra sampling) - other _____ 	<ul style="list-style-type: none"> - downstream of booster chlorination - low but detected residual - high historic levels (from extra sampling) - tank - dead end - hydraulic dead end - mixing zone - low water use - other _____ 	<ul style="list-style-type: none"> - average disinfectant residual - average water pressure - other _____ 	<ul style="list-style-type: none"> - purchased-water take point - closest point - other _____

The sample sites should be geographically representative of the entire distribution system.

This table shows how we determined how many sample sites you must select, and how frequently IDSE sample collection will be scheduled at your system.

Table G.4. Number and Type of IDSE Sample Sites, and Frequency of IDSE Monitoring

Source Water Type	Retail Population (Based on most recent TCEQ investigation)	Monitoring Periods and Frequency of Sampling	Distribution System Monitoring Locations ¹				
			Total Number of Sites	Near Entry Point	Average Water Age	High TTHM	High HAA5
Surface²	< 500 (systems purchasing water) ³	1 (during summer)	2	1	—	1	—
	< 500 (systems treating water) ³		2	—	—	1	1
	500 to 3,300 (systems purchasing water) ²	4 (quarterly)	2	1	—	1	—
	500 to 3,300 (systems treating water) ²		2	—	—	1	1
	3,301 to 9,999		4	—	1	2	1
	10,000 to 49,999	6 (every two months)	8	1	2	3	2
	50,000 to 249,999		16	3	4	5	4
	250,000 to 999,999		24	4	6	8	6
	1,000,000 to 4,999,999		32	6	8	10	8
	5,000,000 or more		40	8	10	12	10
Ground⁴	< 500 (systems purchasing water) ²	1 (during summer)	2	1	—	1	—
	< 500 (systems treating water) ²		2	—	—	1	1
	500 to 9,999	4 (quarterly)	2	—	—	1	1
	10,000 to 99,999		6	1	1	2	2
	100,000 to 499,999		8	1	1	3	3
	500,000 or more		12	2	2	4	4

1. A dual sample set (both a TTHM and an HAA5 sample) must be taken at each site.
2. If there is any surface water (or groundwater under the direct influence of surface water—GUI) in the system, it is considered a surface water system for the purposes of this rule.
3. Most systems with a population of 500 or less will get a waiver to IDSE monitoring.
4. Groundwater only, no surface water or GUI.

4. Attach a Distribution System Map

Attach a distribution system map. On the map, include

- entry points
- take points if there are any purchased-water sources
- storage tanks
- disinfectant booster stations
- DBP1 sample site(s)
- the IDSE sample sites listed in the tables above

The schematic should show that the IDSE sites represent the entire distribution system. You don't have to show every single distribution pipe. A map from an Internet mapping site may be adequate for small systems.

5. Attach a copy of the IDSE Sample Plan to your Monitoring Plan

Make a copy of your completed IDSE Sample Plan. Attach the copy to your Monitoring Plan.

6. Sign and Certify

You must certify that the information in the IDSE Sample Plan is correct and sign the form.

7. Mail the Completed IDSE Sample Plan (with distribution system map) to the TCEQ

Make sure that the form is completely filled out. Call the TCEQ if you have questions. Make sure you attach the distribution system map. We recommend, but don't require, that you mail it certified, so that you get a receipt for proof of mailing. Mail it to:

Attn: DBP Coordinator
Public Drinking Water Section, Mail Code 155
Texas Commission on Environmental Quality
P.O. Box 13087
Austin TX 78711-3087

Appendix H. Lead and Copper Sample Site Selection and Materials Survey Checklist Forms and Instructions (TCEQ Form 20467)

All community and non-transient non-community (NTNC) public water systems are required to do lead and copper sampling at customers' taps. In order to set sample sites accurately, systems must perform a materials survey. The reason for sampling lead and copper inside customer's homes is that water can corrode any lead or copper used in customer service lines. The highest risk sample sites are called "Tier 1" or "Category 1." You must revise your form if you change sample sites, if the conditions in your system change, or if the population changes.

The form and instructions that community systems must submit are located on the TCEQ website at <www.tceq.texas.gov/goto/pdw_lead_copper>.

The objective when selecting sampling sites is to choose sites with interior plumbing materials of lead and/or copper, if possible. These types of sites are categorized on the Lead and Copper Sample Site Selection Form from highest to lowest risk (1–4) based on their likelihood to leach lead and/or copper into the drinking water.

You must try to find sampling sites that fit in the highest category possible (closest to 1). For example, search first for sites that meet the description in Categories 1 or 2 on the form. If you can't find sites that fit in either of these categories, then try to find sites that fit in Category 3. If you can't find any sites that fit in Categories 1–3, then all of your sampling sites will go in Category 4 (other). You must list the type of plumbing material and the date of construction for each site you put in Category 4. The total number of sites you identify must equal the number of sites your system is required to sample.

Table H.1. Number of Lead and Copper Sample Sites Required

The population used for the number of sites will be the population determined during the most recent evaluation of your system and posted on the Web at < www.tceq.texas.gov/goto/wud > or < dww.tceq.texas.gov/DWW/ >.	Population	Number of Sample Sites
	less than 101	5
	101 to 500	10
	501 to 3,300	20
	3,301 to 10,000	40
	10,001 to 100,000	60
	more than 100,000	100

ADDITIONAL GUIDELINES FOR SELECTING LEAD AND COPPER SAMPLE SITES

1. DO NOT choose sites with water softeners, filters, or other such additives or devices.
2. For non-transient, non-community systems, only Categories 1 and 2 may apply. For community systems, Categories 1, 2, and 3 may apply.
3. Community systems must confirm with the occupant of each site that the occupant is willing to participate in the sampling program before choosing his or her residence as a sampling site.
4. If the plumbing in your system (including customer's interior plumbing) consists entirely of PVC (plastic pipe), you are still required to sample, because brass faucets and fittings, which may be present, can leach lead. All of these sites will go in Category 4. State in the blanks provided that your system is "all plastic."
5. If your system consists entirely of mobile homes, you are still required to sample. Mobile homes are Single Family Residences (SFR). If they have PVC interior plumbing, put them in Category 4 and state in the blanks provided that they are mobile homes with PVC plumbing.
6. Return the form to:

Lead and Copper Program
Public Drinking Water Section, Mail Code 155
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

If you have any questions, please call the Water Supply Division receptionist at 512-239-4691 and ask to speak to the Lead/Copper coordinator.



TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Lead and Copper Materials Survey Checklist

The following is a checklist of resources for water systems to use when identifying plumbing materials in their systems. Investigate the interior plumbing of your customers or your facility to determine what types of plumbing materials are present in your system. **Mark the resource(s) you used in your investigation in the blank(s) provided.** If you use a resource which is not listed below, indicate that in the blanks provided next to "Other Sources."

Many of these sources may not be available to small systems. Most community systems, however, are able to determine their customers' interior plumbing materials and the age of their residences by contacting them by phone, by mail, or in person.

MATERIALS SURVEY CHECKLIST

1. Distribution System Materials – Sources available to determine the number of lead service lines or lead goosenecks in the distribution system.

- Distribution system maps and record drawings.
- Capital improvement plans for distribution system development.
- System records including meter installation records, customer complaint investigations, and all historical documentation that indicate and/or confirm the location of lead service connections.
- Interviewing senior personnel.
- Performing community survey.

2. Interior Plumbing Materials – Sources available to determine the number of residential or non-residential buildings that have interior lead pipe or copper pipe with lead solder joints.

- County appraisal district records.
- Contacts within the water system or municipal office, or other local officials.
- Survey area plumbers about when and where copper pipe with lead solder was used.
- Interviewing residents—via letters, phone survey, personal contact, etc.
- Interviewing local contractors, developers, and builders.

3. Other Sources (explain): _____

TCEQ Form 20467

Appendix I. Required Monitoring for Systems Using Monochloramine

Some systems are allowed to use monochloramine as a disinfectant, in addition to or as a replacement for free chlorine. These systems are granted that permission through a case-by-case exception from the TCEQ. If your system uses monochloramine, and if your raw water has any significant naturally-occurring ammonia, you should include a description in your monitoring plan of how you sample and analyze for that.

This appendix describes the current requirements that are contained in most exception approvals for use of chloramines. Because approval is granted on a case-by-case basis, your system's approval letter may contain different requirements. You can contact the TCEQ's Technical Review and Oversight Team at 512-239-4691 if you have questions about your monitoring requirements.

Chloramines are formed by the reaction of chlorine and ammonia. The species that is useful as a disinfectant is monochloramine. Dichloramine and trichloramine (nitrogen trichloride) can also be formed, and these are undesirable. The mass ratio of chlorine to ammonia (as nitrogen) should be maintained at between 3:1 and 5:1 in order to ensure that monochloramine is formed without the formation of dichloramine or trichloramine.

Inadequate ammonia feed rates can result in taste and odor problems within the distribution system, caused by dichloramine or trichloramine. Excess free ammonia levels within the distribution system can result in a biological process called "nitrification," which causes low residuals and can create nitrite levels high enough to exceed the maximum contaminant level, placing small infants at risk of methemoglobinemia.

Monochloramine and free ammonia levels need to be tested periodically to properly control the chloramination process and prevent inappropriate ammonia feed rates. The current ammonia level in the source water will affect the amount of chlorine and ammonia you will need to add to achieve the desired chlorine-to-ammonia ratio.

In some parts of Texas, raw water may contain significant amounts of organic ammonia. In these situations, it is necessary to factor in the naturally occurring ammonia when determining the appropriate additional ammonia dose. Some of this ammonia may be available to create chloramines, and the system may be required to monitor the raw water ammonia in order to correctly determine the appropriate chlorine-to-ammonia ratio.

Systems using chloramines must meet the following requirements as a condition of the exception. The plant must obtain a test kit(s) or use a laboratory procedure that can measure the following:

- **Free Ammonia**—preferably with the ability to differentiate between inorganic ammonia (such as LAS) and naturally-occurring organic nitrogen compounds, such as urea, that might be present in surface water.
- **Monochloramine**—with the ability to distinguish between monochloramine levels and other forms of total chlorine.
- **Chloramine**— measured as Total Chlorine

Table I.1. Monitoring Required for Systems Using Monochloramine for Disinfection

Constituent to Sample	In-Plant At the treatment plant, downstream of the chlorine or ammonia injection point where you are adjusting the feed rate	Entry Point At each entry point to the distribution system	Distribution System At a representative distribution system sample site
Free Ammonia	Prior to and after adjusting the chlorine or ammonia feed rate	Weekly ¹	At least monthly ²
Monochloramine	After adjusting the chlorine or ammonia feed rate	Weekly	n/a
Total Chlorine	After adjusting the chlorine or ammonia feed rate	Weekly	At least monthly ²

1. If an elevated level of free ammonia is detected in the water at the entry point to the distribution system, more frequent monitoring is recommended.

2. When collecting a routine monthly bacteriological sample(s).

The minimum required distribution residual for systems distributing chloraminated water is 0.5 mg/L chloramine residual (measured as total chlorine).

Records of monochloramine, total chlorine, and free ammonia monitoring must be maintained with the system's disinfectant records for a period of three years and made available to the TCEQ staff upon request as specified in 30 TAC 290.46(f)(3)(F).

If the ammonia is too high because of overfeeding, the operator must take action to correct the chlorine-to-ammonia feed ratio.

Under some conditions, a process called "nitrification" can develop in systems that use chloramines. This occurs when ammonia-oxidizing bacteria (AOB) multiply in the pipes. AOB use ammonia as a food source, and produce nitrite. In extreme situations, other bacteria called nitrite-oxidizing bacteria (NOB) use nitrite as a food source to produce nitrate. Both nitrite and nitrate have the adverse health effect of increasing the risk of methemoglobinemia, or blue-baby syndrome. It is highly recommended that any system using chloramines have a nitrification action plan (NAP).

Appendix J. LT2 Sampling Plan Diagrams and Schedule

Sampling Schedule: Long Term 2 Enhanced Surface Water Treatment Rule

You will have a two-day window on either side of the dates you specify to actually take your samples. For example, if you have a sample date of Oct. 8, 2008, you may take your sample anytime between Oct. 6 and Oct. 10, 2008. However, you must take the sample in time to get it submitted to the lab. Please consult with your lab to see when they will actually accept your samples.

PWS Name: _____ PWS ID: _____

Lab Name: _____

Sample #	Sample Date
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

Sample #	Sample Date
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	

Sample Schematics

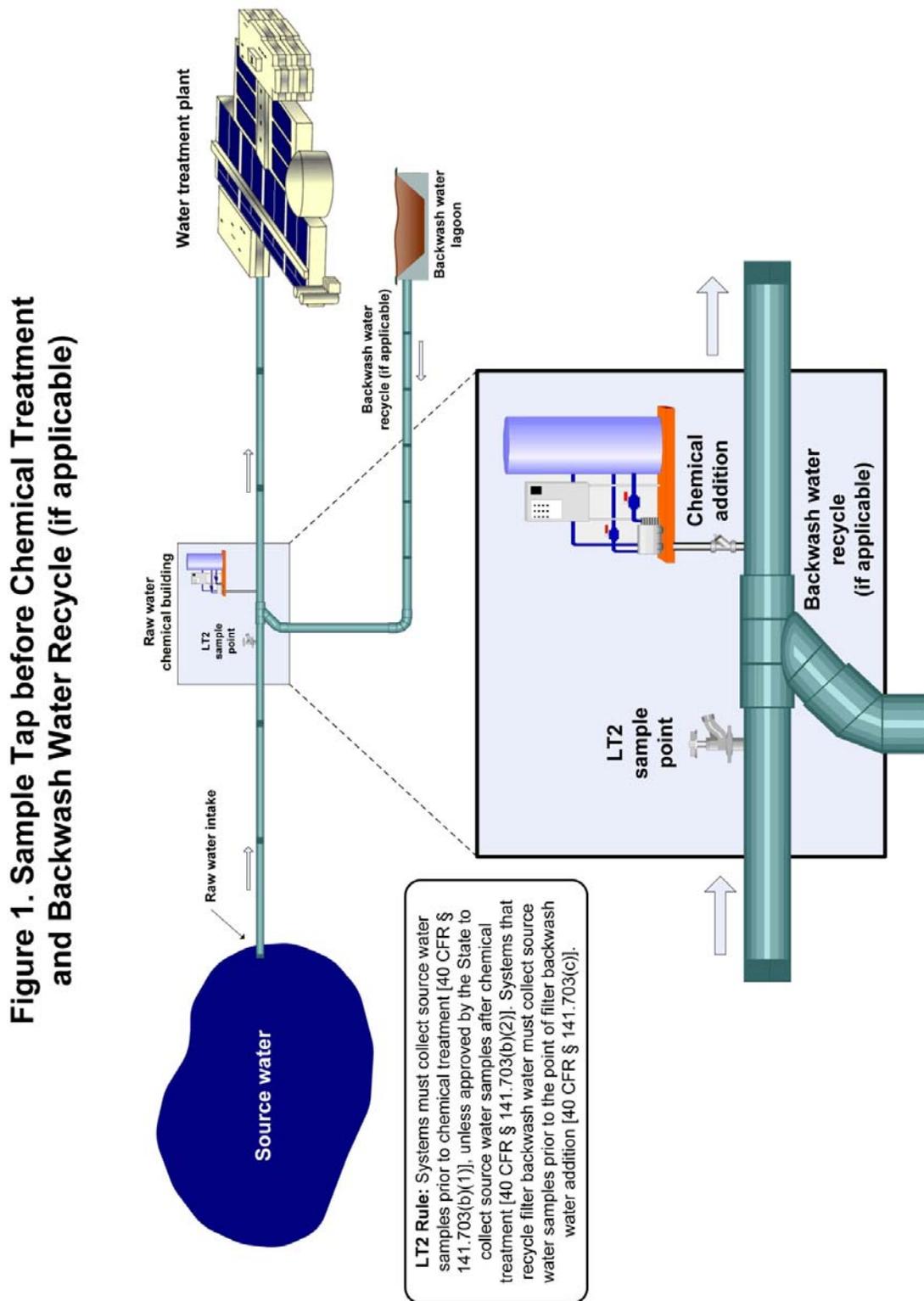
There are ten sample schematics on the following pages. Of these schematics, choose the *one* that most resembles the arrangement for your raw water source and treatment plant(s). Mark it with a pen as needed. Indicate where the samples will be taken. If you recycle your filter backwash water, indicate on the schematic where the recycled filter backwash water re-enters the treatment process.

All samples must be taken at a point prior to any chemical treatment and prior to any re-entry of recycled filter backwash water.

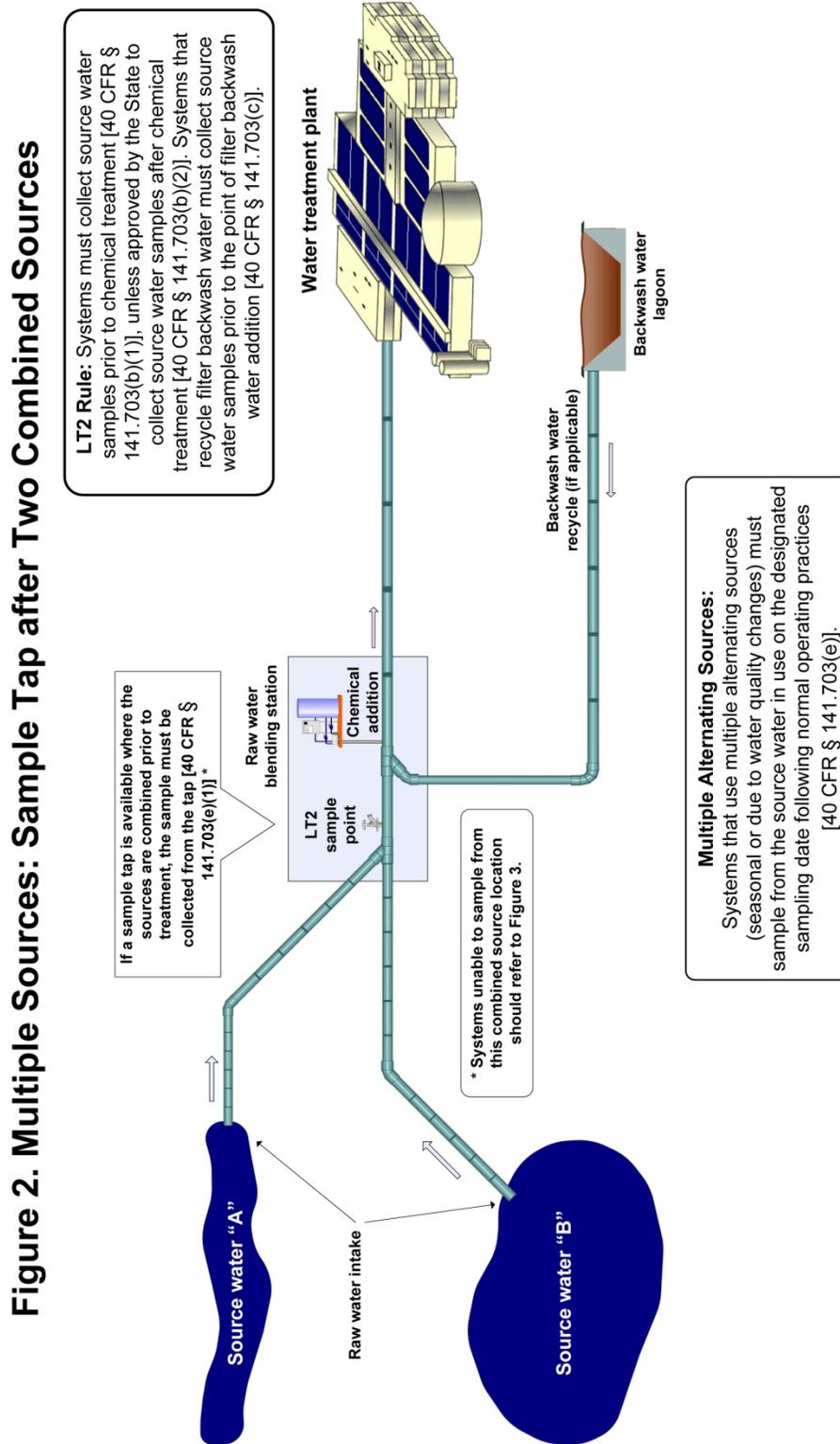
Since the schematics are printed back-to-back, the schematic you choose will have another schematic on the opposite side. Please cross out the extra schematic with a pen (to prevent bleeding through, do not use a marker). You can create your own schematics if you choose.

These schematics, along with other information regarding LT2 sampling for small water systems, can also be found at <www.tceq.texas.gov/goto/pws/lt2>.

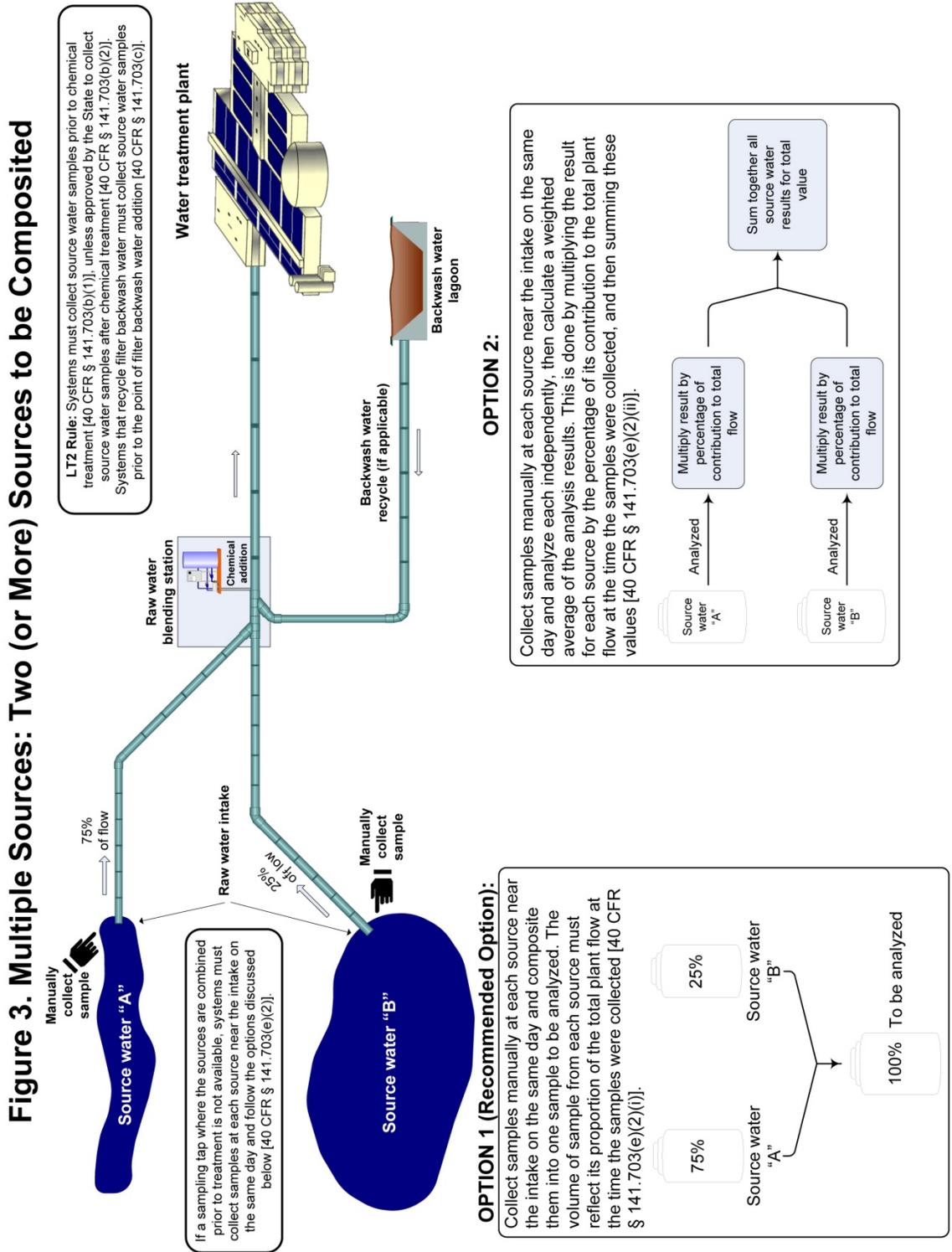
Schematics Figure 1. Sample Tap before Chemical Treatment and Backwash Water Recycle (if applicable)



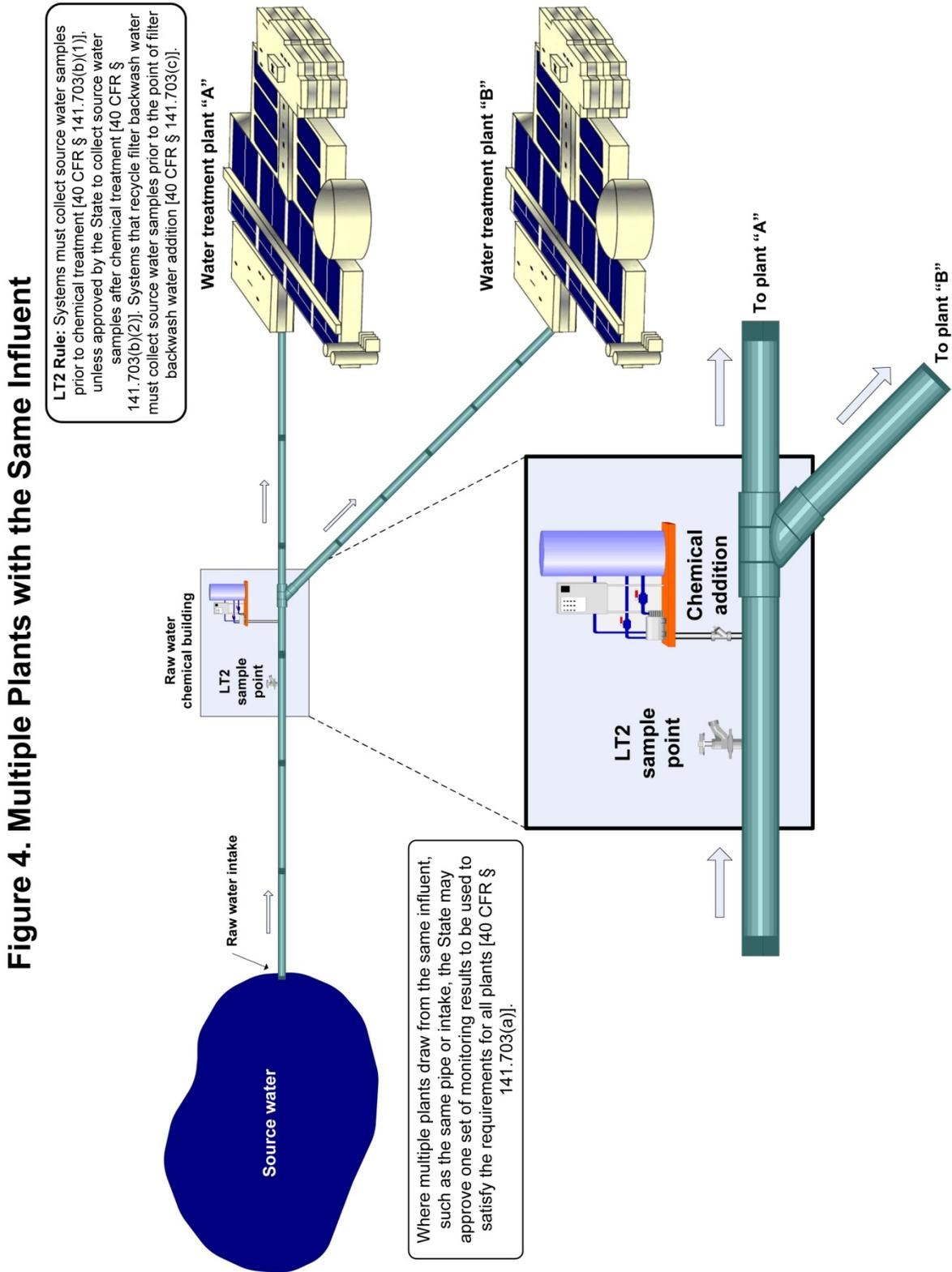
Schematics Figure 2. Multiple Sources: Sample Tap after Two Combined Sources



Schematics Figure 3. Multiple Sources: Two (or More) Sources to be Composited



Schematics Figure 4. Multiple Plants with the Same Influent



Schematics Figure 5. Bank Filtration

Figure 5. Bank Filtration
 The correct sampling location for systems using bank filtration differs depending on whether the bank filtered water is treated by subsequent filtration:

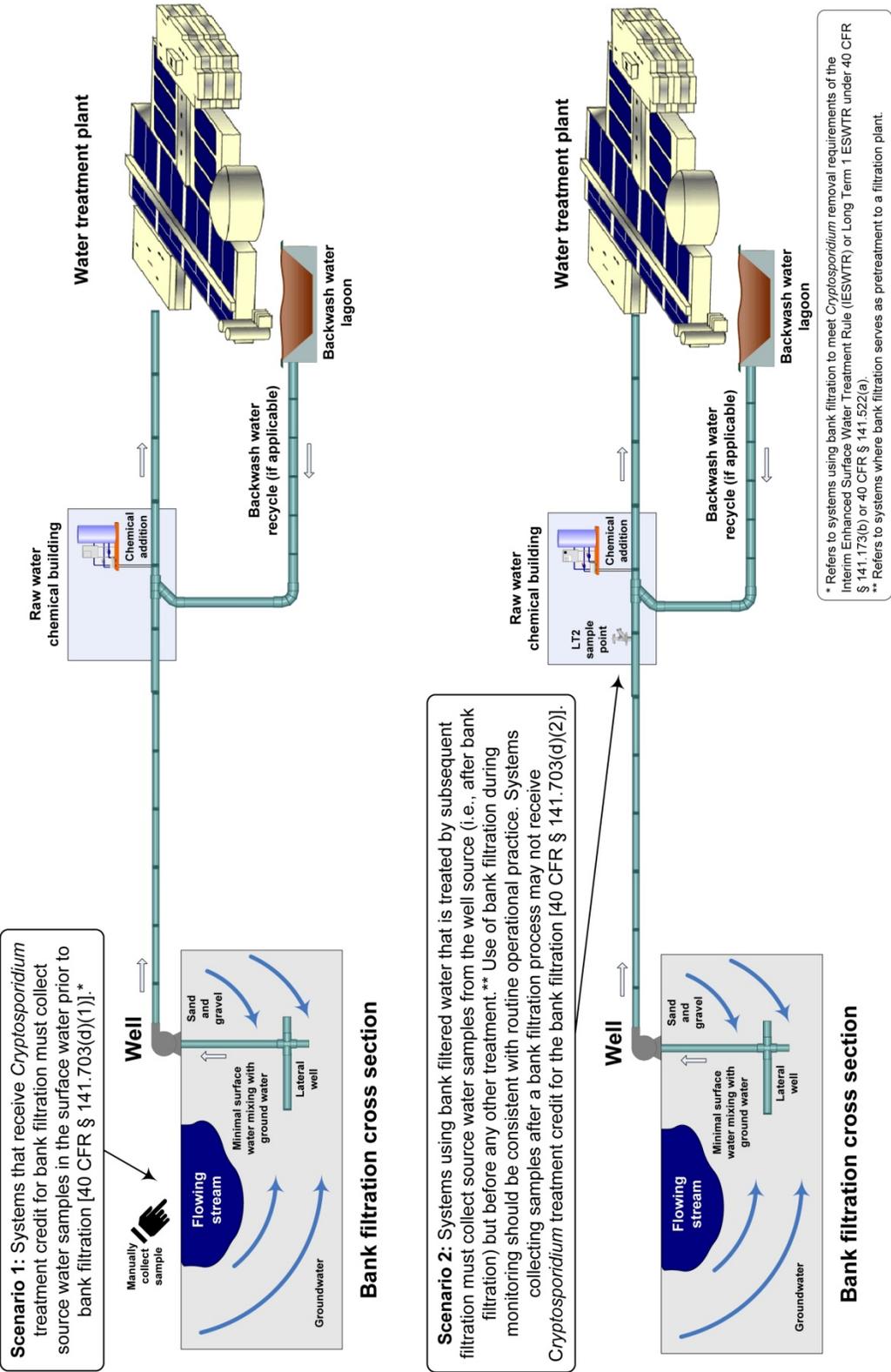
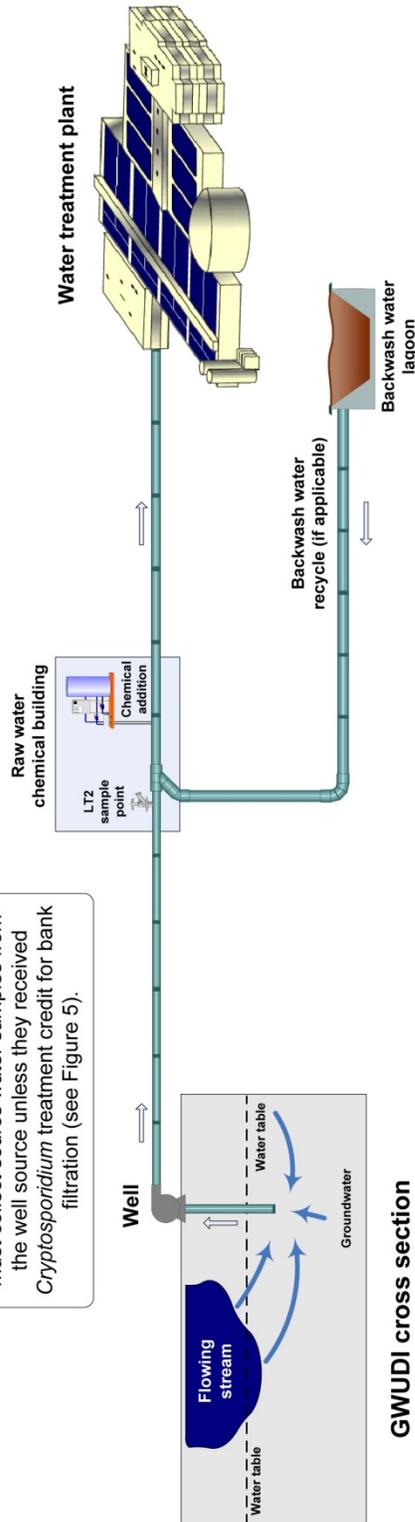


Figure 6. Ground Water Under the Direct Influence of Surface Water (GWUDI)

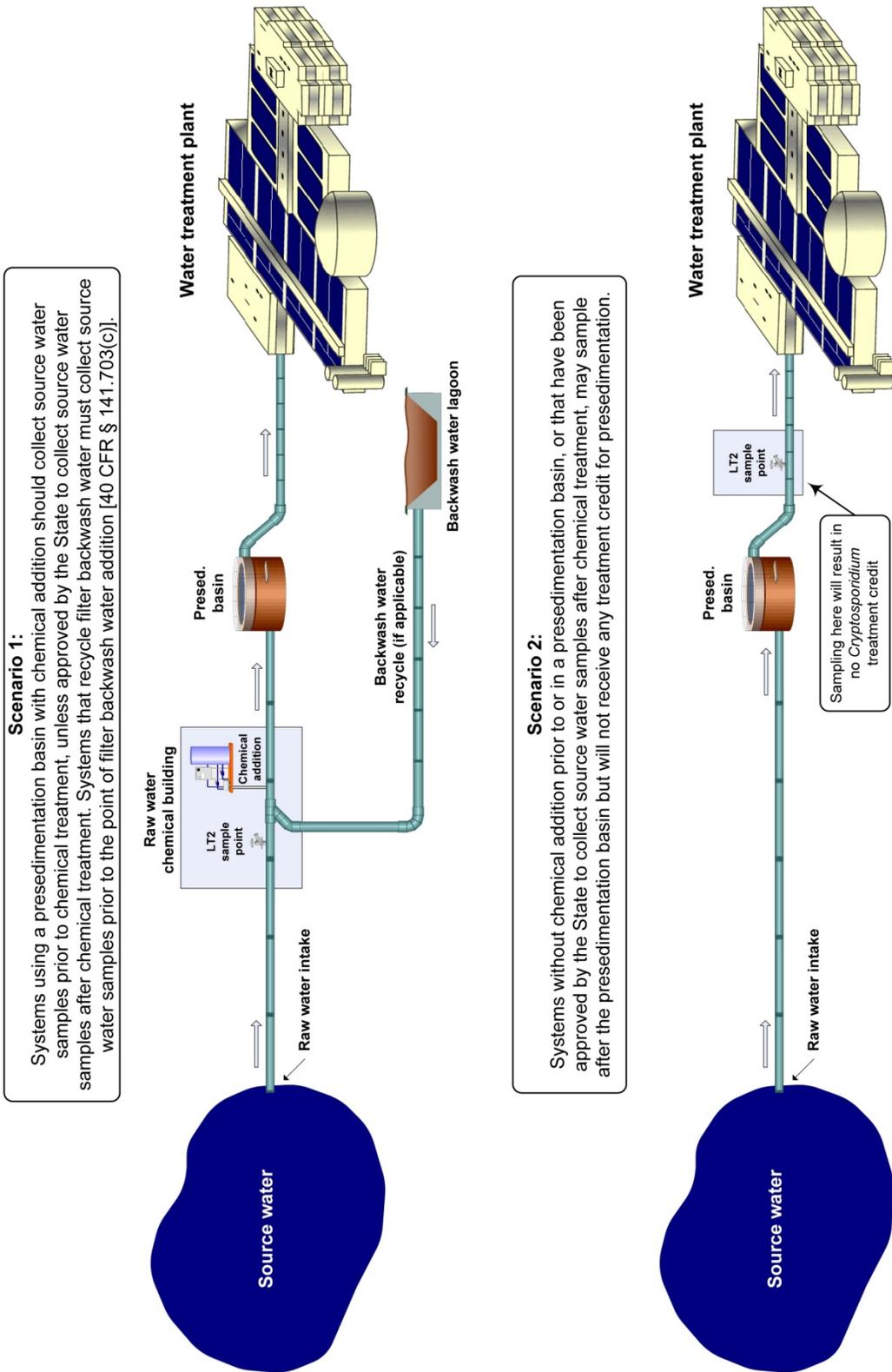
LT2 Rule: Systems must collect source water samples prior to chemical treatment [40 CFR § 141.703(b)(1)], unless approved by the State to collect source water samples after chemical treatment [40 CFR § 141.703(b)(2)]. Systems that recycle filter backwash water must collect source water samples prior to the point of filter backwash water addition [40 CFR § 141.703(c)].

Systems that use ground water under the direct influence of surface water (GWUDI) must collect source water samples from the well source unless they received *Cryptosporidium* treatment credit for bank filtration (see Figure 5).

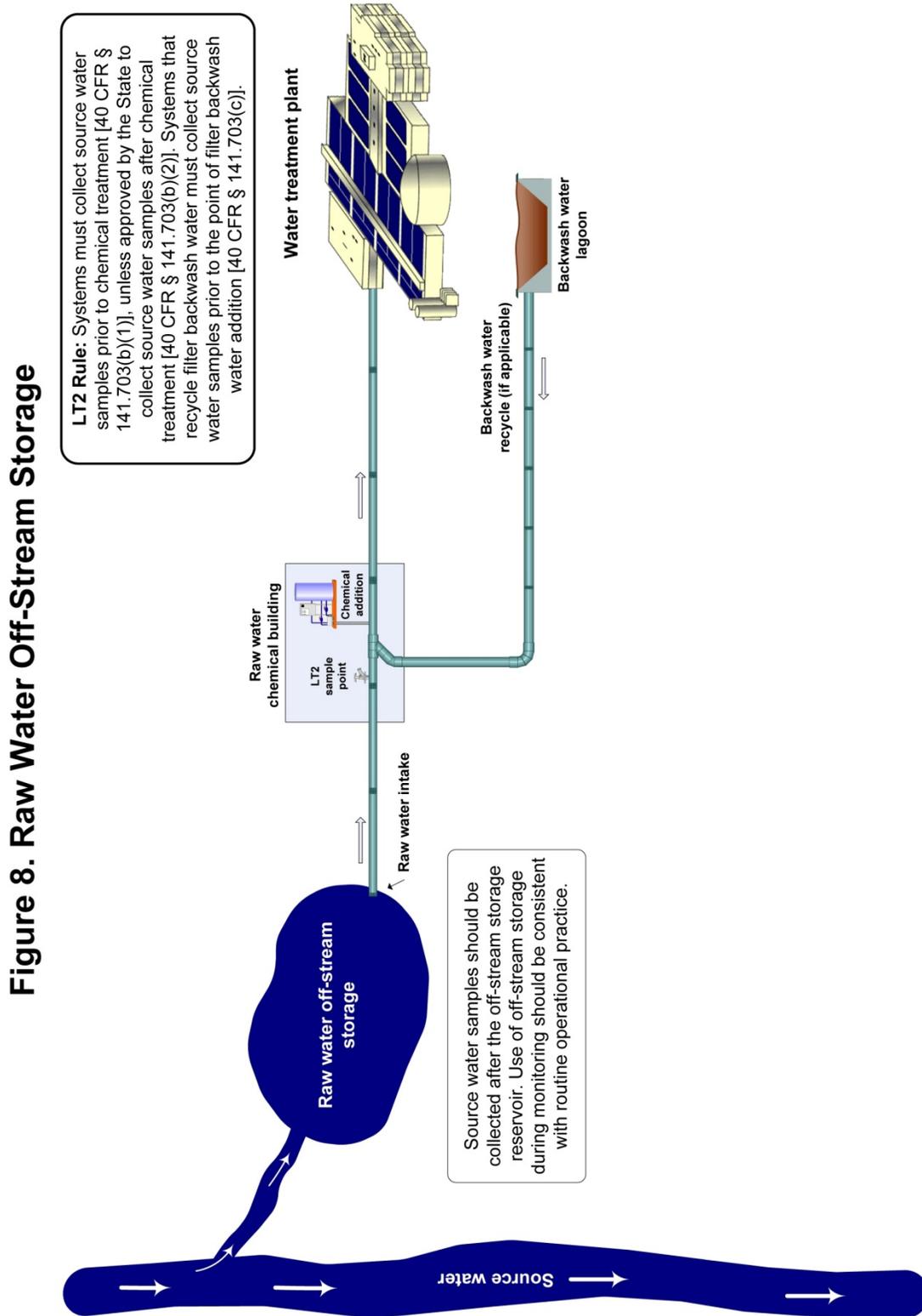


Schematics Figure 7. Presedimentation Basin

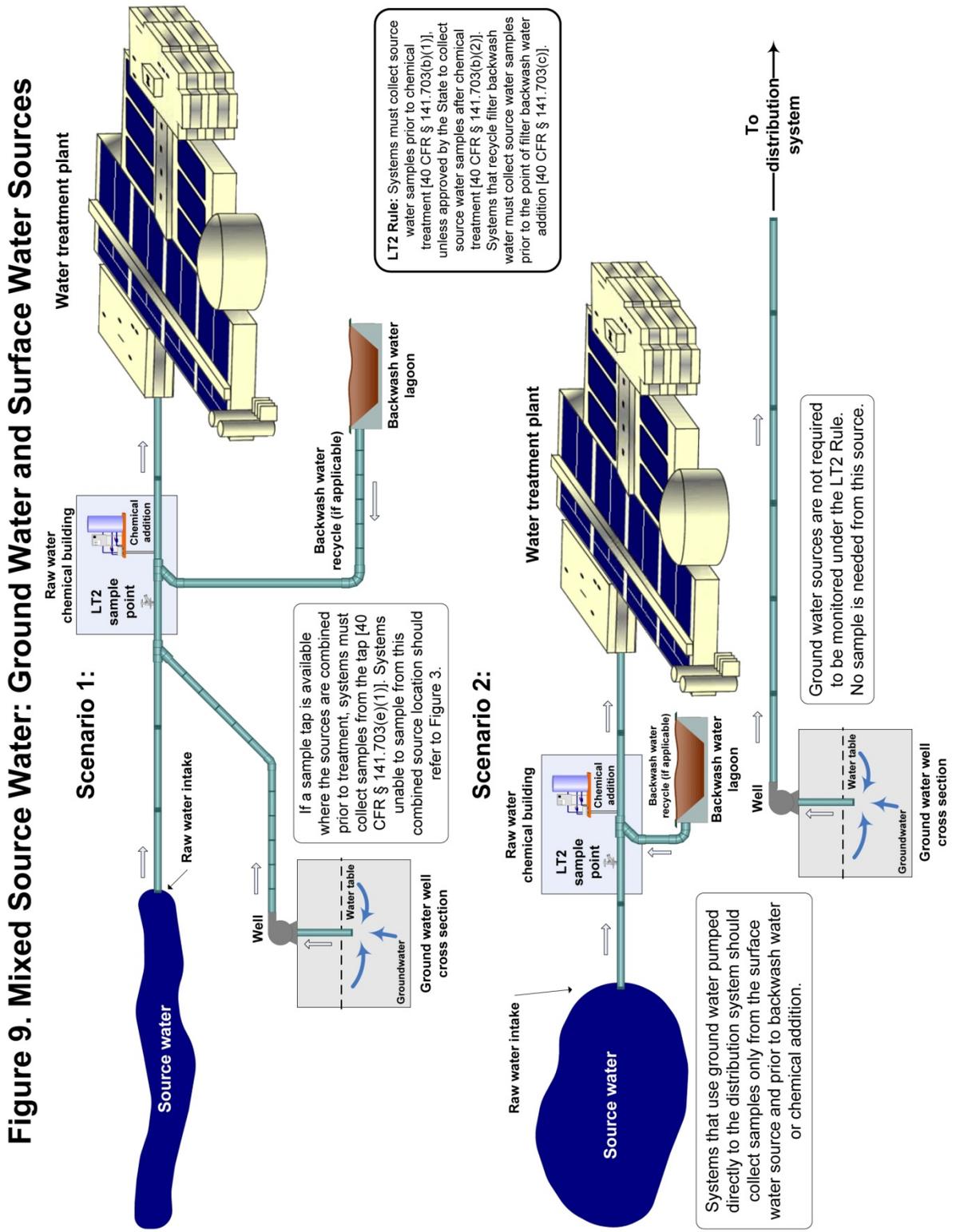
Figure 7. Presedimentation Basin



Schematics Figure 8. Raw Water Off-Stream Storage



Schematics Figure 9. Mixed Source Water: Groundwater and Surface Water Sources



Schematics Figure 10. Blank Schematic

Figure 10. Blank Schematic

Public Water System (PWS) name: _____

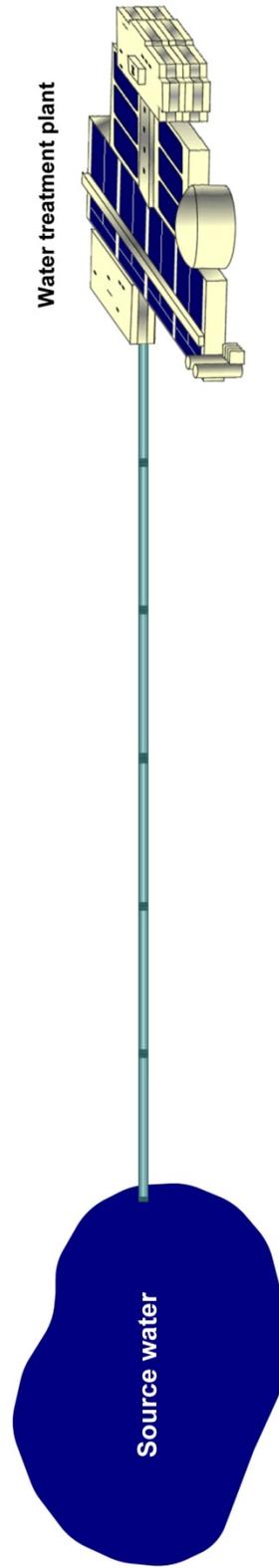
PWS ID: _____

Water treatment plant name: _____

Water system facility ID: _____

Indicate the following on the diagram that best represents your facility type (if applicable):

1. LT2 sampling location
2. Points of chemical treatment prior to the treatment plant
3. Filter backwash water addition
4. Pretreatment processes (e.g., presedimentation basins, bank filtration)
5. Multiple source waters (show by adding additional sources)





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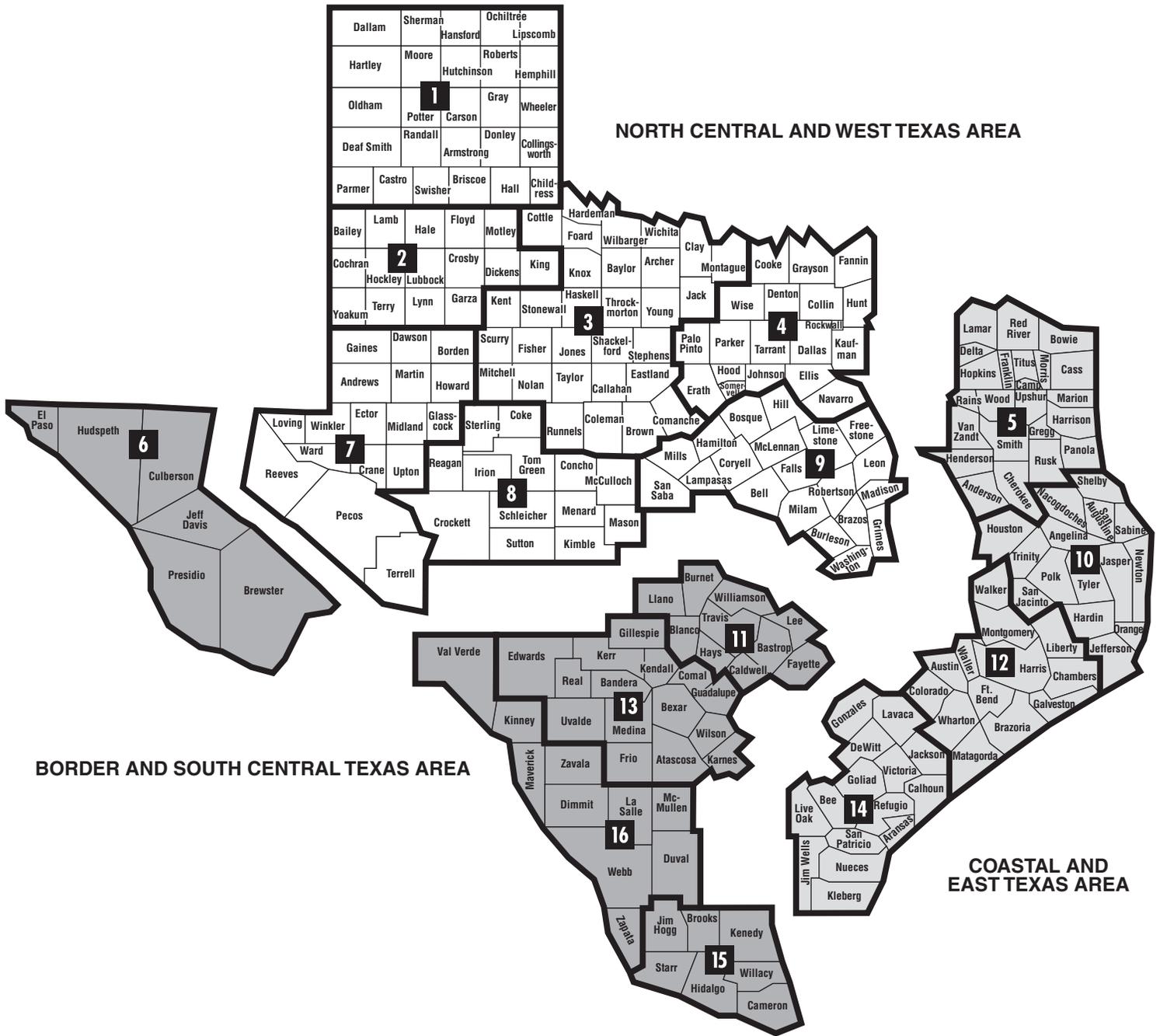
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