3. ENTERING DAILY DATA IN THE SWMOR

Each day that your plant treats water, you must monitor your plant's operations. Record the data you collect in the **Performance Data** tables on pages 2 through 5 of the SWMOR.

After you have prepared your monthly file as described in Chapter 2, you can enter the actual data. This section of the guidance manual describes the process in detail.

SPECIAL INSTRUCTIONS FOR SWMOR2 USERS

In many respects, entering data in the SWMOR2 spreadsheet is the same as entering data in SWMOR. For example, raw and treated water flow rates, raw water quality data, settled water turbidity, finished water residuals, and CT data are entered in exactly the same way on both reports.

Chapter 9 contains the instructions for entering data in SWMOR2. However, because specific parts of the two spreadsheets are similar, some of the information presented in Chapter 3 is not repeated in Chapter 9 in order to save space and paper.

The specific areas in Chapter 3 that you will need to use for SWMOR2 include:

- Section 3.1—except for the subsection "Turbidity (of the Finished Water)"
- Sections 3.3 through 3.5

Enable Macros? Yes!

When the **Enable Macros** dialog box pops up, click [Enable Macros]. You need to enable the macros so that the spreadsheet can accurately perform its many calculations.

Plant Parameters and Disinfection Process Parameters? Cancel!

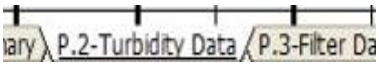
When the **Plant Parameters** and the **Disinfection Process Parameters** dialog boxes pop up, click [Cancel]. The process you went through in Sections 2.2 and 2.3 created a customized spreadsheet that describes your plant. As long as you don't make changes to your plant (such as structural changes), you may skip this step when entering monthly data to save time.

IMPORTANT

We strongly recommend that you begin each month's report with a blank copy of your customized SWMOR. However, if you insist on using a completed report from a previous month as your starting point, you must click on the [OK] button rather than the [CANCEL] button so that the SWMOR will reset the disinfectant types to your default values.

3.1 ENTER DAILY PLANT-PERFORMANCE DATA (PAGE 2)

The **Performance Data** area of the form is used to summarize the performance of your plant each day. This data is entered on page 2 of both the SWMOR and SWMOR2.

To get to page 2, click on the **P.2-Turbidity Data** tab. 

Please note that you must enter some data on the **P.2-Turbidity Data** worksheet every day, even if your plant did not treat water.

Figure 3.1 shows the **Performance Data** table on page 2 as it might be completed for the plant that received the approved CT study in Appendix A. We will refer to the shaded entries in Figure 3.1 as we explain how to complete this table.

PERFORMANCE DATA																			
	Raw Water Pumpage	Treated Water Pumpage	RAW WATER ANALYSES		SETTLED WATER TURBIDITY (Mandatory Data)						FINISHED WATER QUALITY							
					Basin No.						Turbidity						Lowest	
Date	(MGD)	(MGD)	NTU	Alk.	1	2	3	4	5	6	NTU1	NTU2	NTU3	NTU4	NTU5	NTU6	Residual	Time
1	1.411	1.322	49	52	2.4	1.9					X	0.19	0.07	0.03	0.31	ND	2.4	
2	1.484	1.444	26	68	2.8	1.8					X	0.33	0.24	0.27	0.15	0.12	3.4	
3	1.598	1.511	12	59	2.1	2.2					X	0.23	0.08	0.12	0.17	0.26	3.1	
4	1.154	1.064	80	92	5.2	4.3					X	0.34	0.46	0.78	1.06	1.17	2.3	
5	0.000	0.889	X	X	X	X					X	X	X	X	X	X	1.1	
6	2.650	1.103	15	61	1.8	1.4					X	X	0.26	0.32	0.21	0.10	2.8	
7	1.302	1.239	73	55	2.3	2.0					X	0.13	0.28	0.38	0.34	0.30	3.0	
8	1.377	1.280	10	47	1.7	1.9					X	0.27	0.24	0.17	0.19	0.04	2.7	
9	1.701	1.687	24	53	1.9	1.6					X	0.24	0.32	0.25	0.18	0.12	0.3	0.75
10	1.408	1.397	16	44	1.2	1.1					X	0.33	0.08	0.07	0.21	0.11	1.9	
11	1.457	1.402	70	62	1.8	1.5					X	0.30	0.06	0.20	0.23	0.34	2.2	
12	1.537	1.522	98	43	3.2	2.3					X	0.29	0.08	0.16	0.14	0.27	3.1	
13	1.092	1.084	16	57	2.2	1.8					X	0.33	0.28	0.10	0.27	0.29	2.0	
14	1.564	1.506	68	48	2.0	1.7					X	0.23	0.26	0.31	0.28	0.03	1.4	
15	1.361	1.278	93	69	25.6	2.1					X	0.30	0.20	0.23	0.05	0.25	1.8	
16	1.879	1.794	10	55	2.1	1.9					X	0.31	0.21	0.17	0.28	0.22	1.5	
17	0.109	0.000	91	58	2.2	X					X	0.20	0.31	0.24	0.34	0.20	X	
18	0.230	0.050	95	64	2.5	X					X	0.17	0.13	0.16	0.32	0.28	md	
19																		

Figure 3.1. Performance Data section on page 2 of the SWMOR or SWMOR2.

Raw and Settled Water Data

Raw Water Pumpage

Each day, record the amount of raw water pumped to the plant for treatment in the **Raw Water Pumpage** column. Report this value in million gallons per day (MGD). The amount of raw water sent to the plant and treated may not be exactly the same as the volume of water sent to distribution. In this area, you should record the amount of raw water sent to the treatment plant, even if that water was not sent to distribution on the same day.

If no raw water was sent to the plant on a specific day, enter <0.000> in this column. If the plant did receive raw water on a specific day but you failed to record how much, enter <ND> in this column.

Example 3.1: Raw Water Pumpage

In Figure 3.1, the entry on the fifth day of the month shows that the plant did not receive any raw water on that day. Since no water was sent to the plant, the plant was not required to do the following:

- perform raw-water analyses
- monitor settled-, filtered-, or finished-water turbidity
- Collect disinfection-process data

Therefore, the SWMOR automatically entered <X> in all of the applicable cells for that date.

Treated Water Pumpage

Each day, record the amount of treated water discharged to the distribution system in the **Treated Water Pumpage** column. Report this value in MGD. Do not record the meter reading. Instead, record the total amount of water pumped to the distribution system during the day.

If your plant did not pump treated water to distribution on a specific day, enter <0.000> in this column. If the plant sent treated water to the distribution system on a specific day but you failed to record how much, enter <ND> in this column.

Example 3.2: Treated Water Pumpage

In Figure 3.1, the entry on the 17th of the month shows that the plant treated 109,000 gallons of raw water, but did not pump treated water to the distribution system that day. Since treated water was not pumped to distribution, the plant was not required to collect disinfectant residual data entering the distribution system. Therefore, the SWMOR automatically entered <X> in the **Lowest Residual** cell for that date.

Pumpage Summaries *CALC*

Figure 3.2 shows the spaces where the spreadsheet automatically enters the total amounts of raw and treated water pumped during the month as well as the average (**Avg**), maximum (**Max**), and minimum (**Min**) daily pumpage rates for raw and treated water. The spreadsheet fills in these results using the values for raw- and treated-water pumpage that you entered each day.

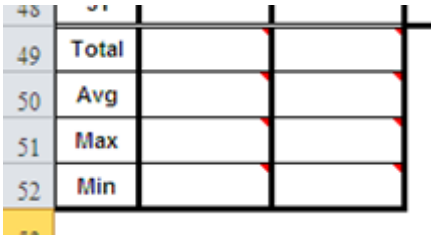


Figure 3.2. Pumpage Summary section of the spreadsheet.

Raw Water Analyses

Each day, record the turbidity and the alkalinity of the raw water treated by the plant in the **Raw Water Analyses** column. Record the turbidity of the raw water in the **NTU** column. Record the alkalinity of the raw water in the **Alk.** column. Report the alkalinity reading in milligrams per liter (mg/L of $CaCO_3$). You must measure the turbidity and the alkalinity of the raw water at least once each day when your plant treats water. If you conduct more than one set of tests during the day, record the average value for each parameter. See Table 7.1 in Chapter 7 of this manual to find the acceptable laboratory methods for measuring these values.

If your plant did not treat water on a specific day, enter <X> in each of the **NTU** and **Alk.** columns. If you treated water but did not collect turbidity or alkalinity data on a specific day, enter <ND> in each of the **NTU** and **Alk.** columns.

Settled Water Turbidity

If we have required your plant to monitor levels of settled water turbidity, you must do so as often as we have specified in our approval letter. Even if such monitoring is optional for your plant, we recommend that you measure the turbidity of the settled water at the effluent of each sedimentation basin at least once each day. Data on settled-water turbidity data allows for valuable analysis of the performance of sedimentation and, in particular, the performance of each basin. See Table 7.1 in Chapter 7 of this manual to find the acceptable laboratory methods for measuring turbidity.

The **Performance Data** table on page 2 of the SWMOR contains six columns where you can enter the turbidity of the settled water from Basins Nos. 1 through 6. If your plant has more than six basins, six additional columns for recording the settled water turbidity from Basins Nos. 7 to 12 appear on the addendum page.

If your plant collects settled water turbidity data from each sedimentation basin, record the turbidity of the settled water from each basin in the corresponding column. If you conduct more than one set of tests during the day, record the maximum (highest) value for each basin. If a basin is not in operation on a specific day, enter <X> in the corresponding column. If settled water turbidity is mandatory and you did not collect the turbidity for an operational basin, you must enter <ND>. However, when settled water turbidity is optional, you may either leave the cell blank or enter <ND>.

Example 3.3: Settled Water Turbidity

The **SETTLED WATER TURBIDITY** section of Figure 3.1. reveals the following:

1. We have required the treatment plant to monitor the turbidity of the settled water.
2. The plant was offline on the fifth of the month.
3. Basin No. 2 was not in operation on the 17th and 18th of the month.
4. The operators tested the reading for settled-water turbidity from each basin at least once each day it was in service.

SWMOR2 USERS

You do not have to read the following subsection **Turbidity (Finished Water)**. We have repeated any information that applies to you in Chapter 9.

Turbidity (Finished Water)

You must measure and record the turbidity of the combined filter effluent each day that your plant treats water. That means that you must record turbidity results each day that you show a raw water pumpage above 0.000 MGD.

What Test to Run: Using an acceptable method from Table 7.1, measure the turbidity of the finished water on a regular schedule.

Where to Sample: You should collect the CFE turbidity sample at the filter outlet header or the clearwell inlet line. However, the TCEQ occasionally approves other sampling sites, such as the clearwell outlet line or the service pump discharge line.

When to Sample: The timing and number of CFE turbidity readings that you must record depends on the number of people that your water system serves. The specific requirements are:

Systems Serving 500 or Fewer Persons: If your system serves 500 or fewer persons each day, you must take this reading at least once each day. The reading must be taken at the same time each day.

Systems Serving More than 500 Persons: If your system serves more than 500 persons, you must take regular four-hour readings whenever the plant is in operation. For example, you may take these readings at 2 a.m., 6 a.m., 10 a.m., 2 p.m., 6 p.m., and 10 p.m. Use the same schedule each day. You may take these readings more frequently than once every 4 hours, but you must use only the readings made at the designated times to determine whether your plant is in compliance.

The TCEQ sets six standard four-hour periods each day: NTU1 is midnight to 4 a.m.; NTU2 is 4 a.m. to 8 a.m.; NTU3 is 8 a.m. to noon; NTU4 is noon to 4 p.m.; NTU5 is 4 p.m. to 8 p.m.; and NTU6 is 8 p.m. to midnight. Readings must be taken to represent each of the TCEQ's four-hour reporting periods when the plant is producing water for any portion of the time.

For example, if the treatment plant starts up at 7 a.m. and shuts down at 5 p.m. each day, the system must set a sampling schedule to represent the treated water for the four-hour periods from midnight to 8 a.m., from 8 a.m. to noon,

from noon to 4 p.m., and from 4 p.m. to 8 p.m. An acceptable schedule would be to take turbidity readings at 7:30 a.m., 11:30 a.m., 3:30 p.m., and 5:00 p.m. The reading taken at 7:30 am would be entered in the NTU2 field; the reading collected at 11:30 am would be entered in the NTU3 field, the 3:30 reading would be entered in the NTU4 field, and the 5:00 pm reading would be entered in the NTU5 field, right before the plant shuts down.

Note that the interval between the last two readings in this example is less than four hours, which is acceptable in this case. However, it is never acceptable for the interval between samples to be longer than four hours.

WHEN TO SAMPLE—SPECIAL CASES

If you are using automated systems to operate or monitor your plant, there are some special requirements that you need to consider when reporting finished water turbidity data. For example:

- **Auto-cycling:** If your plant automatically cycles off and on, we consider the plant to be in continuous operation unless you have turned off the raw water pumps with the manual override. If your plant is not treating water when the sample is supposed to be collected, you must use the last reading that was collected when the plant was in operation. The clearwell and the service pump station may, however, continue to operate when the plant is not in operation because these facilities can continue to operate even if the plant is not filtering water.
- **Online turbidimeters:** If your plant uses a continuous turbidity analyzer, you may either take the turbidity data from the recorder chart or use the results of grab samples. If you choose to use data from the recorder chart, you must verify the accuracy of the turbidity monitor at least once each week. See Section 7.2, "Calibrating Instruments and Other Equipment," for more information about calibrating continuous turbidity monitors and recorders.

IMPORTANT

Avoid calibrating your online turbidimeters immediately before a sample collection is scheduled. If there is a problem during calibration, you could end up recording an erroneous result. Allow at least 15–20 minutes to complete a calibration procedure so that you don't end up missing a sample or accidentally reporting the value of the turbidity standard you are using.

If you do happen to be calibrating an online turbidimeter when a sample is supposed to be collected, we will allow you to report the level of finished-water turbidity using one of the following methods:

- a grab sample and benchtop turbidimeter
- the turbidity reading from the online meter that is recorded 15 minutes after the calibration process is completed
- the last turbidity reading recorded by the online turbidimeter before it was taken offline for calibration

***How to Enter Results*:** The SWMOR contains six columns for recording the turbidity of the finished water. Each column represents a four-hour period of the day. For example, the **NTU1** column represents midnight to 4 a.m., and the **NTU6**

column represents 8 p.m. to midnight. If your plant is in operation during any portion of the four-hour period, you must measure and record a turbidity reading and enter the result in the appropriate column. If your plant is offline during the entire four-hour period, enter <X> in the corresponding column. If the plant treated water at any time during a four-hour period but the required turbidity reading was not recorded at the required time, enter <ND> in the appropriate cell.

Example 3-4: Finished Water Turbidity

The finished water turbidity entries (columns NTU1 through NTU6) in Figure 3.1. give us this information:

1. The scheduled turbidity reading for each four-hour period when the plant was in operation even for part of that period.
2. The plant was always offline between midnight and 4 a.m. each day.
3. The plant was offline on the fifth day of the month.
4. The plant was also offline between 4 a.m. and 8 a.m. on the sixth day of the month.
5. The plant was in operation between 8 p.m. and midnight on the first day of the month, but no data on finished-water turbidity was collected.

Lowest Residual (Finished Water)

You must measure and record the residual concentration of disinfectant, or "residual," in the water entering the distribution system each day that your plant pumps water to distribution. That means that you must record the disinfectant residual reading each day you show a treated water pumpage above 0.000 MGD.

What Test to Run: Using an acceptable method from Table 7.2, measure the disinfectant residual in the finished water on a regular schedule.

Where to Sample: You may collect the residual data at any location in the plant where the quality is representative of the water entering the distribution system. Common sampling sites include the clearwell outlet line and the service pump discharge line.

When to Sample: The timing and number of finished water disinfectant residual readings that you must record depends on the number of people that your water system serves. The specific requirements are:

Systems Serving 3,300 or Fewer Persons: If your system serves 3,300 or fewer persons each day, you may use grab samples to test the residual entering the distribution system. You must collect the residual data at regular intervals throughout the daily period of operation.

Table 3.1 shows the sampling frequency depending on the number of persons the system serves.

Systems using grab samples must collect the residual data at least once every four hours if the residual entering the distribution system falls below the acceptable level. For systems maintaining a free-chlorine residual in the

distribution system, the minimum acceptable level is 0.2 mg/L. For systems maintaining a chloramine residual, the minimum acceptable level is 0.5 mg/L.

Table 3.1. Point-of-entry disinfectant-residual samples depending on system size.

Population	Number of disinfectant samples (entering distribution system)
500 or fewer	1 sample per day
501–1,000	2 samples per day
1,001–2,500	3 samples per day
2,501–3,300	4 samples per day

You may collect the residual data more frequently if you wish. This increased monitoring frequency must continue until the plant restores an acceptable residual.

Systems Serving More than 3,300 Persons: If your system serves more than 3,300 persons, you must equip the plant with equipment to continuously monitor residual disinfectant. The continuous analyzer must sample the plant effluent at least once every 30 minutes. Systems using continuous analyzers to monitor the disinfectant residual must take the data from the recorder chart. These analyzers must be calibrated at least once each month as described under "Chlorine Residual Analyzers" in Section 7.2, "Calibrating Instruments and Other Equipment." A plant that experiences a failure in the continuous monitoring equipment may collect "grab samples" every 4 hours for no more than five working days. The plant must collect these samples at the same time when it collects the CFE turbidity samples.

NOTE
Most systems are required to provide a much higher residual than the allowable minimum so they can maintain an acceptable residual throughout the distribution system.

***How to Enter Results*:** Record the lowest residual reading of the day in the **Lowest Residual** column. Report this value in mg/L. If your plant did not pump treated water to distribution on a specific day, enter <X>. If it sent treated water to the distribution system at any time during the day but failed to collect any finished water disinfectant residual data at the distribution system entry point, you must enter <ND> in the applicable cell. If you recorded some, but not all of the required entry-point residual readings, then you must:

- enter the the lowest reading of the day if it was below the acceptable level of 0.2 mg/L free chlorine or 0.5 mg/L chloramines (measured as total chlorine)

or

- enter <MD> if you collected some, but not all of the required readings, but all of the readings that you do have were above the minimum required level.

Time

Use the **Time** column to record the number of consecutive hours that the disinfectant residual entering the distribution system was below acceptable levels during the day. If the residual fell below the acceptable level more than once during the day, record the longest period of time involved. If the residual entering the distribution system was always above the acceptable level on a specific day, leave this column blank. Also, this column should be left blank if the **Lowest Residual** is recorded as either <ND> or <MD> on a specific day. If you did not record the period of time that the disinfectant residual was below the acceptable level on a specific day, enter <ND> in the corresponding column.

When calculating the duration of the event, the event begins when the reading falls below the acceptable level and concludes when the reading is equal to or greater than the acceptable level. For example, if the 4 p.m. reading was 0.5 mg/L free chlorine, the 8 p.m. reading was 0.1 mg/L free chlorine, and the midnight reading was 0.3 mg/L free chlorine, then the duration of the event was 4.00 hours (8 p.m. to midnight).

A plant may increase the monitoring frequency to more accurately determine the duration of an event. For example, if you collect residual data every 15 or 30 minutes after getting a low reading, you may report the duration of the event in ¼-hour or ½-hour increments. Therefore, an event lasting only 15 minutes will be reported as 0.25 hour, and one lasting 2 hours 45 minutes will be reported as 2.75 hours.

IMPORTANT
The time recorded in the **Time** column may not represent the duration of time that your plant has its lowest residual entering the distribution system. In other words, your entries in the **Lowest Residual** and **Time** columns do not necessarily represent the same event.

Example 3-5: Disinfectant Entering Distribution System

The **Lowest Residual** entries in Figure 3.1. give us this information:

1. The lowest disinfectant residual entering the distribution system each day that the plant pumped water to distribution.
2. The plant did not pump any treated water to distribution on the 17th day of the month.
3. The lowest disinfectant residual entering the distribution system fell below the minimum acceptable level of 0.5 mg/L for total chlorine at least one time on the ninth day of the month. The longest duration of time that the residual was below the acceptable level was 45 minutes, or 0.75 hours.
4. The plant pumped water to distribution on the 18th day of the month, but the plant failed to continuously monitor the chlorine residual entering the distribution system. However, some of the data were recorded and all of those readings were above 0.5 mg/L.

SWMOR2 USERS:
You do not have to read Section 3.2. We have repeated any information that applies to you in Chapter 9.

3.2 Enter Daily Data on Individual-Filter Turbidity Performance

The **Filter Data** area of the form is where you will summarize the performance of each of your plant's individual filters. The data on individual-filter-effluent (IFE) turbidity is entered on page 3.

To get to page 3, click on the **P.3-Filter Data tab**. y Data \ P.3-Filter Data / P.4&5-D

You must enter information on page 3 of the SWMOR every day that your plant treats water. You must also enter some additional information at the end of the month about the performance of individual filters during previous months.

Daily Data on Individual-Filter Performance

The **Performance Data** table on page 3 of the SWMOR contains columns for recording the turbidity of the filtered water from Filters No. 1-10. If your plant has more than 10 filters, additional columns for recording the filtered water turbidity from up to 50 filters are provided on the addendum pages.

11	PERFORMANCE DATA																	
12		INDIVIDUAL FILTER TURBIDITY																
13																		
14		Filter No. 1		Filter No. 2		Filter No. 3		Filter No. 4		Filter No. 5		Filter No. 6		Filter No. 7		Filter No. 8		Filte
15	Date	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max
16	1																	
17	2																	
18	3																	

Figure 3.3 shows the portion of the SWMOR that is described in this section.

11	PERFORMANCE DATA																	
12		INDIVIDUAL FILTER TURBIDITY																
13																		
14		Filter No. 1		Filter No. 2		Filter No. 3		Filter No. 4		Filter No. 5		Filter No. 6		Filter No. 7		Filter No. 8		Filte
15	Date	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max
16	1																	
17	2																	
18	3																	

Figure 3.3. Data section for individual-filter turbidity on page 3 of the SWMOR.

After you review the information on the following several pages, Examples 3.6 and 3.7 show you how to complete and interpret the information contained in this portion of the SWMOR.

Readings of Individual-Filter Turbidity

You must measure and record the turbidity of the water produced by a filter whenever it is sending water to the clearwell. That means that you must record at least one result for IFE turbidity for each day when you show a raw-water pumpage above 0.000 MGD.

What Test to Run: You must use one of the acceptable methods from Table 7.1 to measure the turbidity of the water produced by each filter.

Where to Sample: You must collect the IFE turbidity sample at the outlet of each filter before that water is mixed with the water from any other filter.

When to Sample: You must record the IFE turbidity reading every 15 minutes whenever the filter is sending water to the clearwell. These readings must be collected on the quarter hour, for example, at 1:00 p.m., 1:15 p.m., 1:30 p.m., and 1:45 p.m.

The calibration of each continuous turbidity monitor must be verified at least once each week. See Section 7.2, "Calibrating Instruments and Other Equipment," for information about calibrating the online monitors and recorders. A plant that experiences a failure in the continuous monitoring equipment may collect grab samples every 4 hours for no more than 5 working days. If the result of a grab sample is greater than 1.0 NTU, the plant must collect a confirmation sample 15 minutes later.

SPECIAL CASE—FILTER TO WASTE
A filter is in operation when it is discharging water that contributes to the combined filter effluent. A filter is not in operation if it is offline or filtering to waste.

IMPORTANT
Avoid calibrating your online turbidimeters immediately before a sample is scheduled to be collected. If there is a problem during the calibration procedure, you could end up recording an erroneous result. If you have a calibration problem that affects two consecutive 15-minute readings, you must either document that these readings were collected during a calibration procedure or you will need to fill out a filter-profile report as described in chapter 4.

How to Enter Results: For each filter, record the maximum turbidity value that you recorded in the corresponding **Max** column. If you recorded the turbidity level four hours after starting a filter run, enter that data in the **4 Hrs** column. If a filter is not in operation on a specific day, enter <X> in both the **Max** and **4 Hrs** columns. If you were not required to collect a 4-hour reading, enter <X> in the **4 Hrs** column.

Maximum IFE Turbidity

Record the maximum turbidity value from each filter in the corresponding **Max** column. If a filter is not in operation on a specific day, enter <X>. (See the **important note** below and Examples 3.7 and 3.8 that follow.) If you collected none of the required IFE 15-minute turbidity readings for a particular filter, you must enter <ND> in the applicable **Max** cell. If you recorded some, but not all of the required 15-minute readings, then you must:

- enter the the highest reading of the day if it was above 1.0 NTU

or

- enter <MD> if you recorded some, but not all of the required readings, but all of the readings that you have were 1.0 NTU or less.

IMPORTANT
Systems may be required to conduct additional monitoring if the turbidity level from a filter exceeds the 1.0 NTU or 2.0 NTU trigger level in two consecutive 15-minute readings. Do not report any turbidity reading above either trigger level unless a filter exceeds the trigger level in two consecutive 15-minute readings.

If the turbidity level from a filter is greater than 2.0 NTU on a specific day, report the highest reading only if the reading collected 15 minutes before or after is also greater than 2.0 NTU. If the turbidity level is greater than 1.0 NTU, report the highest reading only if the preceding or following 15-minute reading is also greater than 1.0 NTU. If the turbidity level does not exceed either trigger level in two consecutive 15-minute readings, report the maximum reading no greater than 1.0 NTU.

IFE Turbidity at 4 Hours

If your system serves fewer than 10,000 persons each day, you may leave the **4 Hrs** columns blank. If your system serves 10,000 or more persons, in the corresponding **4 Hrs** column, record the turbidity value from each filter at the end of four hours of continuous filter operation after the filter is returned to service from backwash or shutdown. If such an event occurs more than once for a filter during the day, enter the reading for the event with the maximum turbidity level at four hours. If no such event occurs for a filter on a specific day, enter <X>. If you failed to record required 4-hour turbidity readings for a particular filter, you must enter <ND> in the applicable **4 Hrs** cell. If you recorded some, but not all of the required readings on a given day, then you must:

- enter the the highest reading of the day if any of the 4-hour readings that you do have were above 0.5 NTU

or

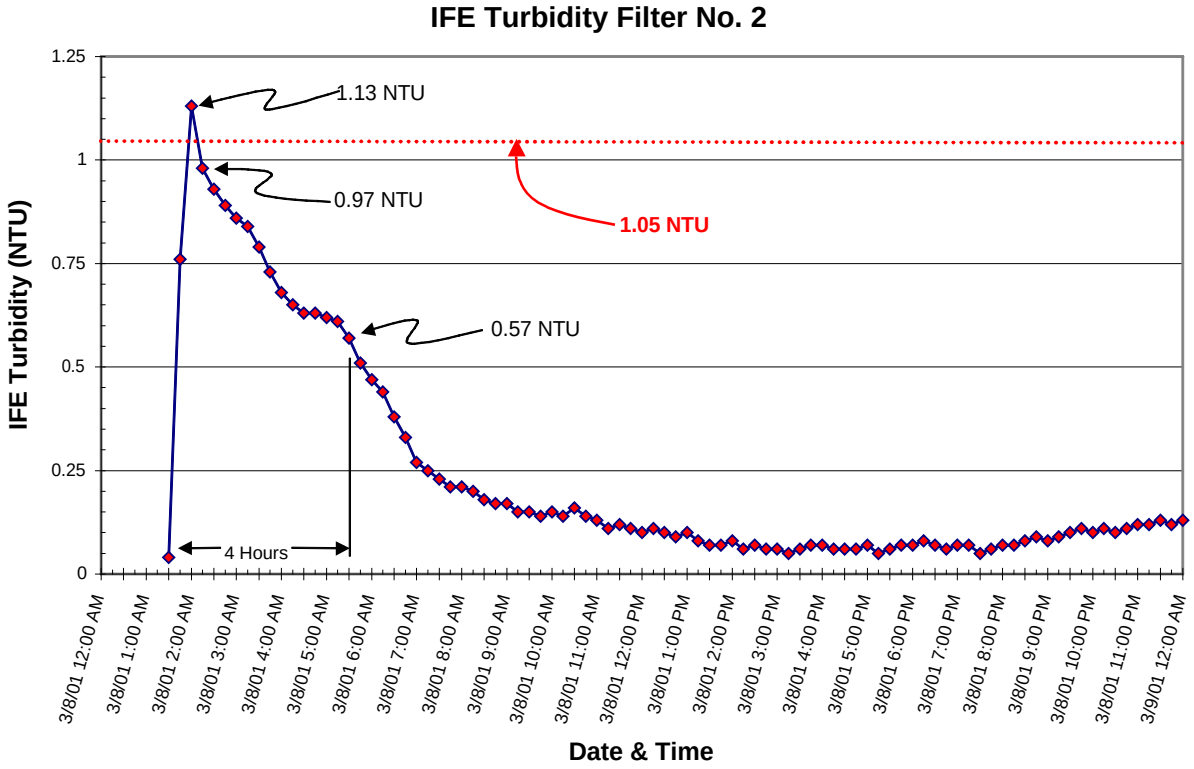
- enter <MD> if you recorded some, but not all of the required readings, but all of the readings that you do have were 0.5 NTU or less.

IMPORTANT
Systems serving fewer than 10,000 people are not required to report “4-hour” data. However, the SWMOR spreadsheet allows you to report the data if you wish. If you decide to include the data, the SWMOR spreadsheet will calculate the number of days when the **4 Hrs** column contains readings above 0.5 NTU but it automatically excludes the information when determining whether additional monitoring is required. Thus, there are no negative consequences to including the additional information.

Systems serving 10,000 or more persons may be required to conduct additional monitoring if the turbidity level from a filter exceeds 0.5 NTU in two consecutive 15-minute readings at the end of four hours of continuous filter operation. Do not report any turbidity reading above 0.5 NTU unless a filter exceeds 0.5 NTU in two consecutive 15-minute readings at the end of four hours into a filter run. If the turbidity level from a filter is greater than 0.5 NTU at 4 hours, report that reading only if the preceding reading, that is, the reading at 3 hours 45 minutes, or the following reading—that is, the reading at 4 hours, 15 minutes—is also greater than 0.5 NTU. Otherwise, report the subsequent reading, that is, the reading at 4 hours, 15 minutes.

Example 3.6: Maximum Daily and 4-Hour Individual Filter Effluent Turbidity

The following figure shows the turbidity readings on samples collected at the effluent of Filter No. 2.



Filter No. 2 was backwashed the previous day and allowed to sit idle for three hours to pre-ripen. It was returned to service at 1:20 a.m. Since turbidity readings must be collected on the quarter hour, the first turbidity reading of the filter run occurs at 1:30 a.m.

Although the maximum daily turbidity reading from this filter was 1.13 NTU, the value was not confirmed by a second consecutive reading of 1.05 NTU or higher. Consequently, when completing page 3 of the SWMOR, the operator should record the 0.97 NTU reading in the **Max** space for March 8, 2001.

At 5:30 a.m., four hours after the first turbidity reading, the operator records a turbidity level of 0.57 NTU. Since this reading is above 0.50 NTU, the operator checks the readings at 5:15 and 5:45 a.m. to determine if at least one of those is also above 0.50 NTU. Since the reading at 5:15 is 0.55 NTU or higher, the operator records the 0.57 NTU reading in the **4 Hrs** space on the SWMOR.

Example 3.7: IFE Turbidity

A surface water treatment plant submits an SWMOR containing the following data:

PERFORMANCE DATA														
	INDIVIDUAL FILTER TURBIDITY													
	Filter No. 1		Filter No. 2		Filter No. 3		Filter No. 4		Filter No. 5		Filter No. 6		Filter No. 7	
Date	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs	Max	4 Hrs
1	0.52	X	0.66	0.11	0.93	0.17	0.33	X	0.45	X	0.34	X		
2	0.40	0.14	0.35	0.30	ND	ND	0.86	0.37	0.78	0.28	X	X		
3	0.23	ND	0.65	X	MD	0.22	0.27	X	0.31	X	0.45	0.09		
4	1.60	0.57	0.73	0.09	0.43	X	0.59	0.19	1.10	ND	0.26	X		
5	X	X	X	X	X	X	X	X	X	X	X	X		

The individual filter turbidity data gives us this information—

1. On the first day of the month:
   a. All six of the plant's filters were operated for some period of time.
   b. There are no 4-hour readings required for Filters No. 1, 4, 5, and 6. Consequently, they were either operated all day long or they were taken offline at some point during the day and were not restarted.
   c. Filters No. 2 and 3 were either taken offline or backwashed at least once during the day. The filters were then restarted and operated for a period of at least four hours.
2. On the second day of the month:
   a. No data was recorded for Filter No. 3.
   b. Filter No. 6 was not operated at all that day.
3. On the third day of the month,
   a. Filter No. 1 was taken out of service, backwashed, and then restarted at least once during the day. However, the operator did not record the turbidity level of the water four hours after beginning one of the production runs.
   b. The SCADA system failed to record all of the required 15-minute IFE turbidity readings from Filter No. 3. However, we know that none of the readings that were recorded were above 1.0 NTU (because, otherwise, the operator would have recorded the exceedance).
4. On the fourth day of the month:
   a. The turbidity level from Filters No. 1 and 5 exceeded 1.0 NTU in two consecutive 15-minute readings.
   b. The turbidity level from Filter No. 1 exceeded 0.5 NTU in two consecutive 15-minute readings at four hours after the filter was returned to service.
   c. The SCADA system failed to record the turbidity level produced by Filter No. 5 four hours after it began a filter run.
5. The plant was completely offline on the fifth of the month; the raw-water flow rate on page 2 of the SWMOR will be 0.00 MGD. (Note: The SWMOR will not let you enter Xs in all the filters unless the flow rate is 0.00 MGD.)
6. If the water system serves at least 10,000 people, the missing 4-hour turbidity readings on the first four days of the month will each result in a monitoring and reporting violation because these systems are required to collect this data. If the system serves fewer than 10,000 people, it is not required to collect this data and so the SWMOR will not treat the empty spaces as data-entry errors.

Summary and Compliance Actions (Page 3)

The **Summary and Compliance Actions** table at the bottom of page 3 of the SWMOR contains columns for summarizing the historical performance of Filters No. 1–10. If your plant has more than 10 filters, additional columns for recording the IFE turbidity data turbidity for up to 50 filters are available on the addendum pages. Figure 3.4 shows the portion of the SWMOR that is described in this portion of the guidance manual.

		Criteria	Filter No. 1	2	3	4	5	6	7
49	SUMMARY & COMPLIANCE ACTIONS	Number of days with event(s) above 0.5 NTU at 4.0 hrs this month							
50		Number of days with event(s) above 1.0 NTU this month							
51		Number of days with event(s) above 1.0 NTU last month							
52		Number of days with event(s) above 1.0 NTU two months ago							
53		Total number of days with event(s) above 1.0 NTU in three months							
54		Number of days with event(s) above 2.0 NTU this month							
55		Number of days with event(s) above 2.0 NTU last month							
56		Does the filter/plant have an approved Corrective Action Plan?							
57		Is the plant required to submit a Filter Profile Report?							
58		Is the plant required to submit a Filter Assessment Report?							
59		Is the plant required to submit a Request for Compliance CPE?							

Figure 3.4. Summary & Compliance Actions section on page 3 of the SWMOR.

After you review the information on the following several pages, Example 3.8 illustrates how to complete and interpret the information contained in this portion of the SWMOR.

Number of days with event(s) above 0.5 NTU at 4.0 hours this month *CALC*

For each filter at the plant, the SWMOR counts the number of days when you entered a turbidity reading above 0.5 NTU in the **4 Hrs** column.

Number of days with event(s) above 1.0 NTU this month *CALC*

For each filter at the plant, the SWMOR counts the number of days when you entered a turbidity reading above 1.0 NTU in the **Max** column.

Number of days with event(s) above 1.0 NTU last month

For each filter at the plant, record the number of days during the last reporting month that you entered a turbidity level above 1.0 NTU. Pull this information from the row of last month's SWMOR labeled **Number of days with event(s) above 1.0 NTU this month**.

Number of days with event(s) above 1.0 NTU two months ago

For each filter at the plant, record the number of days that you entered a turbidity level above 1.0 NTU during the reporting period two months ago. If you pull this information from the row of last month's SWMOR labeled **Number of days with event(s) above 1.0 NTU last month**, you will not have to look at the SWMOR from two months before.

Total number of days with event(s) above 1.0 NTU in three months CALC

For each filter at the plant, the SWMOR calculates the total number of days that you entered a turbidity level above 1.0 NTU during the last three reporting months.

Number of days with event(s) above 2.0 NTU this month CALC

The SWMOR analyzes the data that you entered for each filter at the plant and determines how many days there were with at least one turbidity reading above 2.0 NTU in the **Max** column.

Number of days with event(s) above 2.0 NTU last month

Record the number of days during the last reporting month that you entered one or more turbidity reading values above 2.0 NTU. Pull this information from the **Number of days with event(s) above 2.0 NTU this month** row of last month's SWMOR.

Does the filter/plant have an approved corrective action plan?

For each filter at the plant, use the drop-down list to indicate whether we have approved a corrective-action plan (CAP) that waives the additional monitoring requirements for a specific filter. If the filter has an approved CAP, select <Y>. If the filter does not have an approved CAP, select <N>.

Also use the drop-down list for the plant to show whether we have approved a CAP that waives the plant from the requirement to participate in a comprehensive performance evaluation.

IMPORTANT

You do not have an approved corrective-action plan unless we have written you a CAP-approval letter. These approval letters:

1. identify the specific filters or plant that is covered by the approved CAP
2. briefly describe the corrective actions that must be completed
3. establish a compliance schedule for implementing the improvements

Once the improvements are complete, the CAP expires and the approval letter is no longer valid.

We generally do not approve a CAP for an individual filter unless the plant has submitted a filter-assessment report (FAR) and proposed CAP on that specific filter. If you have not conducted and submitted an FAR for the filter, you probably do not have an approved CAP for that filter.

We generally do not approve a CAP for the plant unless the system has participated in a CPE that was conducted by the TCEQ or a third party.

Is the plant required to submit a Filter Profile Report? CALC

For each filter at the plant, the SWMOR determines if the plant is required to conduct any filter profile on the filter and submit one or more filter-profile reports with the SWMOR.

IMPORTANT
Unless a filter has an approved corrective-action plan that waives the filter from additional monitoring requirements, you must either identify the cause of exceedance or produce a filter profile on the filter each time that the IFE turbidity level in the water produced by that filter exceeds 1.0 NTU in two consecutive 15-minute readings.

If your system serves 10,000 people or more, you must also identify the cause of exceedance or produce a filter profile each time that the IFE turbidity level exceeds 0.5 NTU in two consecutive 15-minute readings at four hours after the filter is returned to service.

Is the plant required to submit Filter Assessment Report(s)? *CALC*

For each filter at the plant, the SWMOR determines if the plant is required to conduct any filter assessment on the filter and submit one or more filter-assessment reports with the SWMOR.

IMPORTANT
Unless a filter has an approved corrective-action plan that waives the filter from additional monitoring requirements, you must conduct an assessment on it each time that a filter exceeds 1.0 NTU in two consecutive 15-minute readings on three separate occasions during the last three reporting months.

Is the plant required to submit a CPE Request Form? *CALC*

The SWMOR determines if the plant is required to participate in a third-party CPE and submit a request-for-compliance CPE with the SWMOR.

IMPORTANT
Unless the plant has an approved corrective-action plan that waives the CPE requirement, you must participate in a third-party CPE each time that a filter or any combination of filters exceeds 2.0 NTU in two consecutive 15-minute readings during the last two reporting months.

Example 3.8: Individual Filter Effluent Summary & Compliance Section

This figure includes the **Summary and Compliance Action** areas of the June and July 2002 SWMORs for a treatment plant in Texas.

July 2012 (This month's SWMOR)

SUMMARY & COMPLIANCE ACTIONS	Filter No.										
Criteria	1	2	3	4	5	6	7	8	9	10	Plant
Number of days with event(s) above 0.5 NTU at 4.0 hrs this month	0	0	0	1							
Number of days with event(s) above 1.0 NTU this month	1	0	0	0							
Number of days with event(s) above 1.0 NTU last month	1	1	2	0							
Number of days with event(s) above 1.0 NTU two months ago	1	1	1	0							
Total number of days with event(s) above 1.0 NTU in three months	3	2	3	0							
Number of days with event(s) above 2.0 NTU this month											0
Number of days with event(s) above 2.0 NTU last month											1
Does the plant have an approved corrective action schedule?	N	N	Y	N							N
Is the plant required to submit a Filter Profile Report?	Y	N	N	Y							
Is the plant required to submit a Filter Assessment Report?	Y	N	N	N							
Is the plant required to submit a Request for Compliance CPE?											N

June 2012 (Last month's SWMOR)

SUMMARY & COMPLIANCE ACTIONS	Filter No.										
Criteria	1	2	3	4	5	6	7	8	9	10	Plant
Number of days with event(s) above 0.5 NTU at 4.0 hrs this month	0	0	0	0							
Number of days with event(s) above 1.0 NTU this month	1	1	2	0							
Number of days with event(s) above 1.0 NTU last month	1	1	1	0							
Number of days with event(s) above 1.0 NTU two months ago	0	0	0	0							
Total number of days with event(s) above 1.0 NTU in three months	2	2	3	0							
Number of days with event(s) above 2.0 NTU this month											1
Number of days with event(s) above 2.0 NTU last month											0
Does the plant have an approved corrective action schedule?	N	N	Y	N							N
Is the plant required to submit a Filter Profile Report?	Y	Y	N	N							
Is the plant required to submit a Filter Assessment Report?	N	N	N	N							
Is the plant required to submit a Request for Compliance CPE?											N

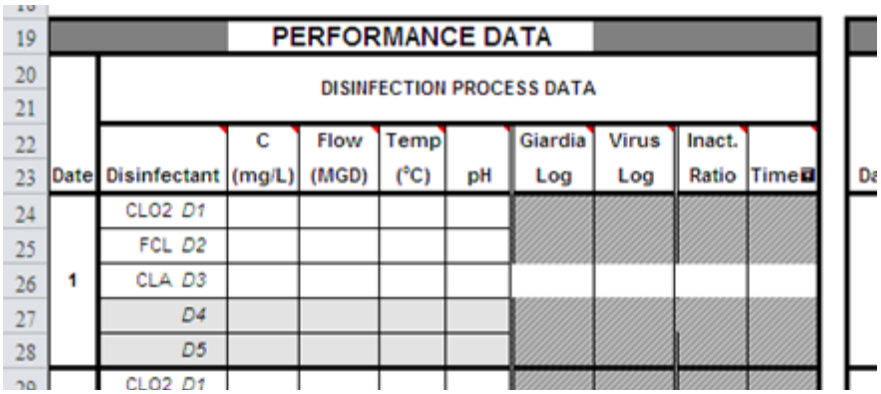
This example shows that:

1. You can use the preceding month's SWMOR to help you complete the information in these rows:
   a. Number of days with events above 1.0 NTU last month,
   b. Number of days with events above 1.0 NTU two months ago, and
   c. Number of days with events above 2.0 NTU last month.
2. You will need to submit a Filter Profile Report on Filters No. 1 and 4 with the July SWMOR because:
   a. there was one day when the maximum turbidity reported on Filter No. 1 was above 1.0 NTU,
   b. there was one day when the turbidity level on Filter No. 4 was above 0.5 NTU exactly four hours after it was placed online, and
   c. we have not yet approved a CAP on either of the filters.
3. You will need to submit a filter-assessment report on Filter No. 1 because the maximum turbidity level exceeded 1.0 NTU on a total of at least three days during the past three months and it has no approved CAP.
4. You have an approved CAP for Filter No. 3 and so you didn't have to submit a filter-assessment report on that filter in June (even though there was a total of three days when the turbidity level rose above 1.0 NTU).
5. You don't need to submit a filter-assessment report on Filter No. 3 in July for two reasons:
   a. you have an approved corrective action plan on the filter, and
   b. none of the three readings above 1.0 NTU occurred during the month of July.

3.3 DISINFECTION-PERFORMANCE DATA (PAGES 4 AND 5)

Disinfection-performance data is used to determine whether your plant achieved an adequate level of disinfection every day. This data is entered on pages 4 and 5. To get to pages 4 and 5, click on the **P.4&5-Disinfection Data** tab.

You must evaluate the effectiveness of the disinfection process at least once each day when your plant treats water. In other words you must evaluate the effectiveness of the disinfection process each day that you show a raw water pumpage above 0.000 MGD. Figure 3.5 shows the area on page 4 where you will record the disinfection data for your plant. This figure, the information on the next few pages, and Example 3.9 should help you complete this portion of the SWMOR and SWMOR2.



	PERFORMANCE DATA								
	DISINFECTION PROCESS DATA								
Date	Disinfectant	C (mg/L)	Flow (MGD)	Temp (°C)	pH	Giardia Log	Virus Log	Inact. Ratio	Time
1	CLO2 D1								
	FCL D2								
	CLA D3								
	D4								
	D5								
	CLO2 D1								

Figure 3.5. Disinfection Process Performance Data section of the spreadsheet.

What Tests to Run: In order to evaluate the effectiveness of the disinfection process, you must measure the following operational data:

- Disinfectant residual concentration, C (mg/L)
- Flow rate, Flow (MGD)
- Temperature, Temp (°C)
- pH

See Tables 7.1 and 7.2 to find the acceptable laboratory methods for measuring residual concentration, water temperature, and pH.

Where to Sample: You must collect the disinfection-process data at the end of each disinfection zone defined in your CT-study-approval letter. We require you to monitor each disinfection zone even if you can meet the minimum inactivation requirements using a fewer number of the zones. This data is needed so that we will be able to assess the overall impact of any changes you propose to make in the disinfection process.

When to Sample: You must monitor each of the required parameters when the plant is operating at the peak hourly flow rate for the day. The peak hourly flow occurs at the plant's peak hour of production when the maximum volume of water flows through the plant during the one-hour period. If you reduce the flow rate during the day, you do not have to make another measurement. However, if you increase the flow rate during day, you must re-collect all the data.

How to Enter Results: If you collected only one set of disinfection process data during the day, record that information in the **Disinfection Process Data** section.

If you collected more than one set of disinfection process data during the day, record the data from the set of readings that corresponds to the lowest total inactivation ratio for *Giardia* and viruses.

IMPORTANT
Do not mix the data collected from two or more data sets. For example, if you got one set of data at 10 a.m. and another set at 4 p.m., you must either use all the morning data or all the afternoon data. Do not use some data from each set.

Disinfection Process Parameters

The **Disinfection Process Parameters** table at the top of pages 4 and 5 of the SWMOR and SWMOR2 spreadsheets include columns that show the plant's approved CT study parameters and performance standards you provided when completing the **Disinfection Process Parameters** dialog box. The tables contain five columns for the CT study parameters for disinfection zones 1 through 5 (or any combination of five zones/trains). If your plant has more than five zones, the program will automatically create addendum pages and add up to five additional columns for zones 6–10.

The SWMOR spreadsheet will automatically use the data you entered when completing the **Disinfection Process Parameters** dialog box to fill in the corresponding table at the top of pages 4 and 5. If you are using SWMOR2, you will have to enter the information manually using the same guidance we supplied in Section 2.3.

Figure 3.6 shows the **Disinfection Process Parameters** table from page 4 of the SWMOR spreadsheet. The values included in this figure are taken from Example 2.1 for the plant with the CT-study-approval letter described in Appendix A.

11	DISINFECTION PROCESS PARAMETERS							
12	APPROVED CT STUDY PARAMETERS						PERFORMANCE STANDARDS	
13								
14		Disinfection Zones					Log Inactivations	
15	Parameters	D1	D2	D3	D4	D5	Giardia lamblia Cysts	Viruses
16	Flow Rate (MGD)	1.440	0.480	0.960			0.5	2.0
17	T_{10} (minutes)	47.0	12.0	122.0				

Figure 3.6. Disinfection Process Parameters section of the spreadsheet.

Disinfectant

The cells in the **Disinfectant** columns on pages 4 and 5 of the spreadsheets contain a drop-down list for each disinfectant zone identified in your plant's CT study approval letter. Each day the plant treats water, you can use the drop-down lists to select the type of disinfectant residual maintained in each of the disinfection zones. The abbreviations for the possible disinfectants are shown in Table 3.2.

Table 3.2. Abbreviations for disinfectants.

Abbreviation	Disinfectant
FCL	free chlorine
CLO2	chlorine dioxide
O3	ozone
CLA	chloramines
NA	the disinfection zone was not used during the day; that is, the flow rate in the zone was 0.000 MGD or there was no disinfectant applied at or upstream of the zone

NOTE
If you are using the SWMOR, the spreadsheet will automatically complete the **Disinfectant** columns on pages 4 and 5 with the information you entered in the **Disinfection Process Parameters** dialog box (described in Section 2.3). However, the spreadsheet also allows you to manually change the disinfectant you use in a given zone on daily basis. Since the SWMOR2 spreadsheet does not include a **Disinfection Process Parameters** dialog box, you must manually enter the data each day that your plant treats water.

Under certain operating conditions, the spreadsheets limit the options you have for selecting a disinfectant in one or more of the disinfection zones. For example, the spreadsheet will automatically do the following:

- enter <NA> in each of the disinfection zones for any day that you have entered <0.000> in the **Raw Water Pumpage (MGD)** column on page 2 of the SWMOR
- remove all of the options except <NA> from the drop-down list of disinfectants for a single zone if you enter a flow rate of <0.000> in the **Flow (MGD)** column for that zone
- remove <NA> from the drop-down list of disinfectants for any zone where you have entered any value in the **C (mg/L)**, **Temp (^{o}C)**, or **pH** columns
- remove <NA> from the drop-down list of disinfectants for any zone downstream (or after) a zone where you have recorded a disinfectant residual (unless you indicate that the flow rate through the zone is 0.000 MGD)

Both spreadsheets will only allow you to select <NA> for a disinfection zone if the treatment train was not in operation or if no disinfectant had yet been applied in the treatment process.

IMPORTANT
As discussed in Section 2.3, the **Disinfection Process Parameters** dialog box will appear each time you open the SWMOR spreadsheet. If you click on the [OK] button, the SWMOR will use the information in the dialog box to replace any data that you have manually entered on pages 4 and 5 of the speadsheet. On the other hand, if you click the [CANCEL] button in this dialog box, the SWMOR does not update pages 4 and 5.

Therefore, you should use your blank customized SWMOR when you begin a report for a new month and you should click the [CANCEL] button if you are completing a report that you have already started.

C (mg/L)—the Disinfectant Residual Concentration in the Disinfection Zone

You must measure the disinfectant concentration, C, at the end of each disinfection zone every day that you treated any water. Record the results in the **C (mg/L)** column. Report this value in mg/L. If you failed to measure the residual at the end of a disinfection zone, enter <ND> in the applicable **C (mg/L)** cell.

The spreadsheets will not allow you to enter a disinfectant residual result for a zone where you have selected <NA> from the drop-down list of disinfectants or where the **Raw Water Pumpage** value shown on page 2 is 0.000 MGD. If you try to enter a residual in this zone, you will get an error message.

ATTENTION, CHLORAMINE USERS
Remember that the DPD test for total chlorine will measure more than just monochloramine. Other combined chlorine compounds such as dichloramine, trichloramine, and organic chloramines can interfere with the colorimetric DPD test. Consequently, chloramine users that use DPD tests for reporting should periodically run process-control tests that are specific for monochloramine. Even if the results cannot be used for reporting, they can be used to adjust the treatment so that the desired monochloramine residual is maintained.

Plants that use ozone have some important special reporting requirements:

ATTENTION, OZONE USERS
The ozone concentration that you use for CT calculations depends on a number of factors. Specifically:

If:	and the water flows:	the reported concentration is:
ozone is applied in the contactor cell	in the same direction that the ozone rises (concurrent flow)	the same as the measured concentration at the outlet of the cell
ozone is applied in the contactor cell	in the opposite direction as the ozone rises (countercurrent flow)	one-half of the measured concentration at the outlet of the cell
no ozone is applied in the contactor cell	any direction (reactive flow)	the same as the measured concentration at the outlet of the cell

Flow (MGD)—the Flow Rate through the Disinfection Zone

Record the flow rate going through each disinfection zone at the time you collected the data set. Enter the results in the **Flow (MGD)** column. Report this value in MGD.

If your plant has more than one treatment train, you must record the flow rate through each of the trains. If your plant meters the flow rate through each unit, you must record this data. If your plant does not have flowmeters on each of the trains, you must use an alternate method that we have approved in writing.

If, on a specific day, your plant does not treat any water, or disinfectant is not used in a disinfection zone, leave this column blank. If you failed to measure the flow rate through a disinfection zone on a day that you did treat water, enter <ND> in the applicable **Flow (MGD)** cell.

IMPORTANT

The flow rate values that you enter on pages 4 and 5 are the flow rates that are occurring in each disinfection zone at the time that the measurements were made. Unless your plant operates a constant production rate for an entire 24-hour day, the daily raw water flow shown on page 2 will not match the flow rate shown on pages 4 and 5 for that day.

If your plant operated for less than 24 hours during the day, the flow rates on pages 4 and 5 will usually be greater than flow rate shown on page 2 (unless the flow is split between two or more trains).

Temperature

Record the water temperature in each disinfection zone in the **Temp (^{o}C)** column. Report this value in degrees Celsius (^{o}C). If you can show the water temperature is essentially constant throughout your treatment plant, you may use a single reading for all the disinfection zones.

If, on a specific day, your plant does not treat any water or disinfectant is not used in a disinfection zone, leave this column blank. However, if you did treat water but failed to measure the temperature of the water, enter <ND> in the applicable **Temp (^{o}C)** cell.

pH

Record the pH of the water in each disinfection zone in the **pH** column. Report this value in pH units.

If, on a specific day, your plant does not treat any water or disinfectant is not used in a disinfection zone, leave this column blank. However, if you did treat water but failed to measure the pH of the water at the end of a disinfection zone, enter <ND> in the applicable **pH** cell.

Giardial Log Inactivations CALC
Viral Log Inactivations CALC

The SWMOR and SWMOR2 spreadsheets both use a series of mathematical equations to determine the level of *Giardia* and viral inactivation obtained in each of the disinfection zones. The spreadsheet then totals the giardial and viral log inactivation and enters the results in the **Giardia Log** and **Virus Log** columns, respectively.

An asterisk (*) after the number indicates that the value is not representative of the total log inactivation for all disinfection zones, that is, you did not enter the disinfection process data for all zones. You can use the circle button ( ) to help identify which piece of data is missing.

Inactivation Ratio CALC

The two spreadsheets calculate the total inactivation ratio for both *Giardia* and viruses, and then record the lower inactivation ratio in the **Inact. Ratio** column. The letter beneath the number tells you if the lower inactivation ratio is the one for *Giardia* or for viruses. “G” shows that *Giardia* produces the lower inactivation ratio; “V” indicates that viruses produce the lower ratio.

If the total inactivation ratio is greater than or equal to 1.00, your plant met both the minimum *giardial* and viral inactivation requirements for the day.

If the ratio is less than 1.00, you must collect the disinfection process data at least once every 4 hours. You may collect this data more frequently if you wish. You must continue this increased monitoring frequency until the inactivation ratio is no longer below 1.00.

Time

In the **Time** column, record the number of consecutive hours that the total inactivation ratio is less than 1.00. If the inactivation ratio is 1.00 or greater during the day, leave this column blank. If the inactivation ratio falls below 1.00 more than once during the day, record the longest period of time that it was below 1.00. If the inactivation ratio fell below 1.00 during the day and you failed to determine how long it remained below 1.00, enter <ND> in the applicable **Time** cell.

A plant may increase the monitoring frequency to more accurately determine the duration of an event. For example, if you collect disinfection process data every 15 or 30 minutes after getting a low inactivation ratio, you may report the duration of the event in ¼-hour or ½-hour increments. Therefore, an event lasting only 15 minutes will be reported as 0.25 hour, and one lasting 2 hours 45 minutes will be reported as 2.75 hours.

IMPORTANT
The time recorded in this column may not represent the duration of time that your plant has its lowest inactivation ratio. That is, your entries in the **Inact. Ratio** and **Time** columns do not necessarily represent the same event.

Log Inactivation Summaries *CALC*

Figure 3.7 shows the cells where the two spreadsheets automatically calculate the average (**Avg**), maximum (**Max**), and minimum (**Min**) daily inactivation ratios for both viruses and *Giardia*. They also calculate the standard deviation (**SD**) for each of the two averages. The spreadsheets fill in these results using the disinfection data that you entered each day.

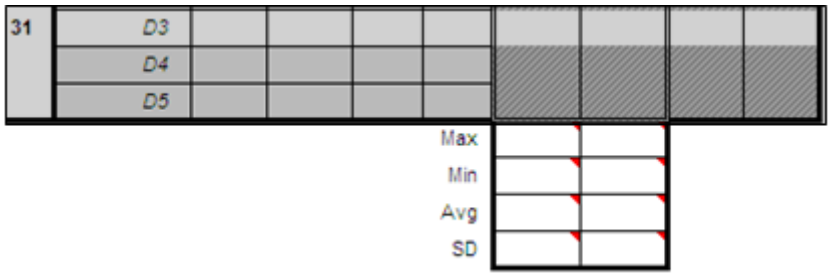


Figure 3.7. Log Inactivation Summary section of the Disinfection Data spreadsheet.

IMPORTANT
The spreadsheets will limit the amount of inactivation credit that your plant receives if one or more of the disinfection zones contain a free chlorine residual above 4.0 mg/L. If you exceeded this level on any day, the spreadsheets will place the following note next to the Log Inactivation Summary—

Note: The log removal credits for this plant were restricted on at least one day this month due to high free-chlorine levels in one or more zones or trains.

Example 3.9: Disinfection Process Data

The following figure includes the **Disinfection Process Data** for the first three days of the month for one of the surface water treatment plants in Texas.

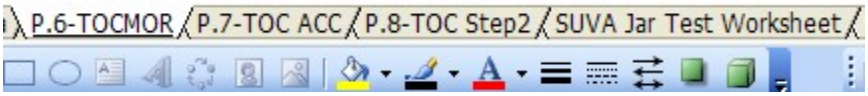
PERFORMANCE DATA									
	DISINFECTION PROCESS DATA								
Date	Disinfectant	C (mg/L)	Flow (MGD)	Temp (°C)	pH	Giardia Log	Virus Log	Inact. Ratio	Time=
1	NA *D1*								
	CLA *D2A*	3.0	3.000	12.0	7.2				
	CLA *D2B*	3.0	3.000	12.0	7.4	0.81	1.97	0.85	1.40
	CLA *D3*	3.5	6.000	12.0	7.4			(V)	
	D4								
2	NA *D1*								
	NA *D2A*								
	NA *D2B*					NA	NA	NA	
	NA *D3*								
	D4								
3	CLO2 *D1*	0.2	3.000	12.0	7.2				
	CLA *D2A*	2.8	3.000	12.0	7.5				
	NA *D2B*					1.78	4.83	2.39	
	CLA *D3*	3.5	3.000	12.0	7.5			(V)	
	D4								

This example shows:

1. The CT Study approval letter for the plant identifies three disinfection zones and there are two treatment trains in zone D2.
2. On the first day of the month:
   - The plant was not feeding a disinfectant in zone D1 when this set of data was collected.
   - The plant was achieving a total 0.81 logs of *Giardia* inactivation and 1.97 logs of viral inactivation when this set of data was collected.
   - The minimum inactivation ratio for the day was 0.85 and was limited by the viral inactivation requirements.
   - The longest period of time that the inactivation ratio was below 1.00 was 1.4 hours.
3. On the second day of the month, the plant did not treat any water.
4. On the third day of the month, Train D2B was not in operation when the operator collected this set of data.

3.4 ENTER TOC DATA (PAGES 6, 7, 8, AND SUVA)

If your plant utilizes sedimentation or clarification treatment processes, you must collect total organic carbon (TOC) information each month. Depending on the treatment alternatives you choose, the information you collect will be recorded on one or more of the worksheets identified below.



If you indicated that you do not have any sedimentation basins when you completed the **Plant Parameters** dialog box, the spreadsheets will hide these four worksheets since you are not subject to the TOC monitoring requirements.

P.6-TOCMOR

Every surface water treatment plant that has a sedimentation or clarification unit must submit the **P.6-TOCMOR** worksheet each month. The worksheet contains cells where you will describe the type of sedimentation or clarification basin you have, record your TOC data, and provide some basic information about the alternative compliance strategies you might be using.

> **IMPORTANT**
> The SWMOR and SWMOR2 spreadsheets will only display the **P.6-TOCMOR** if you indicated that your plant has at least one sedimentation basin when you completed the **Plant Parameters** dialog box. If you indicated that you have no sedimentation basins, the worksheet will be hidden.

Conventional and Unconventional Plants

Indicate whether your treatment plant is classified as a **Conventional** or an **Unconventional** plant by entering <X> in the appropriate box shown in Figure 3.8. If the plant is **Unconventional**, you have to explain what makes it unconventional in the space provided.

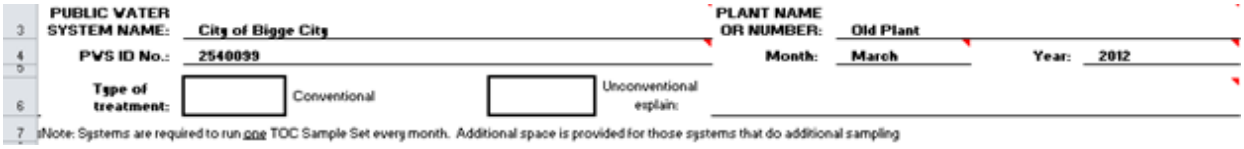


Figure 3.8. Conventional or unconventional plant selection.

Your plant is categorized as **Conventional** if you use gravity or pressure (granular media) filters and have any of the following:

- Flocculators and sedimentation basins
- Conventional solid-contact clarifiers such as slurry-recirculation clarifiers and sludge blank clarifiers
- High-rate clarifiers such as the Infilco-Degremont Pulsator and Superpulsator

If you use membrane filters, your plant is categorized as **Unconventional** regardless of whether or not you use a clarifier to pretreat your membrane feed water. However, a plant with granular media filters may also be classified as **Unconventional** if we

have approved an exception allowing you to use alternative treatment technologies that have extremely high surface overflow rates and very short detention times. These technologies include devices such as the Microfloc Trident clarifier, the Roberts Filter clarifier, or the Actiflow clarifier. If your plant uses an unconventional clarifier, you must still comply with the TOC monitoring requirements.

Monthly TOC Sample Set

You must collect at least one complete **TOC Sample Set** each month that the plant treats any water. A complete TOC sample set consists of the following three samples:

1. raw-water alkalinity
2. raw-water TOC
3. treated-water TOC

Although you must collect at least once complete TOC sample set each month, the worksheet provides enough cells for you to record sample set results once each day. You must report the results of all the complete TOC sample sets you collect during the month. Do not report the results unless you collected a complete sample set.

You must collect all three of the samples required for a complete TOC sample set within a 1-hour period so that you can properly characterize the TOC removal achieved by the plant. Furthermore, these samples should all be collected near the end of a long production run so that the plant will have had time to reach normal operating conditions.

NOTE
Your TOC sample set results must reflect the typical operating conditions that existed during the month. For example, if you change water sources, switch coagulants, or significantly alter the coagulant dose on the 10th of the month, you must collect at least one complete TOC sample set after making the change because data collected during the first 10 days of the month do not reflect the typical conditions that existed when you produced most of the water.

We recommend that you evaluate raw-water or treated-water TOC levels each time source water quality or the treatment process changes significantly, even if you decide not to run a complete TOC sample set. Although incomplete data sets may not be reported, the information is still valuable for making process-control decisions.

Note: Systems are required to run one TOC Sample Set every month. Additional space is provided for those systems that do additional sampling

Test No.	Test Date	Monthly TOC Sample Set			Actual % TOC Removed	Step 1 Required % Removal	Step 1 Removal Ratio	Optional data		COMPLIANCE REMOVAL RATIO
		Raw Alkalinity	Raw TOC	Treated TOC				Step 2 Required % Removal	Step 2 Removal Ratio	
		Enter the Sample Set results			*calculated*	*calculated from matrix*	*calculated*			*calculated*
1										
2										
3										

Figure 3.9. TOC data entry area in P.6-TOCMOR.

Test Date

Use the drop-down list in the appropriate **Test Date** cell to select the date that you collected a complete TOC sample set. Record the date you collected the first complete set in the first row, the date of the second set in the second row, and so on.

If you failed to collect at least one complete sample set during the month, select any of the dates from the drop-down list for the first row.

Raw Alkalinity
Raw TOC
Treated TOC

Enter the results of the raw water alkalinity, raw water TOC, and treated water TOC tests in the appropriate **Raw Alkalinity, Raw TOC,** and **Treated TOC** cells. Record the date you collected the first complete set in the first row, the date you collected the second set in the second row, and so on.

If you failed to collect a complete sample set during the month, enter <ND> in each of these three cells on the first row.

IMPORTANT

Raw water samples must be collected prior to any treatment (including those for taste and odor control, predisinfection, and coagulation) and upstream of the site where you recycle reclaimed water (such as decant water from a lagoon or spent backwash water).

Treated water samples may be collected at the effluent of the clarifiers, at the influent or effluent of the filters, or at the entry point to the distribution system.

Actual % TOC Removed *CALC*
Required Step 1 % Removal *CALC*
Step 1 Removal Ratio *CALC*

The SWMOR and SWMOR2 spreadsheets will use the sample set data you entered to calculate each of these three values.

If the **Step1 Removal Ratio** is less than 1.0, you may need to determine if you can meet one of the Alternative Compliance Criteria or run a Step2 Jar Test.

Step 2 Required % Removal *CALC*
Step 2 Removal Ratio *CALC*

If you want to use the results of a Step 2 jar test to help ensure that you meet the TOC treatment technique requirements, you must complete the **P.8-TOC Step2** worksheet. The SWMOR and SWMOR2 spreadsheets will use the data recorded on that worksheet to complete these two cells.

Compliance Removal Ratio *CALC*

The SWMOR and SWMOR2 spreadsheets will use the TOC sample results to complete these two cells. If you have not completed the **P.8-TOC Step2** worksheet, the compliance-removal ratio for each sample set will be copied from the corresponding **Step 1 Removal Ratio** cell. If you have entered data on the

P.8-TOC Step2 worksheet, the compliance-removal ratio will be based on the higher of the two applicable step 1 and step 2 removal ratios. This ensures that you will always receive the highest credit possible for each complete sample set.

TOTAL ORGANIC CARBON (TOC) REMOVAL SUMMARY

The **P.6-TOCMOR** worksheet contains a summary of the TOC data you have entered in your monthly report. All of the information in this area of the worksheet is calculated by the SWMOR and SWMOR2 spreadsheets.

50	TOTAL ORGANIC CARBON (TOC) REMOVAL SUMMARY					
51	TOC Summary					Monthly Compliance Ratio
52	Raw Water Alkalinity	Raw Water TOC	Treated Water TOC	TOC % Removal	ACC # used	
53						
54						

Figure 3.10. TOC Data Summary area on P.6-TOCMOR.

Raw Water Alkalinity *CALC*
Raw Water TOC *CALC*
Treated Water TOC *CALC*
TOC % Removal *CALC*

The SWMOR and SWMOR2 spreadsheets calculate the values shown in these cells based on respective averages from all of the TOC sample sets. Although this information gives us a general characterization of the plant conditions, we do not use the information to determine whether or not you have met the TOC-monitoring or treatment-technique requirements.

ACC # Used *CALC*

The SWMOR and SWMOR2 spreadsheets will automatically complete this portion of the report. If your plant will benefit from using one of the alternative compliance criteria (ACC), the spreadsheets will use the information that you have recorded on this worksheet and on the **P.7-TOC ACC** worksheet to give you credit for meeting one of the ACCs. If you will not benefit from using the ACCs, the spreadsheets will enter <NA> in this cell.

Monthly Compliance Ratio *CALC*

The SWMOR and SWMOR2 spreadsheets will automatically complete this portion of the report. If your average removal ratio for all of the complete sample sets is 1.0 or higher, the spreadsheets will enter that average value in this cell. If the average is less than 1.0, the spreadsheets will use the information you have supplied on the **P.6-TOCMOR** and the **P.7-TOC ACC** worksheets to determine if you have met one of the ACCs. If you have, the spreadsheets will assign you a monthly compliance ratio of 1.0.

NOTE
Compliance with the TOC treatment technique requirements is based on all of the TOC data you collected during the most recent four consecutive calendar quarters. For example, during the second quarter of 2010 (April, May, and June), we will use the data you collected during April 2009 through March 2010.

Since compliance is based on four quarters worth of data, you may not need to panic if you get a removal ratio of less than 1.0 every once in a while. However, you may want to investigate using one of the alternative compliance criteria or consider running a Step 2 jar test if your quarterly average removal ratio falls below 1.0.

P.7-TOC ACC (Alternative Compliance Criteria)

IMPORTANT
The SWMOR and SWMOR2 spreadsheets will hide the **P.7-TOC ACC** worksheet if:

- you have entered the results of at least one complete TOC sample set on the **P.6-TOCMOR** worksheet, *and*
- the average compliance ratio for all the sample sets collected during the month is 1.0 or higher, *and*
- either:
  - the average source water TOC results for all the sample sets collected during the month is less than 2.0 mg/L

  or
  - the average source water TOC results for all the sample sets collected during the month is less than 2.0 mg/L

In other words, the spreadsheets will hide the **P.7-TOC ACC** worksheet unless it will help you comply with the TOC treatment technique requirements.

You only need to complete the **P.7-TOC ACC** worksheet if you want to use one of the alternative compliance criteria to meet your TOC treatment-technique requirements. Table 3.3 briefly describes each of the eight ACC options and indicates whether the ACCs can be met on an annual basis only or can be met on either an annual or month-to-month basis.

Most plants will tend to use the same option each month. This is especially true at plants using one of the annual compliance options. However, you may switch between ACCs if you think it is appropriate.

ACC Selection

Before you can enter performance data in any of the ACC sections on the **P.7-TOC ACC** worksheet, you must select the ACC that you are using this month by entering an <X> in one of eight boxes for ACC near the top of the worksheet (see Figure 3.11). After you have selected the ACC that you will be using this month, the worksheet will automatically remove the data entry areas for all the other ACC options and show only the cells that you need to complete.

Table 3.3. Brief Description of TOC ACCs.

ACC No.	Compliance Options		Description
	Monthly	Annual[a]	
1	Yes	Yes	Source water TOC less than 2.0 mg/L
2	Yes	Yes	Treated water TOC less than 2.0 mg/L
3	No	Yes	All of the following: source water TOC level less than 4.0 mg/L source water alkalinity greater than 60 mg/L as $CaCO_3$ TTHM no greater than 0.040 mg/L HAA5 no greater than 0.030 mg/L
4	No	Yes	All of the following: TTHM no greater than 0.040 mg/L HAA5 no greater than 0.030 mg/L Free chlorine as the only disinfectant used to in both the plant and distribution system
5	Yes	Yes	Source water SUVA no greater than 2.0 L/mg-m
6	Yes	Yes	Treated water SUVA no greater than 2.0 L/mg-m
7	Yes	Yes	Treated water alkalinity less than 60 mg/L as $CaCO_3$
8	Yes	Yes	Magnesium hardness removal no less than 10 mg/L as $CaCO_3$

[a] Based on the running annual average for all of the listed parameters.

Figure 3.11. ACC selection boxes on the P.7-TOC ACC worksheet.

ACC Data Entry Areas

After you have selected the ACC you want to use, the **P.7-TOC ACC** worksheet will allow you to enter the data for that ACC option. Except for ACC #3 and ACC #4, you can meet the ACC based on the data you collected during the reporting month or the data you collected during each of the previous four calendar quarters. If you meet the ACC requirement on either a monthly or annual basis, the spreadsheet will make appropriate changes to the **ACC # Used** and the **Monthly Compliance Ratio** cells on this month's **P.6-TOCMOR** worksheet.

Current Month Data: If you collected the data needed to evaluate compliance with ACC requirement for the month covered by the report, enter the results in the applicable **Current Month** cell. If the monthly data meets the ACC requirement, the spreadsheets will hide the data entry area for the annual data.

Historical Data: The SWMOR and SWMOR2 spreadsheets will only let you enter data for previous months if:

- you did not enter any data in the **Current Month** cell

or

- the data for the current reporting period does not meet the ACC requirement

If you did not meet the ACC requirement on a monthly basis, the spreadsheets will fill in the **Month/Year** cells to identify the months that you must use to evaluate compliance with the ACC requirement on an annual basis. After you have entered historical data for each of the three months in a given quarter, the spreadsheets will average the three values and insert the value in the appropriate **Quarterly Average** cell. Once you have entered the historical data for all four quarters, the spreadsheets will calculate the running annual average and insert the value in the appropriate **RAA** cell.

> **NOTE**
> Once you have entered 12 months of historical data, the SWMOR and SWMOR2 will not allow you to enter data in the **Current Month** cell unless the value in the **RAA** cell does not meet the ACC requirement.

ACC #1—Source water TOC less than 2.0 mg/L
ACC #2—Treated water TOC less than 2.0 mg/L
As Figure 3.12 indicates, these two ACC alternatives are available on both a monthly and an annual basis.

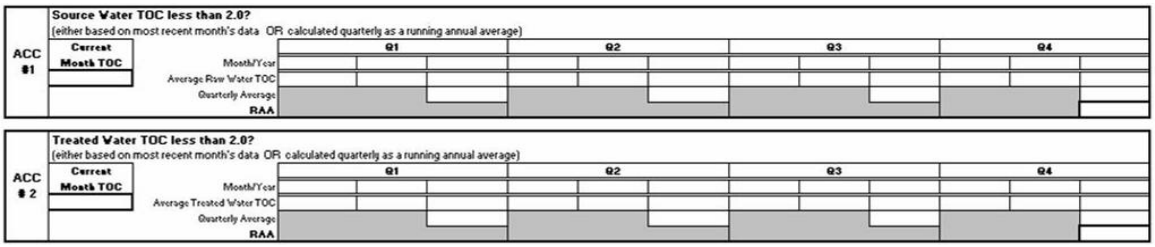


Figure 3.12. TOC ACC #1 and ACC #2 data entry areas.

The average monthly values for both raw and treated water TOC are copied from the **TOC Summary** area at the bottom of the **P.6-TOCMOR** worksheet. However, if either of these monthly results meets the respective ACC criterion, the SWMOR and SWMOR2 spreadsheets will hide the **P.7-TOC ACC** worksheet. If neither of these values is less than 2.0 mg/L, the spreadsheets will display the data-entry area for historical data for the ACC you selected.

To complete the historical-data table, you will need to have **P.6-TOCMOR** worksheets for each of the 12 months identified in the **Month/Year** row. Copy the value from the **Raw Water TOC** cell in the **TOC Summary** area at the bottom of the **P.6-TOCMOR** worksheet to the applicable cell in the historical data table.

ACC # 3—Source water TOC less than 4.0 mg/L
As Figure 3.13 indicates, ACC #3 can only be evaluated on an annual basis.

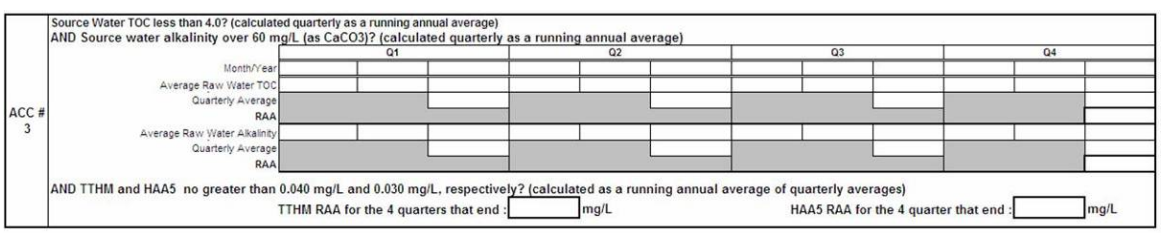


Figure 3.13. TOC ACC #3 data entry area.

To complete the historical data table, you will need to have **P.6-TOCMOR** worksheets for each of the 12 months identified in the **Month/Year** row. Copy the values from the **Raw Water TOC** and **Raw Water Alkalinity** cells in the **TOC Summary** area at the bottom of the **P.6-TOCMOR** worksheets to the appropriate cells in the historical data table.

You will also need to have the results from all of the TTHM and HAA samples that were collected during the 12 months identified in the **Month/Year** row of the historical data table. Use the following procedure to calculate the RAA values for the THM and HAA5 results and enter the results in the appropriate cell in the data entry area.

1. Add the TTHM results for all of the THM samples collected during a given quarter.
2. Calculate the average TTHM for the quarter by dividing the results from step 1 by the number of samples collected during the quarter.
3. Repeat steps 1 and 2 to calculate the quarterly TTHM average for the other three quarters.
4. Add the four quarterly TTHM averages and divide by four to get the TTHM RAA for the 12-month period.
5. Repeat steps 1–4 using the HAA5 results.

ACC #4—TTHM and HAA5 no greater than 0.040 mg/L and 0.030 mg/L, respectively
As Figure 3.14 indicates, ACC #4 can only be evaluated on an annual basis.

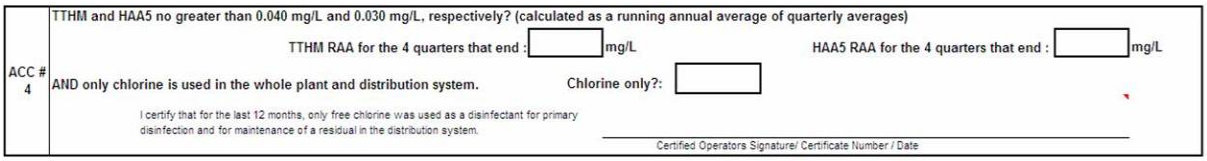

ACC # 4
TTHM and HAA5 no greater than 0.040 mg/L and 0.030 mg/L, respectively? (calculated as a running annual average of quarterly averages)
TTHM RAA for the 4 quarters that end : mg/L
HAA5 RAA for the 4 quarters that end : mg/L
AND only chlorine is used in the whole plant and distribution system.
Chlorine only?:
I certify that for the last 12 months, only free chlorine was used as a disinfectant for primary disinfection and for maintenance of a residual in the distribution system.
Certified Operators Signature/ Certificate Number / Date

Figure 3.14. TOC ACC #4 data entry area.

To complete this portion of the report, you will need the results from all of the TTHM and HAA samples that were collected during the previous four calendar quarters. Use the five steps outlined above to calculate the TTHM and HAA5 RRA values and enter them in the appropriate cell in the data-entry area.

You must also certify whether free chlorine was the only disinfectant that your system used during this 12-month period by entering <Yes> or <No> in the **Chlorine only?** cell and signing the form on the line provided.

ACC #5— Source water SUVA less than or equal to 2.0 L/mg-m
As Figure 3.15 indicates, this ACC alternative is available both monthly and annually.

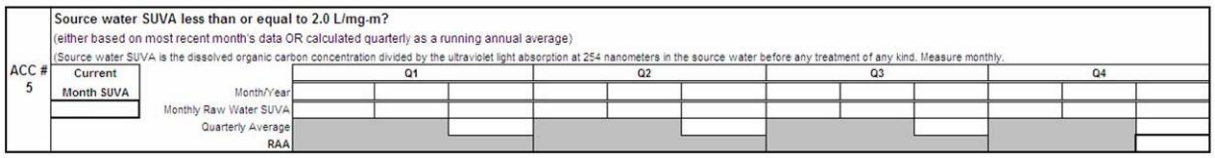

ACC # 5
Source water SUVA less than or equal to 2.0 L/mg-m?
(either based on most recent month's data OR calculated quarterly as a running annual average)
(Source water SUVA is the dissolved organic carbon concentration divided by the ultraviolet light absorption at 254 nanometers in the source water before any treatment of any kind. Measure monthly.
Current Month SUVA
Q1 Q2 Q3 Q4
Month/Year
Monthly Raw Water SUVA
Quarterly Average
RAA

Figure 3.15. TOC ACC #5 data entry area.

If you ran a raw-water SUVA test during the reporting period, enter the results in the **Current Month SUVA** cell. If the value is no greater than 2.0 L/mg-m, the spreadsheet will hide the historical-data table, since you will not need historical data to meet the requirement. If you need to complete the historical-data table, you will have to use previous reports and copy the value for each the 12 months identified in the **Month/Year** row of the table to the appropriate **Monthly Raw Water SUVA** cell.

ACC #6—Finished water SUVA less than or equal to 2.0 L/mg-m

As Figure 3.16 indicates, this ACC alternative is available both monthly and annually.

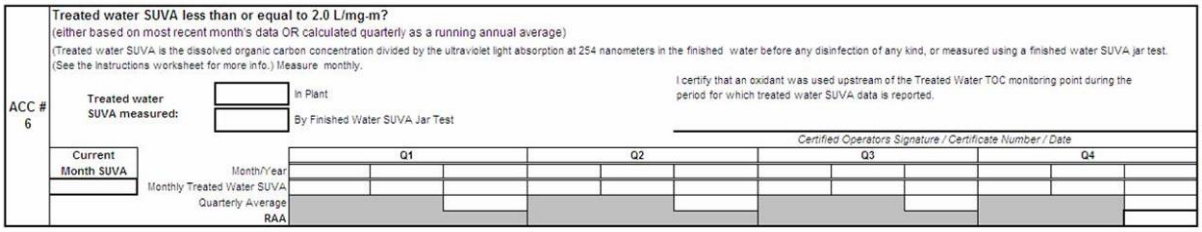


Figure 3.16. TOC ACC #6 data entry area.

If you ran a treated-water SUVA test during the reporting period, enter the results in the **Current Month SUVA** cell. If the value is 2.0 L/mg-m or lower, the spreadsheet will hide the unneeded historical-data table. If you need to complete the historical data table, you will have to use previous reports and copy the monthly value for each the 12 months identified in the **Month/Year** row of the table to the appropriate **Monthly Treated Water SUVA** cell.

You must also certify whether the SUVA test was run on treated water produced by the plant or on a sample of water from a SUVA jar test. If the test was run on a sample of treated water, place an <X> in the **In Plant** cell. If the test was run on a sample of water obtained after running a SUVA jar test, place an <X> in the **By Finished Water SUVA Jar Test** cell. Be sure to sign the form on the line provided.

> **NOTE**
> If you place an <X> in the **By Finished Water SUVA Jar Test** cell, the spreadsheets will reveal a **SUVA Jar Test Worksheet**. We have included this worksheet to provide a convenient place for you to record the SUVA jar test results and the plant conditions at the time you ran the test. However, you do not have to include it when you submit your monthly report.

ACC #7—Treated water alkalinity less than 60 mg/L as $CaCO_3$ (softening practiced) calculated quarterly as a running annual average

As Figure 3.17 indicates, this ACC alternative is available on both a monthly and an annual basis. However, it is only available to plants that practice lime softening.

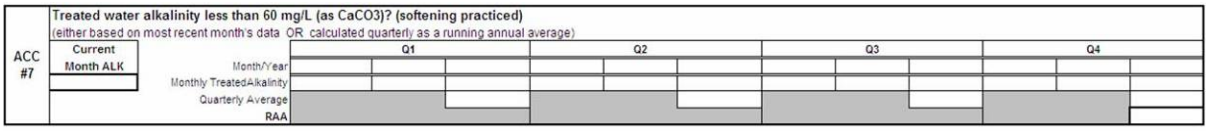


Figure 3.17. TOC ACC #7 data entry area.

If you ran treated water alkalinity tests during the reporting period, enter the average of all your test results in the **Current Month ALK** cell. If the value is less than 60 mg/L, the spreadsheet will hide the unneeded historical-data table. If you need to complete the historical data table, you will have to use previous reports and copy the monthly value for each the 12 months identified in the **Month/Year** row of the table to the appropriate **Monthly Treated Alkalinity** cell.

ACC #8—Magnesium hardness removal greater than or equal to 10 mg/L as $CaCO_3$ calculated quarterly as a running annual average

As Figure 3.18 indicates, this ACC alternative is available both monthly and annually. However, it is only available to plants that practice lime softening.

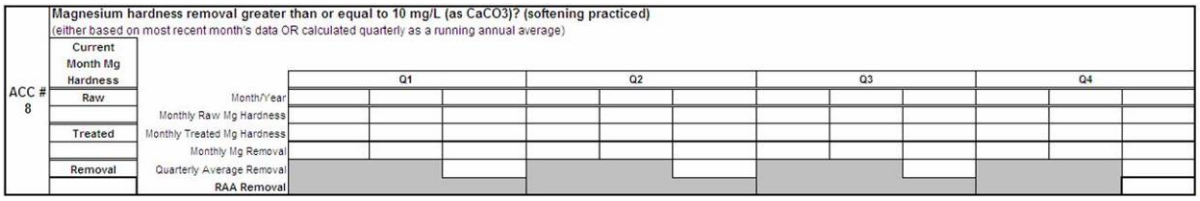


Figure 3.18. TOC ACC #8 data entry area.

If you measured the magnesium levels in both the raw and treated water water during the reporting period, enter the results in **Raw** and **Treated** cells in the **Current Month Mg Hardness** data entry area. The spreadsheets will calculate the amount of magnesium that you removed and, if you removed at least 10 mg/L, will hide the unneeded historical-data table. If you need to complete the table, you will have to use previous reports and copy the monthly value for each the 12 months identified in the **Month/Year** row of the table to the appropriate **Monthly Raw Mg Hardness** and **Monthly Treated Mg Hardness** cells. The spreadsheets will then calculate the amount of magnesium hardness removed each month as well as the quarterly and running annual average values.

P.8-TOC Step2 (Jar Test Report)

You only need to complete the **P.8-TOC Step2** worksheet if you run a Step 2 jar test and want to use the results to help you meet your TOC treatment-technique requirement.

IMPORTANT

The results of a Step 2 jar test are normally valid for six consecutive months beginning with the first month of the calendar quarter when you ran the test and ending with the last month of the following calendar quarter. For example, the results of a Step 2 jar test conducted in March can be used from March through June. You can also apply the results retroactively by amending and resubmitting your monthly reports for January and February.

However, we may require you to conduct another Step 2 jar test if your raw water conditions change significantly during the six-month period. For example, we may require a new jar test if you switch to a new water source and the chemical matrices (TOC, alkalinity, etc) of the two sources differ significantly.

For more information about how to conduct a Step 2 jar test, please refer the *TOC Guidance Manual* (TCEQ publication RG-379).

DATE OF JAR TEST

Before you can enter any other data on the worksheet, you must enter the date that you ran your Step 2 jar test in the **DATE OF JAR TEST** cell. This date may be no earlier than the first day of the previous calendar quarter and the last day of the current reporting period. For example, if you are submitting a report for March 2010, the date you enter may not be earlier than October 1, 2009 (the first day of the previous quarter) or later than March 31, 2010 (the last day of the current quarter).

PLANT CONDITIONS

You must enter information about the operating conditions that exist in the "full-scale" treatment plant in the **PLANT CONDITIONS** area of the worksheet, shown in Figure 3.19.

PLANT CONDITIONS								
RAW WATER SOURCE(s)	COAGULANT		COAGULANT AID		FLOC AID		pH ADJUSTMENT	
	Type	Dose (mg/L)	Type	Dose (mg/L)	Type	Dose (mg/L)	Type	Dose (mg/L)

Figure 3.19. Plant Conditions area of TOC Step 2 Jar Test worksheet.

If you conducted your Step 2 jar test during the current reporting period, record the operating conditions that existed on the day you ran the test. However, if you conducted your test during some other month, record the conditions that existed on the date when you collected your TOC sample set. If you collected more than one TOC sample set, report the conditions that you think most accurately reflect typical operational practices for the month.

If you were not using one or more of the chemicals when you collected the operating data, enter <NA> in the applicable **Type** cell and leave the corresponding **Dose (mg/L)** cell blank.

JAR TEST PARAMETERS

You must enter information about the dosing solutions, jars, and test conditions you used to conduct the Step 2 jar test in the **Step 2 JAR TEST PARAMETERS** area of the worksheet, shown in Figure 3.20.

STEP 2 JAR TEST PARAMETERS									
COAGULANT		BASE		JAR SIZE	JAR TEST CONDITIONS				
					Rapid Mix		Flocculation		Settling
Type	Stock Solution Concentration (g/L)	Type	Stock Solution Concentration (g/L)	Volume (liters)	Speed (rpm)	Duration (minutes)	Speed (rpm)	Duration (minutes)	Duration (minutes)

Figure 3.20. Jar Test Parameters area of the TOC worksheet.

If you did not adjust the pH when you conducted the Step 2 Jar Test, enter <NA> in the **BASE Type** cell and leave the corresponding **Stock Solution Concentration** cell blank. All of the rest of the cells in this data entry area must contain the appropriate information.

IMPORTANT
Many water treatment plants in Texas do not need to add a base during their Step 2 jar test because they have source water with relatively high alkalinity. However, we may require you to use a base when conducting your Step 2 jar test if the pH drops rapidly in the first two or three jars or if the first jar contains a relatively high alum dose.

JAR TEST RESULTS

You must record the results of your Step 2 jar test in the **JAR TEST RESULTS** area of the worksheet, shown in Figure 3.21.

19	JAR TEST RESULTS									
20	Jar No.	COAGULANT		BASE		Alkalinity	pH	TOC	Incremental TOC Removal	Cumulative TOC Removal
21		Dose (Alum eq.)	Volume	Dose	Volume	(mg/L as $CaCO_3$)		(mg/L)	(mg/L TOC removed per 10 mg/L of alum)	(%)
22		(mg/L)	(mL)	(mg/L)	(mL)					
23	RAW									
24	1									
25	2									
26	3									
27	4					Target pH (based on raw water alkalinity)				
28	5									
29	6									
30	7									
31	8									
32	9									
33	10									
34	11									
35	12									
37	Has the TCEQ approved this source as "Not Amenable" to Treatment even though Target pH was not reached?					TOC, % Removal at Apparent PODR:				
38	If "yes", provide the date of the TCEQ letter or e-mail.									

Figure 3.21. Jar Test Results data entry area.

IMPORTANT
Although we have allowed room for you to enter the results for up to 12 jars, you may not need to run such an exhaustive test. You only need to test enough coagulant doses to reach either:

- a point of diminishing returns (PODR)
  or
- your target pH

Coagulant Dose and Volume: Enter the coagulant dose (as mg/L of dry alum) used in each jar and the amount of dosing solution that you added to achieve that dose. If you used a coagulant other than dry alum to prepare your stock solution, be sure to report the dose in the proper units.

Base Dose and Volume: If you adjusted the pH in any of the jars, enter the base dose used in each jar and the amount of dosing solution that you added to achieve that dose. If you did not add base to one or more of the jars, leave the applicable cells blank.

Alkalinity and Target pH: Enter the alkalinity level of the raw water. After you enter the alkalinity reading, the worksheet will automatically complete the **Target pH** cell.

pH and TOC: After you complete the test, measure and record the pH and TOC levels of the settled water in each of the jars in the appropriate cells.

Incremental TOC Removal: After you have entered the TOC level of the settled water in each jar, the worksheet will calculate the incremental reduction that you achieved in each jar. The incremental value reported for each jar is the difference between the TOC levels in that jar and the previous one divided by $^{1}/_{10}$ of the increase in alum dose in those same two jars.

NOTE
If the TOC results indicate that the TOC level in a given jar is higher than the TOC level in the preceding jar, the incremental removal will be reported as a negative value. For example, if Jar 3 has a higher TOC level than Jar 2, the incremental removal for Jar 3 will have a negative value.

Cumulative TOC Removal: After you enter the TOC level of the settled water in each jar, the worksheet will also calculate the cumulative TOC reduction that you achieved in each jar. The cumulative value reported for a given jar is the difference between the TOC level in that jar and the TOC level in the raw water divided by the raw water TOC level and is expressed as percent reduction.

NOTE
If the incremental TOC removal value for a jar is a negative number, the spreadsheet will report a value of [bad data point] in the **Cumulative TOC Removal** cell.

TOC, % Removal at Apparent PODR: Based on the jar test data that you have entered, the SWMOR and SWMOR2 spreadsheets will automatically complete this cell with one of the following five values:

1. **A numerical value**—This result (a number) means that the Step 2 jar test identified one (and only one) point of diminishing returns. If this happens, the spreadsheets will copy the appropriate value from the cumulative TOC-removal data to this cell and use the result to determine your TOC removal ratio for each TOC sample set.

TOC, % Removal at Apparent PODR:	**a numerical value**

2. **Bad data point**—This result means that the Step 2 jar test identified one (and only one) point of diminishing returns. However, this PODR occurred in a jar that had negative **Incremental TOC Reduction**. If this happens, you need to contact the Surface Water Treatment Rule coordinator on the Drinking Water Protection Team at 512-239-4691, or by e-mail at <SWTPMOR@tceq.texas.gov> so that we can help you determine what follow-up is required.

TOC, % Removal at Apparent PODR:	bad data point

3. **Not Found**—This result indicates that your Step 2 jar test did not identify a point of diminishing returns. Usually, this means that you failed to reach the target pH in any of your jars. However, it could also mean the highest coagulant dose you used in the jar test produced a TOC reduction of 0.3 mg/L or higher for each 10 mg/L of alum in the last two jars. If you get this result, you will need to repeat the test using higher alum doses.

TOC, % Removal at Apparent PODR:	Not Found

4. **More than 1 PODR**—This result indicates that your Step 2 jar test produced a point of diminishing returns in two or more jars. If you get this result, you need to determine which of the PODR values best characterizes the jar-test findings and copy the appropriate value from the **Cumulative TOC Removal** cell to the empty cell below the **More than 1 PODR** notice.

TOC, % Removal at Apparent PODR:	More than 1 PODR
More than one PODR found; please enter correct PODR value:	

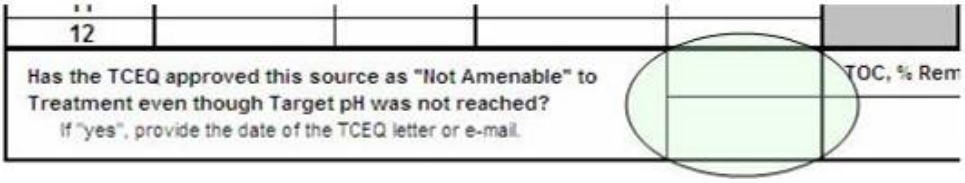
Please contact our Surface Water Treatment Rule Coordinator on the Drinking Water Protection Team at 512-239-4691, or by e-mail at <SWTPMOR@tceq.texas.gov>, if you have any questions about which of the PODR values you should use.

5. **Not Amenable**—This result indicates that your Step 2 jar test revealed that you reached your target pH in at least one of the jars but that all the of the jars produced TOC reductions of less than 0.3 mg/L for each 10 mg/L of alum applied.

TOC, % Removal at Apparent PODR:	Not Amenable

If you get this result, you need to contact our Surface Water Treatment Rule Coordinator on the Drinking Water Protection Team at 512-239-4691, or by e-mail at <SWTPMOR@tceq.texas.gov>, so that we can review your jar test results. If we concur that the TOC in your source water is not amenable to treatment, we will send you a letter or e-mail confirming the finding. Once you have consulted with us, you will need to

use the drop-down menu to enter <Yes> in the upper highlighted cell and enter the date of our correspondence in the lower one.



SUVA Jar Test Worksheet

A SUVA (specific ultraviolet absorbance) jar test estimates the relative amount of humic substances present in the water. Water that contains higher amounts of humic material is generally more amenable to enhanced coagulation. Plants that produce treated water with SUVA levels below 2.0 L/mg-m are unlikely to remove significantly more TOC.

It is generally better to test the SUVA levels of the treated water actually produced by your plant. However, it is not possible to measure treated water SUVA levels at plants that use iron-based coagulants (such as ferric chloride and ferric sulfate) or chemical preoxidants (such as chlorine and sodium or potassium permanganate), because these compounds interfere with the SUVA analytical method. In order to estimate the level of humic materials in the treated water they produce, these plants must conduct a SUVA jar test.

IMPORTANT
During a SUVA jar test:

1. You cannot add any iron-based chemicals (such as ferric chloride or ferrous sulfate) or any oxidant (such as chlorine or permanganate).
2. You may (and should) add any organic polymers and pH-adjustment chemicals that are currently used in your plant prior to the sedimentation basin or clarifier. These kinds of chemicals include coagulant aid polymers, flocculant aid polymers, or acids and bases that you add to adjust the pH or alkalinity of the coagulation process.
3. You should not add any chemicals applied to settled or filtered water in your plant. These chemicals might include filter aid polymers, corrosion control chemicals such as caustic or phosphates, and fluoride.

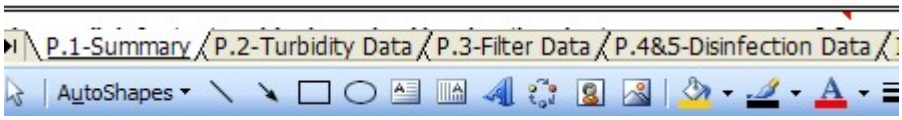
Refer to our *TOC Guidance Manual* (RG-379) for more information on procedures for SUVA jar tests.

NOTE
If you enter an <X> in the **By Finished Water SUVA Jar Test** cell on the **P.7-TOC ACC** worksheet, the spreadsheets will reveal a **SUVA Jar Test Worksheet**. We have included this worksheet as a convenient place for you to record the test results and the plant conditions at the time of testing. However, you do not have to include it when you submit your monthly report.

Since the **SUVA Jar Test Worksheet** is not used for compliance, it is not protected and contains no automated calculations or formulas.

3.5 COMPILING SUMMARY DATA (PAGE 1)

You must compile summary data at the end of the reporting month—that is, after you have completed the **Performance Data** tables on pages 2 through 5 of the SWMOR. Click on the **Page 1-Summary** tab to get to this page.



There are three boxes on page 1: **Treatment Plant Performance, Distribution System,** and **Additional Reports & Worksheets.** Each is described in detail below.

Treatment Plant Performance

The first box on page 1, **Treatment Plant Performance**, is divided into three sections by thin double lines. The top section of **Treatment Plant Performance** is a summary of turbidity data. The next section summarizes the CT data for the plant. The third section summarizes the disinfectant entering the distribution system.

Turbidity

Figure 3.22 shows the portion of the **Treatment Plant Performance** section related to the turbidity level of the water produced by the plant. Most of the data in this section pertains to the CFE turbidity level of the finished water. However, two of the items, **Number of days when plant was on-line but individual filter turbidity data was not collected** and **IFE 95th percentile** are related to IFE information. The spreadsheet automatically answers most of the questions using the information you entered on Page 2 of the SWMOR or pages 6–9 of the SWMOR2.

TREATMENT PLANT PERFORMANCE			
Total number of turbidity readings:	_____	Number of 4-hour periods when plant was off-line:	_____
Number of readings above 0.10 NTU:	_____	Number of 4-hour periods when plant was on-line but turbidity data was not collected:	_____
Number of readings above 0.3 NTU:	_____		
Number of readings above 0.5 NTU:	_____	Number of days when plant was on-line but individual filter turbidity data was not collected:	_____
Number of readings above 1.0 NTU:	_____		
Maximum allowable turbidity level:	_____	Number of days with readings above 1.0 NTU:	[ ] (2)
Percentage of readings above this limit:	[ ] % (1)	Number of days with readings above 5.0 NTU:	[ ] (3)
Statistical Summary	Maximum turbidity reading: _____ NTU	Average turbidity value: _____ NTU	
	Minimum turbidity reading: _____ NTU	Standard deviation: _____ NTU	
	CFE 95th percentile value: _____ NTU	IFE 95th percentile: _____ NTU	

Figure 3.22. Filter Effluent Summary on the Summary page.

Total number of turbidity readings *CALC*

The SWMOR counts the total number of finished water turbidity readings recorded in the **NTU1** through **NTU6** columns on page 2. The SWMOR2 does a similar calculation using the information entered on pages 6 through 9 of that spreadsheet.

Number of readings above X.X NTU Triggers *CALC*

The SWMOR counts the number of finished water (CFE) turbidity readings that were above 0.10 NTU, above 0.3 NTU, above 0.5 NTU, and above 1.0 NTU in the **NTU1** through **NTU6** columns on page 2 and then enters the result on the appropriate line. The SWMOR2 does a similar calculation using the information entered on pages 6 through 9 of that spreadsheet.

Maximum allowable turbidity level

In most cases, the two spreadsheets will automatically enter the maximum allowable turbidity level for your plant. However, if the cell is empty, you must use the drop-down list to select the maximum allowable turbidity level for your finished water. We strongly encourage all public water systems to keep turbidity as low as possible.

Percentage of readings above this limit—Box (1) *CALC*

Both spreadsheets calculate the percentage of finished water (CFE) turbidity readings that were above the maximum allowable turbidity level.

NOTE
Box (1) is the first of several numbered boxes in the **Treatment Plant Performance** and **Distribution System** areas on page 1 on the SWMOR and the SWMOR2. The information in these boxes is related to one of the treatment-technique violations or monitoring and reporting violations that trigger a public-notice requirement. (See "Public Notification" in Chapter 8 for an explanation.) The data in these boxes is used to determine when a system is required to issue a public notice for one or more treatment-technique violations.

Number of 4-hour periods when plant was offline *CALC*

If your system serves more than 500 persons, the SWMOR counts the number of 4-hour periods when the plant was offline, that is, the number of Xs that you entered in the **NTU1** through **NTU6** columns on page 2 of the SWMOR.

If your system serves 500 or fewer persons, the SWMOR counts the number of days when the plant was offline, meaning the number of days when the plant did not treat any water and the flow rate was "0.000" in the **Raw Water Pumpage** column on page 2 of the SWMOR.

SWMOR2 Users:
The SWMOR2 does a similar calculation but uses the 15-minute CFE turbidity readings that you enter on pages 6 through 9 of that report.

Number of 4-hour periods when plant was online but turbidity data was not collected *CALC*

If your system serves more than 500 persons, the SWMOR counts the number of 4-hour periods when the plant was online but you did not enter CFE turbidity data, that is, the number of NDs you entered in the **NTU1** through **NTU6** columns on page 2.

If your system serves 500 or fewer persons, the SWMOR counts the number of days when the plant was online but you did not record at least one finished water turbidity

reading, that is, the number of days when no turbidity reading was recorded in any of the **NTU1** through **NTU6** columns on page 2.

SWMOR2 Users:
The SWMOR2 does a similar calculation but uses the 15-minute CFE turbidity readings that you enter on pages 6 through 9 of that report. However, the SWMOR counts the number of blank cells, rather than the number of <ND> entries.

IMPORTANT
Unless a plant treats no water on a specific day, the plant must measure the turbidity of the finished water at regular four-hour intervals. Systems serving 500 or fewer persons may collect this data once a day.

If your SWMOR says there were some missed readings, please use the circle button ( ) on page 2 of the SWMOR to locate the spots where data is missing. If there are any cells where the data is missing, you must enter a valid value or, if the required test was not conducted, an <ND>.

If your SWMOR2 says there were some missed readings, please use the circle button ( ) on page 5 of the SWMOR2 to locate the spots where data is missing. Since the SWMOR2 spreadsheet does not allow you to enter <ND>, you will have to leave the cells empty if you did not collect the required data.
If your spreadsheet indicates that some of the turbidity data was not collected, you will have committed a monitoring and reporting violation and you will be required to notify your customers of the violation.

Number of days when plant was online but individual filter turbidity data was not collected *CALC*

The SWMOR counts the number of days when the plant was online but you failed to report IFE turbidity data. Thus, the SWMOR will count the number of days when you entered <ND> because you failed to record any of the required readings, as well as days when you entered <MD> because you only collected some of the required 15-minute readings. If your system serves 10,000 or more persons, the SWMOR counts the number of days with missing turbidity data in either the **Max** or **4 Hrs** columns on page 3. If your system serves fewer than 10,000 persons, the SWMOR only counts the number of days with missing turbidity data in the **Max** columns. Note that most of the other items in the **Treatment Plant Performance** section refer to the overall plant performance, but this one question is related to the monitoring of individual filters.

IMPORTANT
You must record the turbidity of the filtered water from each filter every day that your plant treated any raw water. If your plant has IFE turbidimeters, you must continuously monitor the turbidity of the filtered water from each individual filter and record the readings every 15 minutes.
If your plant serves fewer than 10,000 people and has two filters but no IFE turbidimeters, you must collect at least one grab sample from each filter each day.
If your plant has only one filter and you are submitting the SWMOR2 report, the spreadsheet will automatically enter <NA> in this cell.
If your spreadsheet says that some readings were missed, please use the circle button ( ) on page 3 of the spreadsheet to locate the spots where data is missing. If your spreadsheet indicates that some of the turbidity data was not collected, you will have committed a monitoring and reporting violation and you will be required to notify your customers. Remember, SWMOR will not let you print your report unless the cells contain a valid reading or an <ND> or <MD> entry.

Number of days with readings above NTU Triggers—Boxes (2) & (3) *CALC*

The SWMOR counts the number of days when one or more finished water (CFE) turbidity readings were above 1.0 NTU and 5.0 NTU in the NTU1 through NTU6 columns on page 2 of the SWMOR. The SWMOR2 does a similar calculation using the information entered on pages 6 through 9 of that spreadsheet.

Statistical Summary *CALC*

The SWMOR performs statistical analyses on the finished water turbidity data that were recorded in the NTU1 through NTU6 columns on page 2 of the SWMOR to determine the maximum and minimum readings, the average value, the standard deviation, and the 95th percentile. The maximum IFE turbidity data on page 3 are also analyzed in this section for the 95th percentile. The SWMOR2 also does this calculation but uses the information entered on pages 6–9 of the spreadsheet.

Microbial Inactivation (CT)

Figure 3.23 shows the portion of the **Treatment Plant Performance** section related to the disinfection data you collected. You do not have to enter any information in this section; the spreadsheet automatically answers the questions using the information you entered on pages 4 and 5 of your report.

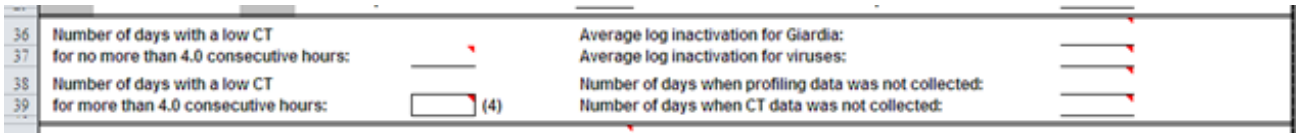


Figure 3.23. Microbial Inactivation (CT) Summary section on the Summary page.

Number of days with a low CT for four hours or less *CALC*

A "low CT" occurs when a plant fails to meet the CT requirements, that is, when the inactivation ratio for *Giardia* or viruses falls below 1.00. The spreadsheets count the number of days when the total inactivation ratio in the **Inact. Ratio** column on pages 4 and 5 was less than 1.00 and the duration in the **Time** column was 4.0 hours or less.

Number of days with a low CT for over four hours—Box (4) CALC

The spreadsheets also count the number of days when the total inactivation ratio in the **Inact. Ratio** column on pages 4 and 5 was less than 1.00 and the duration in the **Time** column was greater than 4.0 hours.

> **IMPORTANT**
> If you do not report the length of time that the inactivation ratio fell below 1.00, the spreadsheet assumes that the event lasted all day (24 hours).

Average log inactivations for *Giardia* or viruses CALC

The two spreadsheets both automatically copy the average log inactivation for *Giardia* and viruses from the summary at the bottom of page 5 of the report.

Number of days when profiling data was not collected CALC

The spreadsheets also count the number of days when the plant was online but failed to collect the disinfection-process data for all disinfection zones, such as the number of days with missing disinfection process data in the **C (mg/L)**, **Flow (MGD)**, **Temp (^{o}C)**, or **pH** columns on pages 4 and 5. Lacking such data, the spreadsheets will be unable to calculate the total *Giardia* and virus inactivation or will determine that the values they did calculate were not representative of the total log inactivations for all disinfection zones.

> **IMPORTANT**
> Unless a plant does not treat water on a specific day, the plant must collect at least one entire set of disinfection process data for each disinfection zone defined in the approved CT study at the plant's peak hourly flow rate.

Number of days when CT data was not collected CALC

Each spreadsheet counts the number of days when the plant was online but failed to collect enough disinfection process data to calculate a CT value, that is, the number of days with missing disinfection process data in the **C (mg/L)**, **Flow (MGD)**, **Temp (^{o}C)**, or **pH** columns on pages 4 and 5 of the report. As a result, the **Inact. Ratio** column on pages 4 and 5 could not be calculated.

> **IMPORTANT**
> If your report says that there were some missed readings, use the circle button ( ) on page 4 of the spreadsheet to locate the spots where data is missing. Remember, the SWMOR will not let you print your report unless the cells contain a valid reading or an <ND> or <MD> entry.

Disinfectant Entering Distribution System

Figure 3.24 shows the portion of the **Treatment Plant Performance** section related to the disinfectant residual in the finished water entering the distribution system. The SWMOR spreadsheet automatically records the type of residual disinfectant that you have selected on the **Disinfection Process Parameters** dialog box (Section 2.3). The spreadsheet automatically answers the rest of the questions using the information you entered on page 2. You do not have to enter any information in this section.

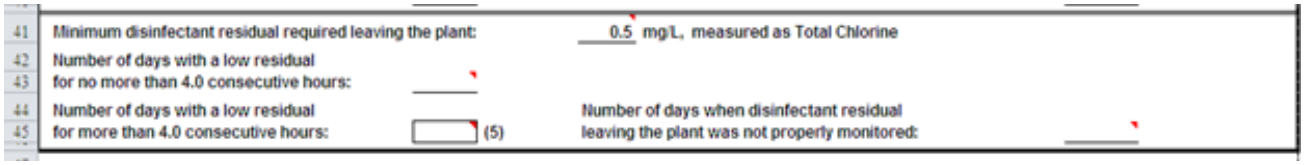


Figure 3.24. Disinfectant Residual Entering System section in the Summary page.

Minimum disinfectant residual required leaving the plant

The SWMOR and SWMOR2 spreadsheets will automatically answer this question based on the information you entered when completing the **Disinfection Process Parameters** dialog box (see Section 2.3). However, the spreadsheets also allow you to use the drop-down list to override the dialog-box selection if you need to.

If you need to, use the drop-down list to select the required minimum disinfectant residual leaving the plant. If your system uses free chlorine in the distribution system, select <0.2>. If your system injects ammonia at the plant, select <0.5>. The spreadsheets will use the residual you select to tell you whether you should be testing for free chlorine or for total chlorine.

NOTE
Most systems need to provide a much higher residual than the allowable minimum so that they can maintain an acceptable residual throught the distribution system.

Number of days with a low residual for four hours or less *CALC*

The SWMOR spreadsheet will automatically count the number of days when the disinfectant residual leaving the plant in the **Lowest Residual** column on page 2 of the report was below the minimum requirement and when the duration in the **Time** column was 4.0 hours or less.

Number of days with a low residual for more than four hours—Box (5) *CALC*

Your spreadsheet counts the number of days when the disinfectant residual in the finished water leaving the plant in the **Lowest Residual** column on page 2 was below the minimum requirement and the duration in the **Time** column was greater than 4.0 hours.

IMPORTANT
If you do not report the length of time that the residual falls below the minimum requirement, the SWMOR assumes that the event lasted all day (24 hours).

Number of days when disinfectant residual leaving plant was not properly monitored CALC

The SWMOR counts the number of days that the plant pumped treated water to distribution but failed to properly monitor the disinfectant residual in the finished water leaving the plant—that is, the number of days when no residual data was recorded in the **Lowest Residual** column on page 2 of the SWMOR.

> **IMPORTANT**
> Unless a plant does not pump treated water to distribution on a specific day, the plant must monitor the disinfectant residual entering the distribution system at the frequency shown in Table 3.1.
>
> If your report says that there were some missed readings, please use the circle button ( ) on page 2 of the spreadsheet to locate the spots where data is missing. If your report indicates that some of the disinfection data was not collected, you will have committed a monitoring-and-reporting violation and you will be required to notify your customers. Remember, the SWMOR will not let you print your report unless the cells contain a valid reading or an <ND> or <MD> entry.

Distribution System

Figure 3.25 shows the portion of the **Summary** page that contains the disinfection data you collected in the distribution system. **You will have to enter most of the data in this section because this is the only area on the SWMOR where distribution information is required.**

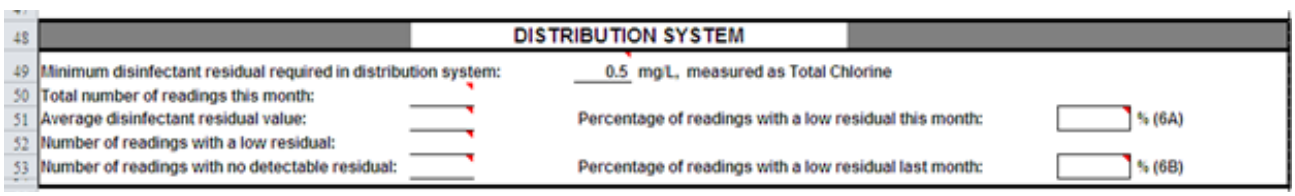


Figure 3.25. Distribution System Summary section of the Summary page.

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Minimum disinfectant residual required in distribution system

The SWMOR and SWMOR2 spreadsheets will automatically answer this question based on the information you entered when completing the **Disinfection Process Parameters** dialog box (see Section 2.3). However, the spreadsheets also allow you to use the drop-down list to override the dialog box selection if you need to.

If you need to, use the drop-down list to select the required minimum disinfectant residual leaving the plant. If your system uses free chlorine in the distribution system, select <0.2>. If your system injects ammonia at the plant, select <0.5>. The spreadsheets will use the residual you select to tell you whether you should be testing for free chlorine or for total chlorine.

Total number of readings this month

Record the total number of disinfectant residual tests you ran at designated sampling sites in the distribution system during this reporting month. If you have not tested disinfectant residual in the distribution system during the month, enter <0>. If you did perform tests, but failed to record the results, enter <ND>.

IMPORTANT
When completing this portion of your report, you must include the results of all samples you collected at a sampling site shown in your approved monitoring plan. See *How to Develop a Monitoring Plan for a Public Water System* (RG-384) for more information on how to prepare a monitoring plan and how to designate distribution residual sampling sites.

You must measure the disinfectant residual at least once each day at one or more of the sites specified in your system's monitoring plan. You must also check the residual each time you collect a bacteriological sample. Unless your system uses chloramine, you must test for free (not total) chlorine when monitoring the distribution system. See Table 7.2 on page 7-4 for the acceptable laboratory methods.

Do not forget that your monitoring plan may identify "residual sampling sites" in addition to the "bacteriological sampling sites" that you have designated for coliform testing. You may use either of these types of sites for your daily disinfectant residual sampling in the distribution system. Any sample collected at a designated sampling site must be included when filling out this part of the report. Although you may check the residual at other locations, you may not include these "other" results when you fill out the spreadsheet.

Average disinfectant residual value

Calculate and record the average disinfectant residual value based on all the distribution samples you collected during the month at designated sampling sites. The average value is calculated by adding all the distribution residual readings, then dividing the sum by the "Total number of readings this month". See Example 3-10 for more information about calculating the average disinfectant residual. If **Total number of readings this month** is <0> or <ND>, enter <NA> or <ND>, respectively.

Number of readings with a low residual

Record the number of readings when the distribution residual was below the minimum requirement during this reporting month. Remember to include only those samples collected at designated sites when answering this question. See Example 3-10 for more information about counting the number of distribution samples that contained a low disinfectant residual. If **Total number of readings this month** is <0> or <ND>, enter <NA> or <ND>, respectively.

Number of readings with no detectable residual

Record the number of readings when the distribution residual was not detectable during this reporting month. Remember to include only those samples collected at designated sites. See Example 3.10 for more information about counting the number of distribution samples that contained a low disinfectant residual. If **Total number of readings this month** is <0> or <ND>, enter <NA> or <ND>, respectively.

Percentage of readings with a low residual this month—Box (6A) *CALC*

The SWMOR and SWMOR2 both calculate the percentage of readings in which the distribution residual was below the minimum requirement during this reporting month.

Percentage of readings with a low residual last month—Box (6B)

Record the percentage of readings that the distribution residual was below the minimum requirement during the last reporting month. Pull this information from Box 6A of your plant's report for the preceding month.

IMPORTANT
The SWMOR and SWMOR2 spreadsheets cannot determine if you have complied with the distribution system disinfection requirements unless you complete box 6B. If you do not complete this box, you will get an **error** message in the **Public Notification** section of the Summary worksheet and be cited for a monitoring and reporting violation.

Example 3.10: Distribution-System Residual Results

The operators at a plant that does not use ammonia collected 31 chlorine residual samples at sampling sites shown on their approved monitoring plan. They also collected 8 coliform samples during the month. Finally, the operators collected 16 additional samples at sites that were not shown on their monitoring plan because they investigated some complaints during the reporting period. Because the plant does not use ammonia, the operator tested the samples using one of the approved methods for free chlorine. The results of these tests are shown in the table below.

Sample Type	Location	Number of samples	Total of all the readings	Number below 0.2 mg/L	Number with no detectable residual
chlorine only	designated site	31	30.8	3	1
chlorine and coliform	designated site	8	12.9	0	0
chlorine only	not a designated site	12	3	5	2
chlorine and coliform	not a designated site	4	1.8	1	1

The operator would complete the SWMOR or SWMOR2 in the following manner:

Step 1: Select the minimum required residual.
Because the plant is not adding ammonia, the operator should select 0.2 from the drop-down list.

Step 2: Determine the total number of readings during the month.
Because the 16 readings that were collected at sites that are not shown on the monitoring plan do not count, those test results are not included. Consequently, the total number of tests for the month was 39, that is, 31 + 8.

Step 3: Determine the average residual in the samples collected at designated sites.
The total residual in the 39 samples that count was 43.7 mg/L, that is, 30.8 + 12.9. So, the average result is 1.1 mg/L, that is, 43.7 mg/L divided by 39 samples.

Step 4: Count the number of tests that had low residual and no residual.
The 16 samples collected at sites that are not shown in the monitoring plan do not count. Therefore, there were 3 samples with low residual, that is, 3 + 0. One of these samples contained no detectable residual, that is, 1 + 0.

Step 5: Record the value shown in box 6A for the previous month in box 6B for this month.

Additional Pages and Reports

Figure 3.26 shows the area on the **Summary Page** related to the supplemental pages and reports you need to include when you submit your SWMOR. The spreadsheet automatically supplies the information that you need to determine if additional information is required and that we need to determine if the report is complete. However, you will need to indicate which of the additional individual filter reports you are including with your SWMOR.

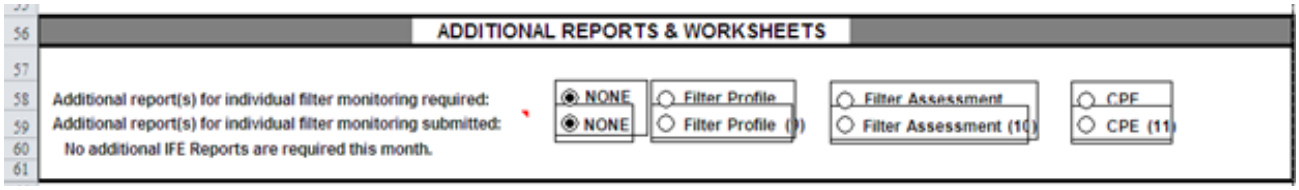

Figure 3.26. Individual Filter Summary Section on the Summary page.

Statement for Page 1 Addendum CALC

The SWMOR spreadsheet automatically determines if any treatment technique or monitoring/reporting violations occurred during the reporting period. If there were any violations, the SWMOR spreadsheet will automatically display the following statement in bold, red letters:

> **The Page 1 Addendum (Public Notices) is required because there was at least one treatment technique or monitoring/reporting violation reported.**

In addition, the **Summary Page Addendum** will be automatically included when you print your report. If your SWMOR adds the above message, you must complete and submit the **Summary Page Addendum** when you submit your report.

If there were no violations during the month, the spreadsheet will automatically display the following statement:

> **The Page 1 Addendum (Public Notices) is not required because there were no treatment technique or monitoring/reporting violations reported.**

The spreadsheet will automatically exclude the **Summary Page Addendum** when you print your report.

Additional report(s) for individual filter monitoring required CALC

The SWMOR also automatically determines whether your plant is required to conduct additional monitoring based on the data on filtered-water (IFE) turbidity you entered on page 3. The spreadsheet will indicate whether your plant is required to complete a filter-profile report, a filter-assessment report, or a CPE request form. If **None** is shown, the plant is not required to conduct additional monitoring or complete any of the additional reports.

IMPORTANT
The SWMOR spreadsheet cannot complete this portion of the report until you have entered all of the required data in the **Summary & Compliance Actions** section located at the bottom of page 3 of your spreadsheet. In some cases, the spreadsheet will replace the **Additional report(s)** heading on this line with a statement that reads:

ERROR: Missing Data From Previous Months (on P.3-Filter Data)

In other cases, the spreadsheet will simply leave all of the circles blank.

If your SWMOR does not fill out at least one of the four circles on the line **Additional report(s) for individual filter monitoring required**, use the circle button ( ) on page 3 of the spreadsheet to locate the spots where there is missing data.

Additional report(s) for individual filter monitoring submitted

Click on the buttons for any additional report that your plant is submitting with this SWMOR. If no additional reports are being submitted with this SWMOR, select **None**.

NOTE
The SWMOR allows you to correct a data-entry mistake in this area. If you make a mistake and select a report that you are not going to submit, you will need to reset the buttons by selecting the [None] button. This will clear all the previous selections so that you can reenter correct data.

The SWMOR also allows you to submit a special report even if you are not required to. For example, if you are having problems with a specific filter, you can complete and submit a filter-assessment report and proposed corrective-action plan before you have your third event with IFE turbidity readings over 1.0 NTU.

Statement for IFE Report *CALC*

The SWMOR compares the additional filter reports that you are required to submit with those that you indicate that you are submitting. If you do not indicate that you are submitting everything that is required, the spreadsheet will automatically display the following statement in bold, red letters:

Additional IFE Reports are required this month.

If you indicated that you are submitting the required reports or the SWMOR determined that no additional reports were required, the spreadsheet will automatically display the following statement:

No additional IFE Reports are required this month.

Statement for Report Waive due to CAP CALC

The SWMOR uses the information you enter on the **P.3-Filter Data** worksheet to determine if your plant is exempt from one or more of the additional reports because you have an approved corrective-action plan. If you do not have an approved CAP, the SWMOR will leave this line blank. However, if an approved CAP is the only reason that you are not required to submit additional reports, the spreadsheet will automatically display the following statement in bold, red letters:

> **One or more additional reports have been waived due to an approved corrective-action plan.**

> **NOTE**
> We do not require you to submit a copy of the CAP with your report. However, we check our records to verify that you currently have a valid CAP that has been approved in writing, has not expired, and covers all specific filters that would have required an additional report. If we cannot verify that you have a valid CAP, you will be required to submit a corrected SWMOR and will be cited for a monitoring-and-reporting violation.

3.6 PUBLIC-NOTIFICATION DATA

You are required to notify both us and your customers if you fail to comply with minimum monitoring and reporting requirements or fail to meet minimum treatment technique requirements. The SWMOR automatically determines if you have violated one of the requirements and, as noted previously, tells you whether you have to include public notice information when you submit your report. If you do have to issue a public notice, you must submit a completed **Summary Page Addendum** with your SWMOR.

The **Summary Page Addendum** contains a **Public Notices** table that:

- Lists and describes the different types of violations that can occur
- Indicates whether or not a violation occurred
- Provides a space for you to enter all the dates when you notified us and your customers of the violation
- Identifies the dates or month of the violation

Figure 3.27 shows the header rows for the **Public Notification** table. If the **Summary Page** indicated that you must submit the **Summary Page Addendum**, you can use this table to determine which violation the SWMOR has detected.

SURFACE WATER MONTHLY OPERATING REPORT

FOR PUBLIC WATER SYSTEMS THAT ARE USING SURFACE WATER SOURCES
OR GROUND WATER SOURCES UNDER THE INFLUENCE OF SURFACE WATER (cont.)
Summary Page Addendum (Violations and Public Notices)

PUBLIC WATER SYSTEM NAME: City of Bigge City

PLANT NAME OR NUMBER: Old Plant

PWS ID No.: 2540099

Month: March

Year: 2012

PUBLIC NOTICES						
VIOLATION TYPE	DESCRIPTION OF VIOLATION	VIOLATION OCCURRED?	NOTICE TO TCEQ DATE OF NOTICE	NOTICE TO CUSTOMER * DATE OF NOTICE	PENDING	VIOLATION DATES

Figure 3.27. Summary Page Addendum (violations and public notices).

Violation Type

There are two general types of violations that can occur at surface water treatment plants: treatment-technique violations and monitoring-and-reporting violations.

Treatment-technique violations are the more severe of the two, because they reflect that your plant failed to meet at least one of the minimum treatment requirements during the reporting period. As a result, your plant may have exposed your customers to contaminated water. Figure 3.28 shows the area for reporting treatment-technique violations.

PUBLIC NOTICES						
VIOLATION TYPE	DESCRIPTION OF VIOLATION	VIOLATION OCCURRED?	NOTICE TO TCEQ DATE OF NOTICE	NOTICE TO CUSTOMER * DATE OF NOTICE	PENDING	VIOLATION DATES
TREATMENT TECHNIQUE	Were more than 5.0% of the turbidity readings above the acceptable level? - see (1) on the *Summary Page*					
	Were there any days with turbidity readings above 1.0 NTU? - see (2) on the *Summary Page*					
	Were there any days with turbidity readings above 5.0 NTU? - see (3) on the *Summary Page*					
	Were there any periods when the plant failed to meet the CT requirements for more than 4.0 consecutive hours? - see (4) on the *Summary Page*					
	Were there any periods when the residuals leaving the plant fell below the acceptable level for more than 4.0 consecutive hours? - see (5) on the *Summary Page*					
	Were more than 5.0% of the residuals in the distribution system below the acceptable level for two months in a row? - see (6A) and (6B) on the *Summary Page*					

Figure 3.28. Portion of the Summary page for treatment-technique violations.

Monitoring-and-reporting violations are significant because they indicate that the operators failed to run all of the tests needed to detect treatment-technique problems. As a result, there were periods of time when the operators could not determine that the water being produced met all of the treatment requirements. The portion of the summary page where monitoring and reporting violations must be reported is shown in Figure 3.29.

95	MONITORING & REPORTING	Were there any days when the plant failed to report all of the required Combined Filter Effluent (CFE) turbidity readings? - see the *Turbidity Data Page*					
96		Were there any days when the plant failed to report all the CT data needed to evaluate the level of microbial inactivation achieved? - see the *Disinfection Data Page*					
97		Were there any days when the plant failed to report the minimum disinfectant residual entering the distribution system? - see the *Turbidity Data Page*					
98		Did the system fail to collect enough samples in the distribution system to meet the minimum disinfectant monitoring requirements? - see (8) on the *Summary Page*					
99		Were there any days when the plant failed to report the maximum individual filter effluent (IFE) turbidity level produced by each filter? - see the *Filter Data Page*					
100		Were there any days when the plant failed to report the IFE turbidity level 4-hours after beginning a filter run? - see the *Filter Data Page*					
101		Did the plant fail to submit a Filter Profile Report if one was required? - see (9) on the *Summary page*					
102		Did the plant fail to submit a Filter Assessment Report if one was required? - see (10) on the *Summary Page*					
103		Did the plant fail to submit a Comprehensive Performance Evaluation Request if one was required? - see (11) on the *Summary Page*					
104		Did the plant fail to collect at least one Total Organic Carbon sample set? - *see TOCMOR Page*					
105		Treatment technique violation notices are due no later than the end of the next business day. Please include a copy if possible.					
106		* Copies of each Public Notice must accompany this report if they have already been issued.					

Figure 3.29. Portion of the Summary page for monitoring-and-reporting violations.

Description of Violation

This portion of the **Public Notices** table contains brief descriptions of the six treatment-technique violations and the nine monitoring-and-reporting violations. It also tells you where in the SWMOR you can find the data the spreadsheet used to make the compliance determinations. In some cases, these references will direct you to one of the numbered items on the **Summary** page. In other cases, the references will direct you to another of the SWMOR's worksheets.

Violation Occurred? *CALC*

The SWMOR will automatically tell you if one or more violations occurred during the reporting period. If the violation occurred, the spreadsheet will enter <Yes> next to the violation description. If the violation did not occur, the spreadsheet will report <No> next to the description.

Notice to the TCEQ

You are required to inform us whenever a treatment-technique or monitoring violation occurs. The method you must use and the amount of time you have to contact us depends on the type and severity of the violation and whether or not we have to take any action. For example, you must notify us of treatment-technique violations soon after they occur while you can often notify us of monitoring violations when you submit your SWMOR. Chapter 8 contains much more information about the procedures you should use when notifying us of violations.

If you sent us an e-mail or faxed us a completed Public Drinking Water Violation Report form, TCEQ Form # 10449 (see Figure 8.1), enter the date that you sent the document. If possible, include a copy of the e-mail or the fax confirmation sheet with your SWMOR.

If you have not already sent us a separate notice, enter the date that you expect to mail your completed SWMOR.

Notice to Customers

You are also required to notify your customers when a treatment-technique or monitoring violation occurs. Again, the methods you must use to issue the notice and the amount of time you have to issue it depends on the type and severity of the violation that has occurred. Chapter 8 contains much more information about the procedures you must follow when you issue a public notice.

The **Notice to Customer** section contains two columns, **Date of Notice** and **Pending**. If you have already issued your public notice, you must:

- enter the date that you notified your customers of the violation or violations
- include a sample copy of the exact language you included in each public notice
- include a complete copy of the certificate of delivery for the notice (see Figure 8.14)

If you have not yet issued any required public notice, you must confirm the fact that the notice is pending by selecting <Yes> from the drop-down list in the **PENDING** column.

NOTE
If you enter <No> in the **PENDING** cell, the SWMOR assumes that you have already issued the notice (because it is no longer "pending"). Therefore, you will not be able to print your report until you enter a date in the corresponding **DATE OF NOTICE** cell.

Your SWMOR will allow you to answer <Yes> to **PENDING** even if you have entered a date in the **DATE OF NOTICE** cell. Although this situation is relatively uncommon, we recognize that there may be times when you have notified your customers of some, but not all, of the violations that occurred during the reporting period. In that case, the date shows when you issued the notices that were issued and the <Yes> indicates that some of the public notices are still pending.

Violation Dates *CALC*

The SWMOR includes formulas which determine the dates when each violation has occurred. To help you make sure that your public notices are complete, we have programmed the SWMOR to list all of the violation dates or periods in the appropriate **Violation Dates** cell.

3.7 PRINT, SIGN, AND SUBMIT THE REPORT

When you have completed the SWMOR or SWMOR2, you must sign and date each page in ink to certify that the information in the report is complete and correct. Find these blanks at the top of page 1 and at the bottom of each subsequent page.

Print the Report

You have to print each worksheet from the report. To print a particular worksheet, activate the worksheet by clicking on its tab, select [File] from the Excel menu, then click [Print].

If there are one or more invalid cells in a worksheet, the SWMOR will automatically terminate printing when you click [Print]. Thus, make sure that you have entered all the necessary information before you start printing. If you did not collect any necessary data, refer to an appropriate section of this manual to see whether the <MD> or <ND> option is available in the corresponding cell.

IMPORTANT
Much of the information contained on page 1 of the SWMOR report is based on data recorded on the later pages. Therefore, the information on page 1 can change any time that you make a change on a later page.

We recommend that you print the rest of your SWMOR before you print the **P.1-Summary** worksheet. By printing page 1 last, you can be sure that you will be sending us the most complete and accurate summary of your results.

If you decide to print the **P.1-Summary** worksheet first, you must remember to reprint the first page if you make any changes when reviewing and printing the rest of the report. If the information on page 1 of your report does not completely reflect the actual results, we mightcite you with a violation. While we can fix such problems, it is trouble for both you and us.

If you are certain that the worksheets contain no errors, you can use the [Print All] button located in the upper right corner of the **P.1-Summary** worksheet. Although this macro will automatically print all of the worksheets, it will also automatically interrupt the entire print job as soon as it detects an error on any of the pages. To help you resolve the problem, the macro will identify the worksheet where it detected the first error. You can then select that page and use the [Circle Errors] buttons in the upper left corner to locate the cells that need to be fixed.

Sign the Report

The certified operator with responsibility for the plant must sign and date the SWMOR, certifying that the data is accurate, as shown in Figure 3.30.

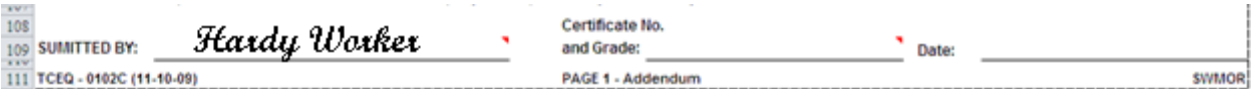

Figure 3.30. Operator's Signature on the SWMOR.

Operator's Signature

The certified operator responsible for the day-to-day operation of the treatment plant must use a pen or permanent marker to sign each page of the report. This signature must be handwritten. Stamped signatures and typewritten names are not acceptable.

Certificate No. and Grade

Enter the certificate number and the grade of the operator who signs the report. Fill out this blank on page 2 of the report; the other pages are linked to this page and the information you enter on page 2 will be automatically repeated on the other pages.

Example: WS12345678, WBS

Date

Enter the date that the operator signs the report. Fill out this blank on page 2 of the report; the other pages are linked to this page and the information you provide on page 2 will be automatically repeated on the other pages. Remember, your report must be received by the TCEQ no later than the 10th day of the month following the reporting period.

Mail the Report

Before you mail your report to the TCEQ, be sure you have included any related documents you may be required to send us. For example, if you are required to complete a filter-profile report, a filter-assessment report, or a CPE request form for this reporting month, you should include it with your report (see Chapters 4–6). You should also include a copy of each public notice your system is required to issue for this plant during this reporting month (see Chapter 8).

Send your completed report and related documents to:

Drinking Water Quality Team, MC-155, Attention: SWTR Coordinator
Water Supply Division
TCEQ
PO Box 13087
Austin, TX 78711-3087

If you wish you may submit documents to our physical address at:

Drinking Water Quality Team, MC-155, Building F
Attn: SWTR Coordinator, Water Supply Division
TCEQ
12100 Park 35 Circle
Austin, TX 78753

You may not submit your SWMOR by fax or e-mail because of legibility issues. We highly recommend that you retain proof of your submittal in the form of a certified mail receipt, fax transmittal confirmation, or return e-mail from us.