



TCEQ REGULATORY GUIDANCE

Water Supply Division

RG-407

November 2003

Disinfectant Residual Reporting for Public Water Systems

Contents

Preface	1
1. Applicability	4
2. Maximum and Minimum Disinfectant Levels	5
3. Sampling: When? Where? How? Who?	6
3.1 How Often to Sample	6
3.2 Where to Sample	10
3.3 How to Analyze Your Samples	12
3.4 Who May Collect Samples	12
4. Reporting Requirements	13
4.1 When Is the Report Due?	13
4.2 Disinfectant Level Quarterly Operating Report (DL QOR) Form	13
4.3 How to Do Important Calculations for a DL QOR	18
5. Compliance	20
6. Public Notification	21

Tables

1. Maximum Residual Disinfectant Levels for Free or Combined Chlorine	5
2. Minimum Disinfectant Levels for Free or Combined Chlorine	5
3. Required Number of Distribution System Disinfectant Samples	6
4. Required Number of Distribution System Sample Sites	8
5. When Your DL QOR Is Due	11

Preface

This guide shows public water systems (PWSs) that use only purchased water or groundwater how to comply with the requirements of 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 290.110: Disinfectants.

Examples

3.1 How Many Samples to Collect	7
3.2 Distribution System Sample Site List ...	9
4.1 Calculating “Average of All Disinfectant Residuals for This Month”	12
4.2 Calculating “below MIN for This Month” (Weekly Sampling)	12
4.3 Calculating “below MIN for This Month” (Daily Sampling)	13
4.4 Calculating “Average of All Disinfectant Residuals for This Quarter”	13
5.1 Compliance with Minimum Residuals ..	14

Reporting Forms

Disinfectant Level Quarterly Operating Report (DL QOR)	back page
Sample Completed DL QOR ..	inside back page

Appendixes

A. Worksheets

PWSs with Fewer Than 750 Customers ..	17
PWSs with 750 to 1000 Customers	18
MRDL Calculation for Any PWS Collecting Daily Disinfectant Residuals ..	19
Residuals Collected with Coliforms	20

B. Abbreviations and Acronyms Used ...

Monitoring requirements for disinfectants 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.

Our Web site has links to the Secretary of State's official version of the rules. From our home page (www.tceq.state.tx.us), click on "Rules, Policy & Legislation" and then follow the links to the official rules. The rules governing this guide were published in the May 10, 2002, edition of the *Texas Register*.

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

What Rules Apply to PWSs in Texas?

The state of Texas has primacy over regulation of public drinking water. This means that we write, adopt, and enforce Texas rules that are at least as stringent as the rules promulgated by the U.S. Environmental Protection Agency (EPA). The Texas rules may be worded differently from the EPA rules, so PWSs should become familiar with these Texas-specific rules.

PWSs should also be aware of the rules pertaining to drinking water that are contained in various parts of the Texas regulations. A PWS must comply with all the applicable requirements. Each rule explains who is affected by it. Some examples of additional rules and their location within the regulations are given below:

- **30 TAC Chapter 290, Subchapter F:** requirements regarding harmful or potentially harmful drinking water constituents for PWSs.
- **30 TAC Chapter 290, Subchapter D:** rules and regulations for PWSs related to requirements for the design, operation, and maintenance of water sources, treatment plants, and distribution systems.
- **30 TAC Chapter 291:** rules and regulations for water utilities related to requirements for rates, capacity development, and Certificates of Convenience and Necessity (CCN) for utilities.
- **30 TAC Chapter 293:** requirements for districts that are also PWSs.
- **30 TAC Chapter 30:** requirements for licensing of water works operators. The TCEQ's Operator Licensing Team can answer questions about these requirements at 512/239-6300.
- **Texas Occupations Code Ann., Title 12, Practices and Trades Related to Water, Health, and Safety, Subtitle A, Chapter 1901 and Chapter 1902:** requirements for water well drillers, including those who drill wells for PWSs. If you have questions about these regulations, call 1-800-803-9202 or 512/463-8876.

Who Can Answer Questions about These Rules?

If you have questions about the rules covered by this guide or about a rule that is listed on page 2 and has no phone number in its description, call our public drinking water program at 512/239-4691.

How Can I Get Copies of TCEQ Publications and Forms?

To get copies of our publications or forms on the Internet, go to **www.tceq.state.tx.us**. Under the “Site Navigation” bar, follow the links to “Rules, Policy, & Legislation” and to “Forms and Publications.”

If the item you want is not listed on our Web site, our Publications Distribution Unit will help you find it. Contact them in one of these ways:

- Fax your order to 512/239-4488.
- Phone 512/239-0028.
- Write to: TCEQ Publications MC 195
PO Box 13087
Austin TX 78711-3087

Try to give the **number** of the rule, publication, or form as well as its title. This information will help us get the correct item to you quickly.

What Can the TCEQ Web Site Show Me about My PWS?

We have put our Water Utility Database (WUD) on the Web so you can check the data we have about your PWS. To find the main WUD page:

1. Go to our home page, **www.tceq.state.tx.us**
2. Under “Site Search,” type “WUD” in the search window. (This will take you to a page that has a list of links.)
3. Click on “Water Utility Database (WUD).”
4. Click on “Go to the Water Utility Database (WUD).”

WUD can help you find your PWS ID number. Every PWS has a seven-digit identification number, or PWS ID. The first three digits of your PWS ID tell us which county your PWS is in. The last four digits are unique to your PWS in that county. To find your PWS ID from the main WUD page:

1. Under “Search by:” click on “Public Water System (PWS) Name or ID.”
2. Following the instructions, enter the first part of the name of your PWS in the box and click “Submit.”
3. Find your PWS in the list that appears. The PWS ID will be in the second column of this list.

WUD can show you our data for your PWS. From the main WUD page:

1. Click on “Request a WUD Report.”
2. From the pull-down menu, select “PWS Data Sheet.”
3. Click “Submit.” (This will take you to another page.)
4. On the new page, enter your PWS ID to bring up your data.

If WUD's data for your PWS is wrong, print out the report and correct the data that is wrong. Attach the corrected report to a note asking us to update the information and mail it to:

Data Management Coordinator
Public Drinking Water Section MC 155
TCEQ
PO Box 13087
Austin TX 78711

1. Applicability [30 TAC §290.110(a)]

Beginning in January 2004, all community (C) and nontransient noncommunity (NTNC) PWSs that use only purchased water (PW) or groundwater (GW) must start reporting information about their distribution system's disinfection to us. This guide explains how these PWSs need to monitor and report disinfectant information to us.

PWSs that treat surface water already submit information about disinfectant residuals on their Surface Water Monthly Operating Report (SW MOR), so this guidance does not affect them. PWSs that treat surface water or groundwater under the direct influence of surface water (GUI) should obtain and follow *Monthly Testing and Reporting at Surface Water Treatment Plants* (TCEQ publication RG-211).

What Did Not Change?

The sampling requirements for disinfectants **have not** changed. PWSs still must collect samples at the same time that coliform samples are collected, as well as periodically checking the disinfectant residual in the distribution system.

What Has Changed?

The EPA promulgated the Stage 1 Disinfectants and Disinfection Byproducts Rule (DBP1) on December 16, 1998. The TCEQ adopted the provisions of this rule on May 7, 2000. This rule has many requirements, including *maximum residual disinfectant levels* (MRDLs). Because of the MRDLs, PWSs must now report their disinfectant residuals to us on the Disinfectant Level Quarterly Operating Report (DL QOR). PWSs must also keep that information on hand to show to the regional investigator who performs the Comprehensive Compliance Investigation (CCI, or "sanitary survey").

Are Transient Noncommunity (TNC) PWSs Exempt?

Not exactly. Transient noncommunity (TNC) PWSs, such as parks, do not have to *send in* the DL QOR. However, TNCs must take samples for disinfectant residual and coliforms in accordance with 30 TAC Subchapter F, Sections 290.109 and 290.110.

2. Maximum and Minimum Disinfectant Levels

[30 TAC §290.110(b)]

What Are Maximum Residual Disinfectant Levels?

MRDL stands for *maximum residual disinfectant level*. In its rules, the EPA noted that there may be increased risks of cancer to people who drink water with *very* high levels of free or combined chlorine. Therefore, the EPA adopted an upper limit to the concentration of disinfectant a distribution system should have, based on all of the sample results. Table 1 shows the MRDLs for free or combined chlorine [30 TAC §290.110(b)(5)].

Table 1: Maximum Residual Disinfectant Levels for Free or Combined Chlorine

Disinfectant	MRDL milligrams per liter (mg/L)	To see if you comply:
Free chlorine	4.0 mg/L	See if the Running Annual Average (RAA) of all distribution system samples is at or below 4.0 mg/L. If so, your PWS complies with this rule.
Combined chlorine (also called chloramines)	4.0 mg/L	

Isn't the Minimum Level of Disinfectant in the Distribution System More Important Than the Maximum?

Yes, the minimum level of disinfectant in the distribution system is more critical than the maximum level, because disinfection kills microbes (germs) that can cause acute diarrhea, nausea, or other illness. The TCEQ's minimum standards for disinfectant in the distribution system have not changed; they are shown in Table 2 [30 TAC §290.110(b)(4)].

Table 2: Minimum Disinfectant Levels for Free or Combined Chlorine

Disinfectant	MINIMUM milligrams per liter (mg/L)	To see if you comply:
Free chlorine	0.2 mg/L	Each month, look at the data for the samples taken that month and the month before. For this two-month set of samples, calculate the percentage that are <i>at or below</i> the minimum. If this value is no more than 5%, your system complies with this rule.
Combined chlorine (also called chloramines)	0.5 mg/L	

3. Sampling: When? Where? How? Who?

[30 TAC §290.110(c)]

3.1 How Often to Sample [30 TAC §290.110(c)(5)]

The number of samples that your PWS must take depends on the number of customers it serves. The two kinds of required samples are:

- disinfectant residual collected at the same time as coliform samples, and
- other disinfectant residuals throughout the distribution system.

In Table 3, you can find the minimum required number of disinfectant residual samples your PWS must take. (You may collect more if you want.)

Table 3: Required Number of Distribution System Disinfectant Samples

Population Served	Number of Monthly Disinfectant Residual Samples Collected with Coliform Samples	Total Number of Monthly Disinfectant Residual Samples Required
1–750	1 per month	Weekly* disinfectant samples
750–1,000	1 per month	Daily* disinfectant samples
1,001–2,500	2 per month	
2,501–3,300	3 per month	
3,301–4,100	4 per month	
4,101–4,900	5 per month	
4,901–5,800	6 per month	
5,801–6,700	7 per month	
6,701–7,600	8 per month	
7,601–8,500	9 per month	
8,501–12,900	10 per month	
12,901–17,200	15 per month	
17,201–21,500	20 per month	
21,501–25,000	25 per month	
25,001–33,000	30 per month	
33,001–41,000	40 per month	
41,001–50,000	50 per month	
50,001–59,000	60 per month	
59,001–70,000	70 per month	
70,001–83,000	80 per month	
83,001–96,000	90 per month	
96,001–130,000	100 per month	
130,001–220,000	120 per month	
220,001–320,000	150 per month	
320,001–450,000	180 per month	
450,001–600,000	210 per month	
600,001–780,000	240 per month	
780,001–970,000	270 per month	
970,001–1,230,000	300 per month	
1,230,001–1,520,000	330 per month	
1,520,001–1,850,000	360 per month	
1,850,001–2,270,000	390 per month	
2,270,001–3,020,000	420 per month	
3,020,001–3,960,000	450 per month	
3,960,001 or more	480 per month	

Note: You may use the disinfectant levels that you measure in your coliform samples for some of these samples. See Example 3.1 on page 7 for more details.

Example 3.1: Determining How Many Samples to Collect in a Month

The Sunshine Mobile Home Park (MHP) PWS serves 14 mobile homes with a total population of 47 people. The PWS's monitoring plan states that all weekly samples will be collected on Monday and that coliform samples will be collected the first Monday of the month. *So how many samples must Sunshine MHP collect in January 2004?*

Answer: According to Table 3, Sunshine MHP must collect:

- at least one coliform sample every month (because it serves fewer than 1,000 people)
- weekly samples for distribution system disinfectant residuals (because it serves fewer than 750 people)

The first Monday of January 2004 is the 5th of the month. So Sunshine MHP's sampling schedule for January 2004 would be:

On Monday, January:	Collect:	On this sample, determine:
5	1 sample	coliform <i>and</i> disinfectant residual
12	1 sample	disinfectant residual only
19	1 sample	disinfectant residual only
26	1 sample	disinfectant residual only

So Sunshine MHP should collect *four* samples in January 2004.

Example 3.1 represents the simplest sampling situation. If your PWS serves 750 or more people:

- You must measure disinfectant residual at least once every day
- You may use the disinfectant residual measurement from a scheduled coliform sample as the measurement for that day.
- If you collect many coliform samples on one day, the residuals count for that day only. For example, even if you take seven coliform samples Monday, you still must measure disinfectant residuals every other day of the week.

So to make sure you make the best use of the samples you take, you need a list that tells *what* to sample for, *when* to take each sample, and *where* to take each sample. This list is actually a required part of your PWS's monitoring plan. To learn more about it, see Section 3.2, "Where to Sample," on page 8.

Tip: Know the Population Your PWS Serves

If you don't know exactly how many customers your PWS serves, you can look up the data we have for your PWS on our Web site. To find out how, see "What Can the TCEQ Web Site Show Me about My PWS?" on page 3.

3.2 Where to Sample [30 TAC §290.110(c)(5)]

Samples for Distribution System Monitoring

Every PWS must designate sample sites that are representative of the entire distribution system for both bacteriological (coliform) and disinfectant residual samples. Table 4 shows how many sample sites a PWS must have, based on the size of the population it serves. This is the minimum required number of sample sites. You may designate more if you want.

Table 4: Required Number of Distribution System Sample Sites

Population Served	Coliform Samples	Number of Sample Sites
1–1,000 1,001–2,500 2,501–3,300 3,301–4,100 4,101–4,900	1 per month 2 per month 3 per month 4 per month 5 per month	At least 5 sites
4,901–5,800 5,801–6,700 6,701–7,600 7,601–8,500 8,501–12,900 12,901–17,200 17,201–21,500 21,501–25,000 25,001–33,000	6 per month 7 per month 8 per month 9 per month 10 per month 15 per month 20 per month 25 per month 30 per month	Same number of sample sites as samples (<i>Example:</i> A PWS that collects 6 samples must have at least 6 sample sites)
33,001–41,000 41,001–50,000	40 per month 50 per month	At least 30 sample sites
50,001–59,000 59,001–70,000 70,001–83,000 83,001–96,000	60 per month 70 per month 80 per month 90 per month	Half as many sample sites as samples (<i>Example:</i> A PWS that collects 210 samples must have at least 105 sample sites)
96,001–130,000 130,001–220,000 220,001–320,000 320,001–450,000	100 per month 120 per month 150 per month 180 per month	
450,001–600,000 600,001–780,000 780,001–970,000 970,001–1,230,000	210 per month 240 per month 270 per month 300 per month	
1,230,001–1,520,000 1,520,001–1,850,000 1,850,001–2,270,000 2,270,001–3,020,000	330 per month 360 per month 390 per month 420 per month	
3,020,001–3,960,000 3,960,001 or more	450 per month 480 per month	

The sample sites for your PWS should be representative of the whole distribution system that you serve. You only need one list of sites that you can use for both coliform and disinfectant monitoring. The list of sample sites also has to show when each site is monitored. Example 3.2 shows a list of sites showing when they are sampled.

Example 3.2: Distribution System Sample Site List

The City of Schulzestown has a population of 3,333 people. *What would the City of Schulzestown's sample site list look like?*

Answer: According to Tables 3 and 4, Schulzestown must:

- collect *daily* disinfectant residual samples (because they serve more than 750 people),
- collect four coliform samples a month (because they serve between 3,301 and 4,100 people), and
- have at least five sample sites (because they serve between 3,301 and 4,100 people).

To develop a set of five sampling sites that produce results that are representative of the entire distribution system, Schulzestown's operator picked locations in all parts of town and developed a sampling schedule. Because the operator is the only person available to do the sampling, weekend samples are collected at the operator's house.

Sample Site	Samples Collected When?	
	Coliform	Disinfectant
City Hall (middle of town)	First Monday of each month	Every Monday
123 Wayout North Street		Every Tuesday
654 Waydown South Street		Every Wednesday
10000 West Way		Every Thursday
999 East Way	<i>Alternate site:</i> See below.	Every Friday
157 Golf Club Drive (Operator's house, in the middle of town)	<i>Alternate site:</i> Use whenever a site listed above cannot be used (e.g., too windy, occupant on vacation, spraying pesticide).	Every Saturday and Sunday

This list of sample sites has been called the “BacT List” in the past, but it can also be referred to as a monitoring plan. In fact, this list must be included as part of a PWS's official monitoring plan, which all PWSs must develop by January 1, 2004. To learn more about the requirements for monitoring plans, see *How to Develop a Monitoring Plan for a Public Water System* (TCEQ publication RG-384).

Samples for Entry Point Monitoring

Technically speaking, the “entry point” to your distribution system is not a part of the distribution system itself. The definition of an entry point is “the point at which freshly treated water enters the distribution system.” You can find more information about entry points in *How to Develop a Monitoring Plan for a Public Water System* (TCEQ publication RG-384).

We recommend highly that you monitor the disinfectant level at your PWS's entry point. If you already do so, we commend you and recommend that you continue to do so. This is your primary process control point. By monitoring at the entry point, you can make sure that the disinfection process is working properly and that you have enough disinfectant in the water. Indeed, under the rules, surface-water and GUI PWSs must monitor disinfectant levels at the entry point [30 TAC §290.110(c)(2)].

However, groundwater and purchased-water PWSs are **not** required to monitor disinfectant levels at the entry point [30 TAC §290.110(c)(3)]. Instead, when we do a Comprehensive Compliance Investigation (CCI or sanitary survey) these PWSs must demonstrate to us that they meet the residual disinfectant requirement.

3.3 How to Analyze Your Samples [30 TAC §290.110(d)]

For each of the EPA-approved methods listed below, you can buy test kits that allow you to analyze samples in the field. Be sure the test kit is labeled as EPA-approved for drinking water analysis. ***Kits designed for testing swimming pools might not be suitable for these analyses.***

Free Chlorine

Use one of these approved methods to measure the free chlorine residual:

- syringaldazine (FACTS)
- amperometric titration
- DPD ferrous titration
- DPD colorimetric with a colorimeter, spectrophotometer, or color comparator for distribution system, but with only a colorimeter or spectrophotometer for entry point [30 TAC §290.110(d)(3)(C)(ii)]

Chloramines (also called “Total” or “Combined” Chlorine)

Use one of these approved methods to measure the chloramine residual:

- amperometric titration
- DPD ferrous titration
- DPD colorimetric with a colorimeter, spectrophotometer, or color comparator for distribution system, but with only a colorimeter or spectrophotometer for entry point [30 TAC §290.110(d)(3)(C)(ii)]

3.4 Who May Collect Samples [30 TAC §30.05(a), 30.381(b), and 30.387(5)]

Call our Operator Licensing Section at 512/239-6300 to learn more about what sampling must be performed by licensed operators.

4. Reporting Requirements [30 TAC §290.110(e)]

4.1 When Is the Report Due?

Every PWS that uses groundwater or purchased water must start reporting the level of disinfectant in its distribution system in 2004. That means you must keep good track of the level of disinfectant in your distribution system, starting in January 2004. Then, you must submit your first DL QOR in April 2004. Table 5 shows when each quarter's report is due:

Table 5: When Your DL QOR Is Due

Quarter 1	Quarter 2	Quarter 3	Quarter 4
Data for January, February, and March	Data for April, May, and June	Data for July, August, and September	Data for October, November, and December
Report is due April 10	Report is due July 10	Report is due October 10	Report is due January 10

The first step in complying with the reporting requirements for disinfectant residuals is to record your data carefully each time you sample. You may already have a good method for doing this; if not, you may find the worksheets contained in Appendix A to be helpful.

4.2. DL QOR Form

After you have gathered one quarter's worth of data, you must report it to TCEQ on the DL QOR. See the end of this guide for a blank DL QOR form that you can photocopy and use.

You can also get copies from our Web site. To get copies from the Web site, go to our home page (www.tceq.state.tx.us), click on "Utilities and Water Supplies," then click on "Public Drinking Water," then click on "Drinking Water Publications." Look down the page and find the link to the DL QOR.

At the end of this guide, you will find a sample DL QOR as the operator of the PWS mentioned in Example 3.1 might complete it.

Other Reports

Every PWS that uses groundwater or purchased water must fill out the Ground Water/Purchased Water Monthly Operating Report, Form TCEQ-0811. You do **not** have to send this form to TCEQ—instead, just keep it on file and show it to your TCEQ regional investigator during the comprehensive compliance investigation.

4.3 How to Do Important Calculations for a DL QOR

You should be able to complete the DL QOR using a simple calculator. Here we present examples of each calculation you must do for the DL QOR.

Example 4.1: Calculating “Average of All Disinfectant Residuals for This Month”

As described in Example 3.1, the Sunshine Mobile Home Park PWS should take four samples in January 2004. Assume that their samples show these levels of residual disinfectant:

Date sample collected:	Jan. 5	Jan. 12	Jan. 19	Jan. 26
Residual disinfectant level:	5.0 mg/L	1.9 mg/L	0.1 mg/L	1.0 mg/L

What should Sunshine MHP’s operator enter under “Average of all disinfectant residuals for January?”

Answer: Calculating the average value takes these three steps:

1. Add up the disinfectant residuals:
 $5.0 \text{ mg/L} + 1.9 \text{ mg/L} + 0.1 \text{ mg/L} + 1.0 \text{ mg/L} = 8.0 \text{ mg/L}$
2. Count the total number of samples collected in the month—in this case, 4.
3. Divide the sum of the measured residuals (from Step 1) by the number of samples collected (from Step 2):

$$\frac{8.0 \text{ mg/L (total)}}{4 \text{ samples}} = 2.0 \text{ mg/L (average)}$$

So the operator should write “2.0 mg/L” under “Average of all disinfectant residuals for this month” in the January portion of the DL QOR for the first quarter of 2004.

Example 4.2: Calculating “% below MIN for This Month” (Weekly Sampling)

Sunshine MHP uses free chlorine in their distribution system. Their results for January were 5.0 mg/L, 1.9 mg/L, 0.1 mg/L, and 1.0 mg/L. *What is the percentage of samples below the minimum residual?*

Answer: As in Example 4.1, we can do this calculation in three steps:

1. Count the samples that were below the minimum residual this month. Because Sunshine MHP uses free chlorine, the minimum residual is 0.2 mg/L. Only one sample—the one with a reading of 0.1 mg/L—was below this value, so for Sunshine MHP in January the count is 1.
2. Count the total number of samples taken this month—in this case, 4.
3. Now divide the number of samples below the minimum by the total number of samples taken and multiply by 100 percent:

$$\left[\frac{1 \text{ (sample below MIN this month)}}{4 \text{ (samples collected this month)}} \right] \times 100\% = 25\%$$

On the DL QOR, Sunshine MHP’s operator should write “25%” under “% below MIN for This Month” for January.

Example 4.3: Calculating “% below MIN for This Month” (Daily Sampling)

Chinquapin Oaks PWS serves a population of 21,501, uses only groundwater sources, and disinfects with chloramines. According to Table 3 (page 6), they must do 25 coliform samples a month and sample disinfectant residual daily. To meet these requirements, their operator set up this sampling schedule:

Jan 2004 Sampling Dates

Key: C = coliform
DR = disinfectant residual
2x = sample two locations

				1 Thu	2 Fri	3 Sat
				2x(C+DR)	DR	DR
4 Sun	5 Mon	6 Tue	7 Wed	8 Thu	9 Fri	10 Sat
DR	2x(C+DR)	C+DR	C+DR	2x(C+DR)	DR	DR
11 Sun	12 Mon	13 Tue	14 Wed	15 Thu	16 Fri	17 Sat
DR	2x(C+DR)	C+DR	C+DR	2x(C+DR)	DR	DR
18 Sun	19 Mon	20 Tue	21 Wed	22 Thu	23 Fri	24 Sat
DR	2x(C+DR)	C+DR	C+DR	2x(C+DR)	DR	DR
25 Sun	26 Mon	27 Tue	28 Wed	29 Thu	30 Fri	31 Sat
DR	2x(C+DR)	C+DR	C+DR	C+DR	DR	DR

Assume that four of these samples show less than the minimum residual required under the rule. *What should the operator write under “% below MIN for This Month” on the DL QOR?*

Answer: Under this sampling schedule, Chinquapin Oaks PWS would collect 39 disinfectant residual samples in January 2004—25 that were taken with coliform samples and 14 that were tested for chloramine residual only. If only 4 of these samples were below the minimum residual, then, following the steps from Example 4.2, the percentage below the minimum residual is:

$$\left[\frac{4 \text{ (samples below MIN this month)}}{39 \text{ (samples collected this month)}} \right] \times 100\% = 10.3\%$$

On the DL QOR, the Chinquapin Oaks PWS operator should write “10.3%” under “% below MIN for This Month” for January.

Example 4.4: Calculating “Average of All Disinfectant Residuals for This Quarter”

In the first quarter of 2004, Sunshine MHP reported these average residual disinfectant levels:

For the month of:	January	February	March
The average residual was:	2.0 mg/L	6.0 mg/L	4.0 mg/L

What was the quarterly average?

Answer: This is another three-step calculation:

- Add up the monthly averages:
 $2.0 \text{ mg/L} + 6.0 \text{ mg/L} + 4.0 \text{ mg/L} = 12.0 \text{ mg/L}$
- Count the months—in each quarter, there are 3.

3. Divide the total of the monthly averages (from Step 1) by the number of months (from Step 2):

$$\frac{12.0 \text{ mg/L}}{3 \text{ months}} = 4.0 \text{ mg/L average}$$

So Sunshine MHP's PWS operator should write "4.0 mg/L" under "Average of all disinfectant residuals for this quarter" on the DL QOR for the first quarter.

5. Compliance [30 TAC §290.110(f)]

Compliance with the Minimum Disinfectant Residuals

If a PWS has more than 5 percent of samples collected that measure less than the minimum residual disinfectant concentration each month ("%" below MIN" on the DL QOR) for any two consecutive months, it is committing a nonacute treatment technique violation. *Nonacute* violations require public notice to customers (see "Public Notification" on page 15).

Example 5.1: Compliance with Minimum Disinfectant Residuals

Assume that February 2004 turns out to be much better than January for the Chinquapin Oaks PWS—out of 37 samples taken, only 2 are below the minimum residual. *Are they in compliance with the minimum disinfectant residual requirements?*

Answer: First, note that January's entry for "% below MIN for This Month" was 10.3 percent (Example 4.3 on page 13). Then calculate the value for February (see Example 4.2 on page 12 if you need help with this calculation):

$$\left[\frac{2 \text{ (samples below MIN this month)}}{37 \text{ (samples collected this month)}} \right] \times 100\% = 5.4\%$$

So for the second month in a row, Chinquapin Oaks PWS has had less than the minimum residual disinfectant concentration in more than 5 percent of their samples. This is a *nonacute treatment technique violation*. The PWS must notify its customers as described in "Public Notification" on page 15.

Compliance with the MRDL

For a PWS to comply with the maximum residual disinfectant residuals, the running annual average of all distribution system samples must be less than 4.0 mg/L. Failure to comply will result in a *nonacute* violation, requiring public notification of customers as described on page 15.

Compliance with Monitoring and Reporting Requirements

Failure to monitor or failure to send in reports in accordance with 30 TAC §290.110(f) may result in a *nonacute* monitoring or reporting violation, requiring public notification of customers.

6. Public Notification

Public Notice for Minimum Disinfectant Residual Violation

A PWS that fails to maintain an adequate disinfectant residual in the water served to customers for two consecutive months must notify their customers within 30 days of the end of the second consecutive month [30 TAC §290.122(b)(1), (2)].

Under the mandate of the rule, this public notice must include this language:

Minimum Residual Treatment Technique Violation

The Texas Commission on Environmental Quality sets drinking water standards and has determined that the presence of microbiological contaminants is a health concern at certain levels of exposure. If water is inadequately treated, microbiological contaminants in that water may cause disease. Disease symptoms may include diarrhea, cramps, nausea and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not associated with disease-causing organisms in drinking water, but may also be caused by a number of factors other than your drinking water.

The TCEQ has set enforceable requirements for treating drinking water to reduce the risk of these adverse health effects. Treatment such as filtering and disinfecting removes or destroys microbiological contaminants. Drinking water that is treated to meet the TCEQ requirements is associated with little to none of this risk and should be considered safe.

The **<INSERT THE NAME OF YOUR PUBLIC WATER SYSTEM HERE>** failed to meet the minimum treatment techniques for the month of **<INSERT THE MONTHS AND YEAR THAT THE VIOLATION OCCURRED>**. Specifically, our water system failed to maintain an acceptable disinfectant residual throughout the distribution system for two consecutive months.

OPTIONAL PARAGRAPHS

You may add other language if you want to. The additional language should describe steps that you have taken to correct the violation, but should not frustrate the intent of the notice.

How to Issue Public Notice

The specific method a PWS uses to issue this notice depends on how word best gets to the community it serves [30 TAC §290.122(b)(2)]:

- If a local daily or weekly newspaper serves the community, the PWS can have the notice printed in the “Notices” section of that newspaper. (Newspapers usually charge a fee for printing these notices.)
- If there is no local newspaper, the PWS can:
 - mail the notice to each customer, or
 - have the notice hand-delivered to each customer, or
 - post the notice beside community mailboxes or in other places where residents would see it, if the community has such places.

Appendix A: Worksheets

Worksheets for Recording Disinfectant Residuals

There is a broad range in the number of sample results that different PWSs will need to track. We have provided several worksheets to help you keep track of disinfectant residual results for your PWS. These worksheets are designed to assist you; you **do not** need to send them in to us. If you want to develop your own method to keep track, that is fine.

We have provided the following worksheets:

- ***Worksheet 1. Calculating Residual Disinfectant Levels for Groundwater or Purchased Water PWSs with Fewer than 750 Customers.*** If your PWS serves 750 or fewer customers, this worksheet will help you keep track of all the disinfectant data you need to collect each month. There is space to write the disinfectant residual from your single coliform sample, plus repeats (if necessary). There is also space to write the disinfectant residual from each of your weekly distribution system disinfectant residual samples.
- ***Worksheet 2. Calculating Residual Disinfectant Levels for Groundwater or Purchased Water PWSs with 750–1000 Customers.*** If your PWS serves from 750 up to 1000 customers, this worksheet will help you keep track of all the disinfectant data you need to collect each month. There is space to write the disinfectant residual from your single coliform sample, plus repeats (if necessary). There is also space to write the disinfectant residual from each of your daily distribution system disinfectant residual samples.
- ***Worksheet 3. Calculating Daily Disinfectant Residuals for the MRDL Calculation, for Any PWS Collecting Daily Disinfectant Residuals.*** If your PWS serves more than 750 customers, you can use this worksheet to keep track of the disinfectant data from your daily distribution system disinfectant residual samples. You will need to use another piece of paper (or the following worksheet) to keep track of the results for disinfectant residuals that are collected at the same time as your coliform sampling.
- ***Worksheet 4. Calculating the Disinfectant Residual in a Coliform Samples Worksheet for Any PWS Collecting More than 1 Coliform Sample.*** If your PWS serves more than 1000 customers, you need to collect more than one coliform sample a month. PWSs that serve up to 33,000 customers can use this worksheet to keep track of the disinfectant residuals that are collected at the same time as your coliform sampling. You will need to use another piece of paper (or the previous worksheet) to keep track of the results for the disinfectant data from your daily distribution system disinfectant residual samples.

Disinfectant Residual Worksheet for MRDL Calculation Groundwater or Purchased-Water PWSs with Fewer Than 750 Customers

If you wish, use this worksheet to keep track of the residual disinfectant that you collect with your coliform samples.
Do **NOT** send this worksheet to us. You should send your results to us on the DL QOR form.

PWS Name:	PWS ID:
MONTH:	YEAR:

Type of Disinfectant Used in Distribution System:

☐ Free chlorine (MIN= 0.2 mg/L) ☐ Chloramine (MIN = 0.5 mg/L)

Disinfectant Residual Collected with Coliform Sample(s)

#	Sample Date	Sample Site	Disinfectant Residual	Less than MIN? Y/N	NO residual? Y/N
1					
2					
3					
4					
5					

Groundwater and purchased water systems that serve up to 1000 people must collect **one** coliform sample a month. The disinfectant should be measured at the same time. If you have a coliform-found sample, you must collect **four** repeat samples immediately. Then, the month after the coliform-found, you must collect follow-up routine samples. Therefore, this worksheet provides room to keep track of more than one sample. If you have multiple positive results, you will need another piece of paper.

Disinfectant Residual Collected in Distribution System

#	Sample Date	Sample Site	Disinfectant Residual	Less than MIN? Y/N	NO residual? Y/N
1					
2					
3					
4					
5					

Groundwater and purchased water systems that serve up to 750 people must collect **weekly** distribution system disinfectant residual samples. This worksheet provides room to keep track of one sample a week for five weeks. If you collect more samples than that, you will need another piece of paper.

Monthly Summary

Number of Samples	Highest Reading	Lowest Reading	Average	# Below MIN	# with NO residual
(1)	(2)	(3)	(4)	(5)	(6)

These are the numbers that you will need to report on the GW PW Monthly Operating Report form.

- (1) Add up all the disinfectant results from samples collected with coliform samples, plus weekly distribution system samples. Write that number here.
- (2) Write in the highest residual from all your samples.
- (3) Write in the lowest residual from all samples.
- (4) Add up the residual from all samples and divide by the number of samples. Write that number here.
- (5) Write in the number of samples that had less than 0.2 mg/L (if you use free chlorine) or less than 0.5 mg/L (if you use chloramines).
- (6) Write in the number of samples that had no disinfectant at all.

Disinfectant Residual Worksheet for MRDL Calculation Groundwater or Purchased Water PWSs with 750 to 1000 Customers

This worksheet is provided to help systems keep track of the residual disinfectant that you collect with your coliform samples. Do **NOT** send this worksheet to us. You should send your results to us on the DL QOR form.

PWS Name:	PWS ID:
MONTH:	YEAR:

Type of Disinfectant Used in Distribution System: ☐ Free chlorine MIN= 0.2 mg/L ☐ Chloramine MIN = 0.5 mg/L

Disinfectant Residual Collected with Coliform Sample(s)

#	Sample Date	Sample Site	Disinfectant Residual	Less than MIN? Y/N
1				
2				
3				
4				
5				

Groundwater and purchased water systems that serve up to 1000 people must collect **one** coliform sample a month. The disinfectant should be measured at the same time. If you have a coliform-found sample, you must collect **four** repeat samples immediately. Then, the month after the coliform-found, you must collect follow-up routine samples. Therefore, this worksheet provides room to keep track of more than one sample. If you have multiple positive results, use another piece of paper.

Disinfectant Residual Collected Daily

Sample Date	Sample Site	Residual	Less than MIN? Y/N
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

Sample Date	Sample Site	Residual	Less than MIN? Y/N
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			

Groundwater and purchased water systems that serve 750 or more people must collect **one** disinfectant residual sample **daily**. The worksheet provides room to keep track of 31 days. If you collect more than 31 samples in a month you will need another piece of paper.

Monthly Summary

Number of Samples	Highest Reading	Lowest Reading	Average	# Below MIN	# with NO residual
(1)	(2)	(3)	(4)	(5)	(6)

These are the numbers that you will need to report on the GW PW Monthly Operating Report form (TCEQ-0811).

- (1) Add up all the disinfectant results from samples collected with coliform samples, plus weekly distribution system samples. Write that number here.
- (2) Write in the highest residual from all your samples.
- (3) Write in the lowest residual from all samples.
- (4) Add up the residual from all samples and divide by the number of samples. Write that number here.
- (5) Write in the number of samples that had less than 0.2 mg/L for free chlorine, or less than 0.5 mg/L for chloramines.
- (6) Write in the number of samples that had no disinfectant at all.

Daily Disinfectant Residual Worksheet for MRDL Calculation For Any System Collecting Daily Disinfectant Residuals

This worksheet is provided to help systems keep track of the residual disinfectant that you collect with your coliform samples.
Do **NOT** send this worksheet to us. You should send your results to us on the DL QOR form.

PWS Name:	PWS ID:
MONTH:	YEAR:

Disinfectant in Distribution System: ☐ **Free chlorine** (MIN= 0.2 mg/L) ☐ **Chloramine** (MIN = 0.5 mg/L)

Disinfectant Residual Collected Daily

Sample Number	Sample Date	Sample Site	Residual	Less than MIN? Y/N	NO residual? Y/N
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
	Tot:		Sum:	# < MIN:	#=0:

The worksheet provides room to keep track of 31 days. If you collect more than 31 samples in a month, you will need another piece of paper.

Worksheet for Disinfectant Residuals Collected with Coliform Samples For Any System Collecting More than One Coliform Sample

This worksheet is provided to help systems keep track of the residual disinfectant that you collect with your coliform samples.
Do **NOT** send this worksheet to us. You should send your results to us on the DL QOR form.

PWS Name:	PWS ID:
MONTH:	YEAR:

Type of Disinfectant in Distribution System: ☐ **Free chlorine** (MIN= 0.2 mg/L) ☐ **Chloramine** (MIN = 0.5 mg/L)

Disinfectant Residual Collected With Coliform Samples

Sample Number	Sample Date	Sample Site	Residual	Less than MIN? Y/N	NO residual? Y/N
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
	Tot:		Sum:	# < MIN:	#=0:

Systems with 33,000 customers must collect 30 coliform samples every month. If your system collects more than this, you will need another sheet of paper.

Appendix B: Abbreviations and Acronyms

§	section
C	community
CCI	Comprehensive Compliance Investigation (sanitary survey)
DL QOR	Disinfectant Level Quarterly Operating Report
DPD	N,N-diethyl-p-phenylenediamine
EPA	U.S. Environmental Protection Agency
GUI	groundwater under the direct influence of surface water
GW	groundwater
GWPW MOR	Ground Water/Purchased Water Monthly Operating Report
mg/L	milligrams per liter
MHP	mobile home park
MIN	minimum
MRDL	maximum residual disinfectant level
NTNC	nontransient noncommunity
PW	purchased water
PWS	public water system
PWS ID	public water system identification number
RAA	running annual average
SW MOR	Surface Water Monthly Operating Report
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TNC	transient noncommunity
WUD	Water Utilities Database

DISINFECTANT LEVEL QUARTERLY OPERATING REPORT (DL QOR)

FOR GROUNDWATER OR PURCHASED-WATER PUBLIC WATER SYSTEMS—ANY SIZE

Please print or type. Forms that are not readable will not be processed.

PWS Name: **Sunshine Mobile Home Park**

PWS ID: **12345467**

Type of Disinfectant Used in Distribution System*: ☒ Free Chlorine MIN = 0.2 mg/L ☐ Chloramine* MIN = 0.5 mg/L

* If you normally use chloramine but you shocked with free chlorine at any time during this quarter, check **both** boxes.

First Month of Quarter: Monthly Summary

Month: **January** Year: **2004** Was the PWS active this month? ☒ Yes ☐ No

Average of all disinfectant residuals for this month	% below MIN for this month	% with NO residual for this month
2.0 mg/L	25%	0%

Second Month of Quarter: Monthly Summary

Month: **February** Year: **2004** Was the PWS active this month? ☒ Yes ☐ No

Average of all disinfectant residuals for this month	% below MIN for this month	% with NO residual for this month
4.0 mg/L	25%	25%

Third Month of Quarter: Monthly Summary

Month: **March** Year: **2004** Was the PWS active this month? ☒ Yes ☐ No

Average of all disinfectant residuals for this month	% below MIN for this month	% with NO residual for this month
6.0 mg/L	0%	0%

Quarterly Summary and Certification

Average of all disinfectant residuals for this quarter	Lowest residual for this quarter	Highest residual for this quarter
4.0 mg/L	0.0 mg/L	8.0 mg/L

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

Signature: **Opa Rater** Date: **4/3/04**

Print Name: **Opa Rater**

Title: Mayor, Utility Director, Water and Wastewater Operator, Meter Reader, Chief Cook and Bottle Washer (sometimes Dogcatcher)

Complete this DL QOR for the previous quarter at the beginning of April, July, October, and January.

In time for it to **arrive** by the 10th of the month, send it to:

TCEQ / PDW MC-155

Attn: DL QOR

PO Box 13087

Austin TX 78711-3087

How to Complete the DL QOR (TCEQ-20067)

These instructions will help you complete the Disinfectant Level Quarterly Operating Report (DL QOR; form TCEQ-20067). To find out whether your public water system (PWS) must complete and submit this form, see *Disinfectant Residual Reporting for Public Water Systems* (TCEQ publication RG-407). If you fill out the form by hand, be sure to use blue or black ink and print clearly.

The DL QOR begins with blanks for basic information about your PWS.

PWS Name. Enter the name of your PWS.

PWS ID. Your PWS has a seven-digit PWS identification number issued by the TCEQ. Enter that number here.

Type of Disinfectant Used in Distribution System.

Check the box for the type of disinfectant that is used in your distribution system.

Monthly Summaries—first row

Three blocks on TCEQ-20067 give you space to report the data for each month of the quarter. Use the first block for the first month, the second block for the second month, and so on. The first row of each block identifies the month and year and tells whether your PWS was active.

Month. Enter the name of the month that this block covers. The months in each of the four quarters of the year are:

Quarter:	Months:
1 st	January, February, March
2 nd	April, May, June
3 rd	July, August, September
4 th	October, November, December

Year. Enter the year you are reporting for. (The year will be the same for each month of the quarter.) The first year that you must send DL QORs is 2004. The first DL QOR is due April 10, 2004. The DL QOR for the last quarter of 2004 is due January 10, 2005.

Was the PWS active this month? If you sent any water to the distribution system this month, your PWS was active.

- If so, check "Yes."
- If not, check "No"—and attach a copy of your GWPW MOR (TCEQ-0811) for the month to document that you produced no water during this month. *This is the only reason you would have to send us a copy of a GWPW MOR. Be sure to keep the original on file.*

Monthly Summaries—second row

In the second row of each Monthly Summary, you report information about your disinfection process. This information should already be recorded on your PWS's Ground Water/Purchased Water Monthly Operating Report (GWPW MOR; form TCEQ-0811) for each month. So to complete this part of the DL QOR, you can just look up the information from the GWPW MORs for that quarter.

Average of all disinfectant residuals for this month.

Enter the average of all the samples you took this month.

To calculate the average:

1. Add up the results for every sample.
2. Count the number of samples.
3. Divide the total from Step 1 by the count from Step 2.

% below MIN for this month. "MIN" is the required minimum residual concentration of disinfectant:

- For *free chlorine*, MIN is 0.2 mg/L.
 - For *chloramine*, MIN is 0.5 mg/L. (Chloramine is also called "total chlorine" or "combined chlorine.")
- Enter the percentage of samples for which the residual was below this level.

% with NO residual for this month. Enter the percentage of samples that had *no* disinfectant this month. "No disinfectant" means that the measured concentration of residual disinfectant was 0.0 mg/L.

Quarterly Summary and Certification

Average of all disinfectant residuals for this quarter.

To calculate this quarterly average:

1. Add up the three monthly averages.
2. Divide by 3.

Lowest residual for this quarter. Look at all of the results you had during the quarter. Enter the *lowest* measurement that you took during the quarter. (If you ever had no residual in this quarter, enter "0.0 mg/L" here.)

Highest residual for this quarter. Look at all of the results you had during the quarter. Enter the *highest* measurement that you took during the quarter.

Operator's Signature. Your PWS's main operator should sign the DL QOR in dark blue or black ink. This signature is not a formality—the falsification of data on this form is a criminal offense. *If you sign an inaccurate form, you could lose your water operator's license—or worse.*

Date. The operator who signs the form should enter the date as the form is signed. *Use dark blue or black ink.*

Print Name. Type or print the name of the person who signed (or will sign) the form.

Title. Type or print the title of the person signing the form. If a certified operator signs the form, also list his or her certificate number and the type of license—for example, *Chief Operator, 123-45-6789 C GW.*

When You Are Done ...

Mail the completed and signed DL QOR to the address shown at the lower right of the form.

Hold on to Your GWPW MORs!

Except as mentioned under "Was the PWS active this month?", *don't mail us your GWPW MORs.* Keep them on file at your facility. Our regional investigator will review them as part of a comprehensive compliance investigation (CCI, or "sanitary survey").

DISINFECTANT LEVEL QUARTERLY OPERATING REPORT (DL QOR)

FOR GROUNDWATER OR PURCHASED-WATER PUBLIC WATER SYSTEMS—ANY SIZE

Please print or type. Forms that are not readable will not be processed.

PWS Name:	PWS ID:
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Type of Disinfectant Used in Distribution System*: ☐ Free Chlorine MIN = 0.2 mg/L ☐ Chloramine* MIN = 0.5 mg/L

* If you normally use chloramine but you shocked with free chlorine at any time during this quarter, check **both** boxes.

First Month of Quarter: Monthly Summary

Month: _____ Year: _____ Was the PWS active this month? ☐ Yes ☐ No

Average of all disinfectant residuals for this month	% below MIN for this month	% with NO residual for this month

Second Month of Quarter: Monthly Summary

Month: _____ Year: _____ Was the PWS active this month? ☐ Yes ☐ No

Average of all disinfectant residuals for this month	% below MIN for this month	% with NO residual for this month

Third Month of Quarter: Monthly Summary

Month: _____ Year: _____ Was the PWS active this month? ☐ Yes ☐ No

Average of all disinfectant residuals for this month	% below MIN for this month	% with NO residual for this month

Quarterly Summary and Certification

Average of all disinfectant residuals for this quarter	Lowest residual for this quarter	Highest residual for this quarter

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

Signature: _____ Date: _____

Print Name: _____

Title: _____

Complete this DL QOR for the previous quarter at the beginning of April, July, October, and January. In time for it to **arrive** by the 10th of the month, send it to:

TCEQ / PDW MC-155
Attn: DL QOR
PO Box 13087
Austin TX 78711-3087