

# How to Complete the Membrane Filters Worksheet of the SWMOR-Alt

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## General Information about the Spreadsheets

The Surface Water Monthly Operating Report for Alternative Technologies (SWMOR-Alt) is for public water systems that produce drinking water from surface water or groundwater under the direct influence of surface water using alternate technologies. The EPA's Long Term 2 Enhanced Surface Water Treatment Rule (LT2) defines the alternate technologies that can receive credit for removal or inactivation of pathogens.

As you work with the SWMOR-Alt spreadsheets, you will find many features that make it easier for you to use. The following general information will help you use the spreadsheets.

An Excel spreadsheet is also called a workbook which is made up of separate worksheets. After you open the workbook, you will find a series of tabs at the bottom of the screen. Each of these tabs identifies one of the worksheets in the workbook. When you click on one of these tabs, the tab will change from gray to white and the program will take you to the worksheet for the pages shown on the tab.

Because the SWMOR-Alt is an electronic file, we have been able to place many instructions and comments directly in the two spreadsheets. Those electronic comments will help you immediately while you are completing the form.

## **“We” and “You” in This Guide**

“We” as used in this guide refers to the Texas Commission on Environmental Quality—specifically, the TCEQ's Water Supply Division.

In this guide, “you” means the person who must sign the SWMOR or SWMOR2 each month. Under the rules, this person must be the certified surface water treatment plant operator who is responsible for the daily supervision of the plant.

# 1. MEMBRANE–MBT WORKSHEET

## 1.1 INTRODUCTION

The **Membrane-MBT** worksheet of the SWMOR-Alt is used to record performance data for membrane units that use a marker based direct integrity test (DIT). If your plant uses this type of membrane system, you must enter information in the **Membrane-MBT** worksheet of the SWMOR every day.

If you indicated that your plant has this type of membrane system when you customized the SWMOR, this worksheet will be visible. If you indicated that your plant does not use membranes, or uses membranes with a different DIT method, this worksheet will be hidden. See **Chapter 2** for more information about customizing the SWMOR for your particular plant.

At the top of the **Membrane-MBT** worksheet, there is a block of information that describes your system, plant, and reporting period. The spreadsheet copies this information from the data you entered on the **P.2-Turbidity Data** worksheet, and this data cannot be re-entered or edited on the **Membrane-MBT** worksheet.

## 1.2 TEST PARAMETERS & ADDITIONAL DATA

Just below the block of information at the top of the worksheet, there is the **Test Parameters & Additional Data** table that contains the DIT parameters for each membrane unit, its DIT results from the previous month, and cells where you can enter other general information about the membrane unit. **Figure 1.1** shows the portion of the **Test Parameters & Additional Data** table for Membrane Unit 1.

DIT CONDITIONS & ADDITIONAL DATA	Unit No. 1								
	DIT Cond'ns	C <sub>feed,max</sub> Conc.	LRC -		Prev. Month Data	DIT <sub>last</sub> date	Pass? Yes/No	C/A success?	95th % count
	Optional Data	Filt.Flux gfd	TMP psi						

**Figure 1.1.** Test Parameters and Additional Data Table for MBT Membranes

## DIT Conditions

The **DIT Cond'ns** portion of the table contains the approved DIT test conditions and log removal credit for the membrane unit. The SWMOR automatically completes this portion of the table based on data you entered in the dialog boxes when you customized your SWMOR form. You cannot edit this information by entering data directly in the **Membrane-MBT** worksheet. Your plant's TCEQ-approved DIT parameters are in your exception approval letter from TCEQ. See **Chapter 2** for more information about customizing the SWMOR for your plant or changing your **DIT Cond'ns** values.

### **Maximum marker concentration in DIT feed stream** **[C<sub>feed,max</sub> (Conc.)]**

This cell shows the maximum marker concentration (in particles/mL or mg/L) in the DIT feed stream for the membrane unit to receive treatment credit in the **C<sub>feed,max</sub> (Conc.)** field.

### **Log removal credit [LRC]**

This cell shows the log removal credit that the membrane unit receives when it passes its DIT in the **LRC** field.

## Previous Month's Data

The **Prev. Month Data** portion of the table contains data you recorded during the previous month. To complete this part of the table, you must review your operational records from the previous month and enter the required information in this month's SWMOR. You may not leave the cells in this portion of the report blank because the SWMOR uses this information to determine when DITs are needed during the current month.

### **Date of previous month's DIT [DIT<sub>last</sub> (date)]**

In the **DIT<sub>last</sub> (date)** field, enter the date (<MM/DD/YY>) of the last DIT conducted on the membrane unit during the previous month. If you do not know the date of the last DIT, enter <ND>.

### **Did the unit pass the previous DIT? [Pass? (Yes/No)]**

Indicate in the **Pass? (Yes/No)** cell whether the membrane unit passed the last DIT conducted during the previous month. Enter <YES> if the unit passed that last DIT. Enter <NO> if the unit failed that last DIT. Enter <ND> if you do not have the results of that last DIT.

### **Were the previous corrective actions successful?** **[C/A success?]**

In the **C/A success?** field, if corrective action was required following the last DIT conducted during the previous month, indicate whether the corrective action was completed successfully. To successfully complete a

corrective action, you must run, and pass, a subsequent DIT. If you cannot verify that the barrier is intact, you should stop producing water from the membrane unit, or you will receive a treatment technique violation.

Corrective action is *not* required after the unit passes a DIT so if the unit passed the last DIT conducted during the previous month, you should enter <NA>.

Corrective action *is* required if:

- The unit failed the last DIT conducted during the previous month (which you will report by entering <NO> in the **Pass?** cell), *or*
- You did not record the data from the unit's last DIT (which you will report by entering <ND> in the **Pass?** cell).

If corrective action is required, you must:

- Enter <YES> if you investigated why the unit failed the DIT and have demonstrated that the membrane unit is intact by passing a subsequent DIT. Enter <YES> even if the corrective action was just successfully repeating the DIT.
- Enter <NO> if you investigated why the unit failed the DIT, but the unit is still unable to pass a subsequent DIT. Enter <NO> even if the only corrective action you took was to repeat the DIT without success.
- Enter <ND> if you:
  - Have not yet investigated why the unit failed the DIT;
  - Investigated the problem, but have not yet conducted a subsequent DIT; *or*
  - Investigated the problem and conducted a subsequent DIT, but failed to collect the data needed to determine if the unit passed the DIT.

### **95th percentile particle count [95th % (count)]**

You may only enter data in the **95th % (count)** cell if you use particle counters or particle monitors to continuously monitor the performance of your membrane units. In fact, if you use laser turbidimeters for continuous monitoring, the header will be hidden, and the data entry cell will be locked. If you continuously monitor the performance of the membrane unit with a particle counter or particle monitor, you must determine the 95th percentile reading from the previous month and enter the value in units of number of particles per milliliter (mL). The 95th percentile value for the membrane unit must be calculated from all of the data recorded by its SCADA system during the previous month.

## Optional Data

This portion of the table contains places for you to record other design or operational data that you can use to assess the ongoing performance of the membrane unit. Since the data in this part of the table is not used for daily compliance calculations, you may leave the cells in this portion of the report blank.

### Filter Flux (gfd)

Enter the maximum temperature-adjusted normalized filter flux (in gallons per square foot of membrane surface per day, or gfd) that the TCEQ has approved for the membrane unit in the **Filt. Flux (gfd)** cell. You may leave this cell blank. However, this data can help you determine if the membrane unit is operating at an approved flux, or if you need to request permission to operate the unit at higher flux rates.

### Transmembrane pressure [TMP (psi)]

Enter the maximum transmembrane pressure (in pounds per square inch, or psi) that the TCEQ has approved for the membrane unit in the **TMP (psi)** cell. You may leave this cell blank. However, this data can help you determine if the membrane unit is operating at an approved TMP, or if you need to request permission to operate the unit at higher pressures.

The cells to the right of the **TMP (psi)** cells are unprotected and can be used to record a variety of other data that you might find helpful. For example, some plants will use one of the columns to keep track of the normalized temperature-adjusted specific flux of a clean membrane unit to help them know if it is time to chemically clean the unit, or to calculate the level of irreversible fouling that remains after a clean-in-place (CIP) is completed.

## 1.3 PERFORMANCE DATA

You must report daily data about membrane operating conditions and results of direct and indirect integrity tests for each membrane unit in the **Performance Data** table. The table contains three sections, where you record operational and integrity test data and can provide any additional remarks or comments about the membrane unit. The three sections are **Operational Data**, **DIT Data**, and **Summary**.

### Operational Data

**Figure 1.2** shows the **Operational Data** section of the **Performance Data** table. As the figure shows, this section contains six columns. You will use the first five columns to enter data that summarizes the daily performance of the membrane unit. The last column is used to indicate any date when you conducted a full chemical cleaning of the membrane unit.

Operational Data					
Daily Pump.	Norm. Filt. Flux	TMP	Norm. Spc. Flux	Daily Max.	CIP done?
MG	gfd	psi	gfd/psi	mNTU	-

**Figure 1.2.** Operational Data Table for MBT Membranes

### Daily pumpage (MG)

You must measure and record the total volume of filtered water (in MG) produced by the membrane unit each day in the **Daily Pump. (MG)** cell. The SWMOR uses the data recorded in this cell to determine which days the membrane unit sent filtered water to the clearwell.

#### NOTE

If possible, you should enter the net volume of filtrate (in MG) produced each day. If your plant's control system only tracks the volume of feed water sent to the membrane, you will need to enter the volume of feed water (in MG) treated each day (rather than the volume of filtrate produced) and assume that all of the feed water was filtered and sent to the clearwell.

Enter **<ND>** if you know that the membrane unit sent filtered water to the clearwell, but you have no production data. Enter **<0.0>** if the unit was off-line for the entire day and sent no water to the clearwell. You may not leave this cell blank.

### Normalized filter flux (gfd)

You must measure and record the temperature-adjusted normalized filter flux (in gfd) of the membrane unit at least once each day in the **Norm. Filt. Flux (gfd)** cell. If this value is recorded more than once each day, enter the average of all the readings taken during the day. Enter **<X>** if the unit was off-line for the entire day. Enter **<ND>** if the membrane unit sent any water to the clearwell, but you did not record any temperature-adjusted normalized filter flux data. You may not leave this cell blank.

### Transmembrane pressure [TMP (psi)]

You must measure and record the transmembrane pressure (in psi) applied to the membrane unit at least once each day in the **TMP (psi)** cell. If this value is recorded more than once each day, enter the average of all the readings taken during the day. Enter **<X>** if the unit was off-line for the entire day. Enter **<ND>** if the membrane unit sent any water to the clearwell, but you did not record any transmembrane pressure data. You may not leave this cell blank.

## Normalized specific flux (gfd/psi) CALC

Do not enter anything in the **Norm. Spc. Flux (gfd/psi)** column. The temperature-adjusted normalized specific flux will be automatically calculated from the values entered for temperature-adjusted normalized filter flux and transmembrane pressure.

## Daily maximum turbidity or particle count

The **Daily Max. (mNTU or P. Count)** cell is used to record the highest level of turbidity (or particles) measured from each unit each day. You must monitor and record the turbidity or particle count of the filtered water produced by the membrane unit. These tests are referred to as indirect integrity tests (IITs) because they only provide an indirect, qualitative indication that the membrane unit is structurally intact.

You must conduct these IITs at least once every 5 minutes whenever the membrane unit is sending filtered water to the clearwell, unless you have a letter from TCEQ that allows you to monitor less frequently. You must record the highest of all IIT results each day in the applicable **Daily Max.** cell. You may not leave these cells blank.

The column heading will automatically indicate “**mNTU**” or “**P. Count**” based on your answers when you created your plant’s customized spreadsheet. If you reported that your plant uses laser turbidimeters, the column heading will instruct you to report your data in units of milliNTU (mNTU). If you reported that your plant uses particle counters or particle monitors, the column heading will instruct you to report results as particle count (P. count). For example, **Figure 1.2** indicates that this particular plant is using laser turbidimeters for its IITs.

To complete this section of the report, you must:

- Enter <X> if the unit was off-line for the entire day and sent no filtrate to the clearwell.
- Enter <ND> if the unit was used during the day, but you did not record any of the required filtrate turbidity data.
- Enter <MD> if:
  - The unit was used during the day and you recorded some, but not all, of the required filtrate turbidity data; *and*
  - All of the readings you did record were 150 mNTU or less (or less than last month's 95th percentile reading if you are using particle counters or monitors).
- Enter the daily maximum turbidity or particle count reading of the membrane unit’s filtrate if:

- There are any confirmed readings above 154 mNTU (or above last month's 95th percentile reading if you are using particle counters or monitors; *or*
- You have recorded all of the required readings and none of them were above 154 mNTU (or last month's 95th percentile particle count reading).

**NOTE**

Do not record any value above 154 mNTU (or last month's 95th percentile particle count) unless it is confirmed by at least one consecutive reading that is also above 154 mNTU. Elevated readings that are not confirmed by a consecutive elevated reading should not be reported.

**Was a CIP performed? [CIP done?]**

Enter <YES> in the **CIP done?** cell if you conducted a full chemical clean-in-place on the membrane unit during the day. You should leave the cell blank if you conducted a mini-CIP or partial CIP, or if you did not conduct a CIP at all.

**DIT Data**

**Figure 1.3** shows the **DIT Data** section of the **Performance Data** table. As the figure shows, this section contains four columns. You must enter data in all four of these columns each day you conduct a DIT.

DIT Data			
$C_{feed}$	$C_{product}$	DIT	C/A
Conc.	Conc.	pass?	success?
		-	-

**Figure 1.3.** DIT Data Table for MBT Membranes



The number of DITs you must run each month depends on several factors. Specifically, you must run a DIT on the membrane unit:

- If you have a confirmed turbidity reading above 154 mNTU (or above last month's 95th percentile reading if you are using particle counters or monitors).
- After you conduct a full CIP procedure. You are not required to conduct a DIT after a mini-CIP or partial CIP.
- At least once each day if the LT2 is in effect at your plant, and your plant is assigned to Bin 2, 3, or 4.
- At least once every seven days if:
  - Your plant is assigned to Bin 1, *or*
  - Your plant is assigned to Bin 2, 3, or 4, and the LT2 is not yet in effect at your plant.

**Marker concentration in DIT feed stream [ $C_{\text{feed}}$  (Conc.)]**

Enter the average marker concentration (in particles/mL or mg/L) in the DIT feed stream in the  $C_{\text{feed}}$  (Conc.) cell. If more than one DIT was performed during the day, enter the lowest of all the average feed stream marker concentrations. Leave the cell blank if a DIT was not run on the unit because it was not required. Enter <X> if the unit was off-line for the entire day. Enter <ND> if you did not conduct a DIT when one was required, or you conducted one or more DITs on the unit, but failed to record any feed stream marker concentration data.

**Marker concentration in DIT product stream [ $C_{\text{product}}$  (Conc.)]**

Enter the average marker concentration (in particles/mL or mg/L) in the DIT permeate/filtrate stream in the  $C_{\text{product}}$  (Conc.) cell. If more than one DIT was performed during the day, enter the highest of all the average product stream marker concentrations. Leave the cell blank if a DIT was not run on the unit because it was not required. Enter <X> if the unit was off-line for the entire day. Enter <ND> if you did not conduct a DIT when one was required, or you conducted one or more DITs on the unit, but failed to record any product stream marker concentration data.

**NOTE**

If no marker was detected in the product stream, enter the method detection limit (MDL) of the analytical instrument used to test the sample.

### **Did the unit pass the DIT? [DIT pass?] CALC**

The SWMOR spreadsheet will automatically determine whether or not the unit passed the DIT by comparing the DIT data entered with the DIT criteria for the unit and place the result in the **DIT pass?** cell. You may not enter any results in this cell.

### **Success of corrective action [C/A success?]**

In the **C/A success?** cell, indicate whether corrective action was required following the DIT and, if so, whether the corrective action was completed successfully. To successfully complete corrective action, you must run, and pass, a subsequent DIT. If you cannot verify that the barrier is intact, you should stop producing water from the membrane unit, or you will receive a treatment technique violation.

Leave the cell blank if no DIT was performed, and therefore, no corrective action was taken.

If the unit passed the DIT, you should enter <NA> because corrective action is not required after the unit passes a DIT.

However, corrective action is required if:

- The unit failed the DIT (which will be indicated by <NO> in the **DIT pass?** cell), *or*
- You did not record the data from the DIT (which will be indicated by <ND> in the **DIT pass?** cell).

If corrective action is required, you must:

- Enter <YES> if you investigated why the unit failed the DIT and have demonstrated that the membrane unit is intact by passing a subsequent DIT. Enter <YES> even if the corrective action was just successfully repeating the DIT.
- Enter <NO> if you investigated why the unit failed the DIT, but the unit is still unable to pass a subsequent DIT. Enter <NO> even if the only corrective action you took was to repeat the DIT without success.
- Enter <ND> if you:
  - Have not yet investigated why the unit failed the DIT,
  - Investigated the problem, but have not yet conducted a subsequent DIT, *or*
  - Investigated the problem and conducted a subsequent DIT, but failed to collect the data needed to determine if the unit passed the DIT.

## Summary

At the end of each reporting month, you should finish the **Summary** section, which is shown in Figure 1.4. As indicated below, the quantitative data for IITs (**IIT**) and DITs (**DIT**) will be filled in automatically based on your daily data.

		Unit No. 1	
		IIT	Number of days with DIT triggered by high turbidity or particle count
Number of days with a monitoring violation			
DIT	Number of days with failure to pass a DIT		
	Number of days with a treatment technique violation		
SUMMARY	Comments	General Remarks	Additional Comments

**Figure 1.4.** Summary Tables for MBT Membranes

### **IIT: Number of days with DIT triggered by high turbidity or particle count** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which your plant needed to conduct a DIT due to high turbidity (or particle count) and enter the result in the appropriate cell.

### **IIT: Number of days with a monitoring violation** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which the membrane unit had one or more monitoring violations and enter the result in the appropriate cell. A monitoring violation occurs each time:

- You do not conduct the required IITs on a day that the membrane unit sends filtrate to the clearwell (i.e., you report **Daily Max.** = <MD> or **Daily Max.** = <ND>).
- You do not pass a DIT (or complete successful corrective action) on a day that a DIT is required.

### **DIT: Number of days with failure to pass a DIT** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which the membrane unit failed to pass a DIT and enter the result in the appropriate cell.

**DIT: Number of days with a treatment technique violation** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which the membrane unit had a treatment technique violation and enter the result in the appropriate cell. A treatment technique violation occurs each day you produce water after failing a DIT, but fail to successfully complete corrective action.

**NOTE**

The SWMOR assumes that you took the membrane unit off-line as soon as it failed a DIT. Consequently, you will not be cited for a treatment technique violation on the day that the unit failed its DIT. However, the SWMOR does not assume that corrective action was completed before you produced water on any subsequent day. Therefore, you must report successful corrective action at least one day before you report that the unit sent water to the clearwell.

**Comments**

The SWMOR provides a row for you to enter general remarks about the membrane treatment process, as well as comments about the performance of individual membrane units. However, this information is optional, and you may leave the cells in this row blank.

General comments should go in the **General Remarks** cells, whereas unit-specific information should go in the applicable **Additional Comments** cells. Some examples of unit-specific information that you may find useful to enter are: number of failed fibers, dates of any mini-CIPs or partial CIPs conducted, and descriptions of any successful corrective actions completed. However, this row is provided for your convenience, so you may use it in whatever way makes the most sense for your plant.

# 2. MEMBRANE–PBT WORKSHEET

## 2.1 INTRODUCTION

The **Membrane-PBT** worksheet of the SWMOR is used to record performance data for membrane units that use a **pressure based direct integrity test (DIT)**. If your plant uses this type of membrane system, you must enter information in the **Membrane-PBT** worksheet of the SWMOR every day.

If you indicated that your plant has this type of membrane system when you customized the SWMOR, this worksheet will be visible. If you indicated that your plant does not use membranes, or uses membranes with a different DIT method, this worksheet will be hidden. See **Chapter 2** for more information about customizing the SWMOR for your particular plant.

At the top of the **Membrane-PBT** worksheet, there is a block of information that describes your system, plant, and reporting period. The spreadsheet copies this information from the data you entered on the **P.2-Turbidity Data** worksheet, and this data cannot be re-entered or edited on the **Membrane-PBT** worksheet.

## 2.2 TEST PARAMETERS & ADDITIONAL DATA

Just below the block of information at the top of the worksheet, there is the **Test Parameters & Additional Data** table that contains the DIT parameters for each membrane unit, its DIT results from the previous month, and cells where you can enter other general information about the membrane unit. **Figure 2.1** shows the portion of the **Test Parameters & Additional Data** table for Membrane Unit 1.

DIT CONDITIONS & ADDITIONAL DATA	Unit No. 1									
	DIT Cond'ns	P <sub>test</sub> psi	LRC -	UCL psi/min		Prev. Month Data	DIT <sub>last</sub> date	Pass? Yes/No	C/A success?	95th % count
	Optional Data	Filt.Flux gfd	TMP psi							

**Figure 2.1.** Test Parameters and Additional Data Table for PBT Membranes

## DIT Conditions

The **DIT Cond'ns** portion of the table contains the approved DIT test conditions and log removal credit for the membrane unit. The SWMOR automatically completes this portion of the table based on data you entered in the dialog boxes when you customized your SWMOR form. You cannot edit this information by entering data directly in the **Membrane-PBT** worksheet. Your plant's TCEQ-approved DIT parameters are in your exception approval letter. See **Chapter 2** for more information about customizing the SWMOR for your plant or changing your **DIT Cond'ns** values.

### **Minimum beginning test pressure [ $P_{\text{test}}$ (psi)]**

This cell shows the minimum test pressure (in psi) at which you must begin each DIT for the membrane unit to receive treatment credit in the  **$P_{\text{test}}$  (psi)** field.

### **Log removal credit [LRC]**

This cell shows the log removal credit that the membrane unit receives when it passes its DIT in the **LRC** field.

### **Upper control limit [UCL (psi/min)]**

This cell shows the upper control limit, which is the maximum allowable rate that the pressure can drop during the DIT, in the **UCL (psi/min)** field.

## Previous Month's Data

The **Prev. Month Data** portion of the table contains data you recorded during the previous month. To complete this part of the table, you must review your operational records from the previous month and enter the required information in this month's SWMOR. You may not leave the cells in this portion of the report blank because the SWMOR uses this information to determine when DITs are needed during the current month.

### **Date of previous month's DIT [ $DIT_{\text{last}}$ (date)]**

In the  **$DIT_{\text{last}}$  (date)** field, enter the date (<MM/DD/YY>) of the last DIT conducted on the membrane unit during the previous month. If you do not know the date of the last DIT, enter <ND>.

### **Did the unit pass the previous DIT? [Pass? (Yes/No)]**

Indicate in the **Pass? (Yes/No)** cell whether the membrane unit passed the last DIT conducted during the previous month. Enter <YES> if the unit passed that last DIT. Enter <NO> if the unit failed that last DIT. Enter <ND> if you do not have the results of that last DIT.

## Were the previous corrective actions successful? [C/A success?]

In the **C/A success?** field, if corrective action was required following the last DIT conducted during the previous month, indicate whether the corrective action was completed successfully. To successfully complete a corrective action, you must run, and pass, a subsequent DIT. If you cannot verify that the barrier is intact, you should stop producing water from the membrane unit, or you will receive a treatment technique violation.

Corrective action is *not* required after the unit passes a DIT, so if the unit passed the last DIT conducted during the previous month, you should enter **<NA>**.

Corrective action *is* required if:

- The unit failed the last DIT conducted during the previous month (which you will report by entering **<NO>** in the **Pass?** cell), *or*
- You did not record the data from the unit's last DIT (which you will report by entering **<ND>** in the **Pass?** cell).

If corrective action is required, you must:

- Enter **<YES>** if you investigated why the unit failed the DIT and have demonstrated that the membrane unit is intact by passing a subsequent DIT. Enter **<YES>** even if the corrective action was just successfully repeating the DIT.
- Enter **<NO>** if you investigated why the unit failed the DIT, but the unit is still unable to pass a subsequent DIT. Enter **<NO>** even if the only corrective action you took was to repeat the DIT without success.
- Enter **<ND>** if you:
  - Have not yet investigated why the unit failed the DIT;
  - Investigated the problem, but have not yet conducted a subsequent DIT; *or*
  - Investigated the problem and conducted a subsequent DIT, but failed to collect the data needed to determine if the unit passed the DIT.

## 95th percentile particle count [95th % (count)]

You may only enter data in the **95th % (count)** cell if you use particle counters or particle monitors to continuously monitor the performance of your membrane units. In fact, if you use laser turbidimeters for continuous monitoring, the header will be hidden, and the data entry cell will be locked. If you continuously monitor the performance of the membrane unit with a particle counter or particle monitor, you must determine the 95th percentile reading from the previous month and enter the value in units of number of

particles per milliliter (mL). The 95th percentile value for the membrane unit must be calculated from all of the data recorded by its SCADA system during the previous month.

### Optional Data

This portion of the table contains places for you to record other design or operational data that you can use to assess the ongoing performance of the membrane unit. Since the data in this part of the table is not used for daily compliance calculations, you may leave the cells in this portion of the report blank.

#### Filter Flux (gfd)

Enter the maximum temperature-adjusted normalized filter flux (in gallons per square foot of membrane surface per day, or gfd) that the TCEQ has approved for the membrane unit in the **Filt. Flux (gfd)** cell. You may leave this cell blank. However, this data can help you determine if the membrane unit is operating at an approved flux, or if you need to request permission to operate the unit at higher flux rates.

#### Transmembrane pressure [TMP (psi)]

Enter the maximum transmembrane pressure (in pounds per square inch, or psi) that the TCEQ has approved for the membrane unit in the **TMP (psi)** cell. You may leave this cell blank. However, this data can help you determine if the membrane unit is operating at an approved TMP, or if you need to request permission to operate the unit at higher pressures.

The cells to the right of the **TMP (psi)** cells are unprotected and can be used to record a variety of other data that you might find helpful. For example, some plants will use one of the columns to keep track of the normalized temperature-adjusted specific flux of a clean membrane unit to help them know if it is time to chemically clean the unit, or to calculate the level of irreversible fouling that remains after a clean-in-place (CIP) is completed.

## 2.3 PERFORMANCE DATA

You must report daily data about membrane operating conditions and results of direct and indirect integrity tests for each membrane unit in the **Performance Data** table. The table contains three sections, where you record operational and integrity test data and can provide any additional remarks or comments about the membrane unit. The three sections are **Operational Data**, **DIT Data**, and **Summary**.

### Operational Data

**Figure 2.2** shows the **Operational Data** section of the **Performance Data** table. As the figure shows, this section contains six columns. You will use the first



five columns to enter data that summarizes the daily performance of the membrane unit. The last column is used to indicate any date when you conducted a full chemical cleaning of the membrane unit.

Operational Data					
Daily Pump.	Norm. Filt.Flux	TMP	Norm. Spc.Flux	Daily Max.	CIP done?
MG	gfd	psi	gfd/psi	mNTU	-

**Figure 2.2.** Operational Data Table for PBT Membranes

### Daily pumpage (MG)

You must measure and record the total volume of filtered water (in MG) produced by the membrane unit each day in the **Daily Pump. (MG)** cell. The SWMOR uses the data recorded in this cell to determine which days the membrane unit sent filtered water to the clearwell.

#### NOTE

If possible, you should enter the net volume of filtrate (in MG) produced each day. If your plant's control system only tracks the volume of feed water sent to the membrane, you will need to enter the volume of feed water (in MG) treated each day (rather than the volume of filtrate produced) and assume that all of the feed water was filtered and sent to the clearwell.

Enter **<ND>** if you know that the membrane unit sent filtered water to the clearwell, but you have no production data. Enter **<0.0>** if the unit was off-line for the entire day and sent no water to the clearwell. You may not leave this cell blank.

### Normalized filter flux (gfd)

You must measure and record the temperature-adjusted normalized filter flux (in gfd) of the membrane unit at least once each day in the **Norm. Filt. Flux (gfd)** cell. If this value is recorded more than once each day, enter the average of all the readings taken during the day. Enter **<X>** if the unit was off-line for the entire day. Enter **<ND>** if the membrane unit sent any water to the clearwell, but you did not record any temperature-adjusted normalized filter flux data. You may not leave this cell blank.

### Transmembrane pressure [TMP (psi)]

You must measure and record the transmembrane pressure (in psi) applied to the membrane unit at least once each day in the **TMP (psi)** cell. If this value is recorded more than once each day, enter the average of all the readings taken during the day. Enter **<X>** if the unit was off-line for the entire

day. Enter **<ND>** if the membrane unit sent any water to the clearwell, but you did not record any transmembrane pressure data. You may not leave this cell blank.

### **Normalized Specific Flux (gfd/psi)** **CALC**

Do not enter anything in the **Norm. Spc. Flux (gfd/psi)** column. The temperature-adjusted normalized specific flux will be automatically calculated from the values entered for temperature-adjusted normalized filter flux and transmembrane pressure.

### **Daily maximum turbidity or particle count**

The **Daily Max. (mNTU or P. Count)** cell is used to record the highest level of turbidity (or particles) measured from each unit each day. You must monitor and record the turbidity or particle count of the filtered water produced by the membrane unit. These tests are referred to as indirect integrity tests (IITs) because they only provide an indirect, qualitative indication that the membrane unit is structurally intact.

You must conduct these IITs at least once every 5 minutes whenever the membrane unit is sending filtered water to the clearwell, unless you have a letter from TCEQ that allows you to monitor less frequently. You must record the highest of all IIT results each day in the applicable **Daily Max.** cell. You may not leave these cells blank.

The column heading will automatically indicate “**mNTU**” or “**P. Count**” based on your answers when you created your plant’s customized spreadsheet. If you reported that your plant uses laser turbidimeters, the column heading will instruct you to report your data in units of milliNTU (mNTU). If you reported that your plant uses particle counters or particle monitors, the column heading will instruct you to report results as particle count (P. count). For example, **Figure 1.2** indicates that this particular plant is using laser turbidimeters for its IITs.

To complete this section of the report, you must:

- Enter **<X>** if the unit was off-line for the entire day and sent no filtrate to the clearwell.
- Enter **<ND>** if the unit was used during the day, but you did not record any of the required filtrate turbidity data.
- Enter **<MD>** if:
  - The unit was used during the day and you recorded some, but not all, of the required filtrate turbidity data; *and*
  - All of the readings you did record were 150 mNTU or less (or less than last month's 95th percentile reading if you are using particle counters or monitors).

- Enter the daily maximum turbidity or particle count reading of the membrane unit's filtrate if:
  - There are any confirmed readings above 154 mNTU (or above last month's 95th percentile reading if you are using particle counters or monitors; *or*
  - You have recorded all of the required readings and none of them were above 154 mNTU (or last month's 95th percentile particle count reading).

**NOTE**

Do not record any value above 154 mNTU (or last month's 95th percentile particle count) unless it is confirmed by at least one consecutive reading that is also above 154 mNTU. Elevated readings that are not confirmed by a consecutive elevated reading should not be reported.

**Was a CIP performed? [CIP done?]**

Enter <YES> in the **CIP done?** cell if you conducted a full chemical clean-in-place on the membrane unit during the day. You should leave the cell blank if you conducted a mini-CIP or partial CIP, or if you did not conduct a CIP at all.

**DIT Data**

**Figure 2.3** shows the **DIT Data** section of the **Performance Data** table. As the figure shows, this section contains four columns. You must enter data in all four of these columns each day you conduct a DIT.

DIT Data			
$P_{initial}$	$\Delta P_{test}/\Delta t$	DIT	C/A
psi	psi/min	pass?	success?
		-	-

**Figure 2.3.** DIT Data Table for PBT Membranes

The number of DITs you must run each month depends on several factors. Specifically, you must run a DIT on the membrane unit:

- If you have a confirmed turbidity reading above 154 mNTU (or above last month's 95th percentile reading if you are using particle counters or monitors).
- After you conduct a full CIP procedure. You are not required to conduct a DIT after a mini-CIP or partial CIP.
- At least once each day if the LT2 is in effect at your plant, and your plant is assigned to Bin 2, 3, or 4.
- At least once every seven days if:

- Your plant is assigned to Bin 1, *or*
- Your plant is assigned to Bin 2, 3, or 4, and the LT2 is not yet in effect at your plant.

### **Initial pressure at start of DIT [ $P_{\text{initial}}$ (psi)]**

Enter the pressure (in psi) recorded at the beginning of the DIT in the  **$P_{\text{initial}}$  (psi)** cell. If more than one DIT was performed during the day, enter the lowest of all the initial pressure values. Leave the cell blank if a DIT was not run on the unit because it was not required. Enter **<X>** if the unit was off-line for the entire day. Enter **<ND>** if you did not conduct a DIT when one was required, or you conducted one or more DITs on the unit, but failed to record any initial pressure data.

### **Average pressure decay rate [ $\Delta P_{\text{test}}/\Delta t$ (psi/min)]**

Enter the average pressure decay rate (in psi/min) that occurred during the DIT in the  **$\Delta P_{\text{test}}/\Delta t$  (psi/min)** cell. If more than one DIT was performed during the day, enter the highest of all the average pressure decay rates. Leave the cell blank if a DIT was not run on the unit because it was not required. Enter **<X>** if the unit was off-line for the entire day. Enter **<ND>** if you did not conduct a DIT when one was required, or you conducted one or more DITs on the unit, but failed to record any pressure decay rate data.

### **Did the unit pass the DIT? [DIT pass?] **CALC****

The SWMOR spreadsheet will automatically determine whether or not the unit passed the DIT by comparing the DIT data entered with the DIT criteria for the unit and place the result in the **DIT pass?** cell. You may not enter any results in this cell.

### **Success of corrective action [C/A success?]**

In the **C/A success?** cell, indicate whether corrective action was required following the DIT and, if so, whether the corrective action was completed successfully. To successfully complete corrective action, you must run, and pass, a subsequent DIT. If you cannot verify that the barrier is intact, you should stop producing water from the membrane unit, or you will receive a treatment technique violation.

Leave the cell blank if no DIT was performed, and therefore, no corrective action was taken.

If the unit passed the DIT, you should enter **<NA>** because corrective action is not required after the unit passes a DIT.

However, corrective action is required if:

- The unit failed the DIT (which will be indicated by **<NO>** in the **DIT pass?** cell), *or*

- You did not record the data from the DIT (which will be indicated by <ND> in the **DIT pass?** cell).

If corrective action is required, you must:

- Enter <YES> if you investigated why the unit failed the DIT and have demonstrated that the membrane unit is intact by passing a subsequent DIT. Enter <YES> even if the corrective action was just successfully repeating the DIT.
- Enter <NO> if you investigated why the unit failed the DIT, but the unit is still unable to pass a subsequent DIT. Enter <NO> even if the only corrective action you took was to repeat the DIT without success.
- Enter <ND> if you:
  - Have not yet investigated why the unit failed the DIT,
  - Investigated the problem, but have not yet conducted a subsequent DIT, *or*
  - Investigated the problem and conducted a subsequent DIT, but failed to collect the data needed to determine if the unit passed the DIT.

### Summary

At the end of each reporting month, you should finish the **Summary** section, which is shown in Figure 1.4. As indicated below, the quantitative data for IITs (**IIT**) and DITs (**DIT**) will be filled in automatically based on your daily data.

		Unit No. 1	
		IIT	Number of days with DIT triggered by high turbidity or particle count
Number of days with a monitoring violation			
DIT	Number of days with failure to pass a DIT		
	Number of days with a treatment technique violation		
Comments	General Remarks	Additional Comments	

**Figure 1.4.** Summary Tables for PBT Membranes

#### **IIT: Number of days with DIT triggered by high turbidity or particle count** **CALC**

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which your plant needed to conduct a DIT due to high turbidity (or particle count) and enter the result in the appropriate cell.

### **IIT: Number of days with a monitoring violation** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which the membrane unit had one or more monitoring violations and enter the result in the appropriate cell. A monitoring violation occurs each time:

- You do not conduct the required IITs on a day that the membrane unit sends filtrate to the clearwell (i.e., you report **Daily Max.** = <MD> or **Daily Max.** = <ND>).
- You do not pass a DIT (or complete successful corrective action) on a day that a DIT is required.

### **DIT: Number of days with failure to pass a DIT** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which the membrane unit failed to pass a DIT and enter the result in the appropriate cell.

### **DIT: Number of days with a treatment technique violation** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which the membrane unit had a treatment technique violation and enter the result in the appropriate cell. A treatment technique violation occurs each day you produce water after failing a DIT, but fail to successfully complete corrective action.

#### **NOTE**

The SWMOR assumes that you took the membrane unit off-line as soon as it failed a DIT. Consequently, you will not be cited for a treatment technique violation on the day that the unit failed its DIT. However, the SWMOR does not assume that corrective action was completed before you produced water on any subsequent day. Therefore, you must report successful corrective action at least one day before you report that the unit sent water to the clearwell.

#### **Comments**

The SWMOR provides a row for you to enter general remarks about the membrane treatment process, as well as comments about the performance of individual membrane units. However, this information is optional, and you may leave the cells in this row blank.

General comments should go in the **General Remarks** cells, whereas unit-specific information should go in the applicable **Additional Comments** cells. Some examples of unit-specific information that you may find useful to

enter are: number of failed fibers, dates of any mini-CIPs or partial CIPs conducted, and descriptions of any successful corrective actions completed. However, this row is provided for your convenience, so you may use it in whatever way makes the most sense for your plant.

# 3. MEMBRANE–QBT WORKSHEET

## 3.1 INTRODUCTION

The **Membrane-QBT** worksheet of the SWMOR is used to record performance data for membrane units that use an **air flow based direct integrity test (DIT)**. If your plant uses this type of membrane system, you must enter information in the **Membrane-QBT** worksheet of the SWMOR every day.

If you indicated that your plant has this type of membrane system when you customized the SWMOR, this worksheet will be visible. If you indicated that your plant does not use membranes, or uses membranes with a different DIT method, this worksheet will be hidden. See **Chapter 2** for more information about customizing the SWMOR for your particular plant.

At the top of the **Membrane-QBT** worksheet, there is a block of information that describes your system, plant, and reporting period. The spreadsheet copies this information from the data you entered on the **P.2-Turbidity Data** worksheet, and this data cannot be re-entered or edited on the **Membrane-QBT** worksheet.

## 3.2 TEST PARAMETERS & ADDITIONAL DATA

Just below the block of information at the top of the worksheet, there is the **Test Parameters & Additional Data** table that contains the DIT parameters for each membrane unit, its DIT results from the previous month, and cells where you can enter other general information about the membrane unit. **Figure 3.1** shows the portion of the **Test Parameters & Additional Data** table for Membrane Unit 1.

DIT CONDITIONS & ADDITIONAL DATA	Unit No. 1									
	DIT Cond'ns	P <sub>test</sub> psi	LRC -	UCL L/min		Prev. Month Data	DIT <sub>last</sub> date	Pass? Yes/No	C/A success?	95th % count
	Optional Data	Filt.Flux gfd	TMP psi							

**Figure 3.1.** Test Parameters and Additional Data Table for QBT Membranes



## DIT Conditions

The **DIT Cond'ns** portion of the table contains the approved DIT test conditions and log removal credit for the membrane unit. The SWMOR automatically completes this portion of the table based on data you entered in the dialog boxes when you customized your SWMOR form. You cannot edit this information by entering data directly in the **Membrane-QBT** worksheet. Your plant's TCEQ-approved DIT parameters are in your exception approval letter. See **Chapter 2** for more information about customizing the SWMOR for your plant or changing your **DIT Cond'ns** values.

### **Minimum beginning test pressure [ $P_{\text{test}}$ (psi)]**

This cell shows the minimum test pressure (in psi) at which you must begin each DIT for the membrane unit to receive treatment credit in the  **$P_{\text{test}}$  (psi)** field.

### **Log removal credit [LRC]**

This cell shows the log removal credit that the membrane unit receives when it passes its DIT in the **LRC** field.

### **Upper control limit [UCL (L/min)]**

This cell shows the upper control limit, which is the maximum allowable air flow rate during the DIT, in the **UCL (L/min)** field.

## Previous Month's Data

The **Prev. Month Data** portion of the table contains data you recorded during the previous month. To complete this part of the table, you must review your operational records from the previous month and enter the required information in this month's SWMOR. You may not leave the cells in this portion of the report blank because the SWMOR uses this information to determine when DITs are needed during the current month.

### **Date of previous month's DIT [ $DIT_{\text{last}}$ (date)]**

In the  **$DIT_{\text{last}}$  (date)** field, enter the date (<MM/DD/YY>) of the last DIT conducted on the membrane unit during the previous month. If you do not know the date of the last DIT, enter <ND>.

### **Did the unit pass the previous DIT? [Pass? (Yes/No)]**

Indicate in the **Pass? (Yes/No)** cell whether the membrane unit passed the last DIT conducted during the previous month. Enter <YES> if the unit passed that last DIT. Enter <NO> if the unit failed that last DIT. Enter <ND> if you do not have the results of that last DIT.

## Were the previous corrective actions successful? [C/A success?]

In the **C/A success?** field, if corrective action was required following the last DIT conducted during the previous month, indicate whether the corrective action was completed successfully. To successfully complete a corrective action, you must run, and pass, a subsequent DIT. If you cannot verify that the barrier is intact, you should stop producing water from the membrane unit, or you will receive a treatment technique violation.

Corrective action is *not* required after the unit passes a DIT, so if the unit passed the last DIT conducted during the previous month, you should enter **<NA>**.

Corrective action *is* required if:

- The unit failed the last DIT conducted during the previous month (which you will report by entering **<NO>** in the **Pass?** cell), *or*
- You did not record the data from the unit's last DIT (which you will report by entering **<ND>** in the **Pass?** cell).

If corrective action is required, you must:

- Enter **<YES>** if you investigated why the unit failed the DIT and have demonstrated that the membrane unit is intact by passing a subsequent DIT. Enter **<YES>** even if the corrective action was just successfully repeating the DIT.
- Enter **<NO>** if you investigated why the unit failed the DIT, but the unit is still unable to pass a subsequent DIT. Enter **<NO>** even if the only corrective action you took was to repeat the DIT without success.
- Enter **<ND>** if you:
  - Have not yet investigated why the unit failed the DIT;
  - Investigated the problem, but have not yet conducted a subsequent DIT; *or*
  - Investigated the problem and conducted a subsequent DIT, but failed to collect the data needed to determine if the unit passed the DIT.

## 95th percentile particle count [95th % (count)]

You may only enter data in the **95th % (count)** cell if you use particle counters or particle monitors to continuously monitor the performance of your membrane units. In fact, if you use laser turbidimeters for continuous monitoring, the header will be hidden, and the data entry cell will be locked. If you continuously monitor the performance of the membrane unit with a particle counter or particle monitor, you must determine the 95th percentile reading from the previous month and enter the value in units of number of

particles per milliliter (mL). The 95th percentile value for the membrane unit must be calculated from all of the data recorded by its SCADA system during the previous month.

### Optional Data

This portion of the table contains places for you to record other design or operational data that you can use to assess the ongoing performance of the membrane unit. Since the data in this part of the table is not used for daily compliance calculations, you may leave the cells in this portion of the report blank.

#### Filter Flux (gfd)

Enter the maximum temperature-adjusted normalized filter flux (in gallons per square foot of membrane surface per day, or gfd) that the TCEQ has approved for the membrane unit in the **Filt. Flux (gfd)** cell. You may leave this cell blank. However, this data can help you determine if the membrane unit is operating at an approved flux, or if you need to request permission to operate the unit at higher flux rates.

#### Transmembrane pressure [TMP (psi)]

Enter the maximum transmembrane pressure (in pounds per square inch, or psi) that the TCEQ has approved for the membrane unit in the **TMP (psi)** cell. You may leave this cell blank. However, this data can help you determine if the membrane unit is operating at an approved TMP, or if you need to request permission to operate the unit at higher pressures.

The cells to the right of the **TMP (psi)** cells are unprotected and can be used to record a variety of other data that you might find helpful. For example, some plants will use one of the columns to keep track of the normalized temperature-adjusted specific flux of a clean membrane unit to help them know if it is time to chemically clean the unit, or to calculate the level of irreversible fouling that remains after a clean-in-place (CIP) is completed.

## 3.3 PERFORMANCE DATA

You must report daily data about membrane operating conditions and results of direct and indirect integrity tests for each membrane unit in the **Performance Data** table. The table contains three sections, where you record operational and integrity test data and can provide any additional remarks or comments about the membrane unit. The three sections are **Operational Data**, **DIT Data**, and **Summary**.

### Operational Data

**Figure 3.2** shows the **Operational Data** section of the **Performance Data** table. As the figure shows, this section contains six columns. You will use the first

five columns to enter data that summarizes the daily performance of the membrane unit. The last column is used to indicate any date when you conducted a full chemical cleaning of the membrane unit.

Operational Data					
Daily Pump.	Norm. Filt.Flux	TMP	Norm. Spc.Flux	Daily Max.	CIP done?
MG	gfd	psi	gfd/psi	mNTU	-

**Figure 3.2.** Operational Data Table for QBT Membranes

### Daily pumpage (MG)

You must measure and record the total volume of filtered water (in MG) produced by the membrane unit each day in the **Daily Pump. (MG)** cell. The SWMOR uses the data recorded in this cell to determine which days the membrane unit sent filtered water to the clearwell.

#### NOTE

If possible, you should enter the net volume of filtrate (in MG) produced each day. If your plant's control system only tracks the volume of feed water sent to the membrane, you will need to enter the volume of feed water (in MG) treated each day (rather than the volume of filtrate produced) and assume that all of the feed water was filtered and sent to the clearwell.

Enter **<ND>** if you know that the membrane unit sent filtered water to the clearwell, but you have no production data. Enter **<0.0>** if the unit was off-line for the entire day and sent no water to the clearwell. You may not leave this cell blank.

### Normalized filter flux (gfd)

You must measure and record the temperature-adjusted normalized filter flux (in gfd) of the membrane unit at least once each day in the **Norm. Filt. Flux (gfd)** cell. If this value is recorded more than once each day, enter the average of all the readings taken during the day. Enter **<X>** if the unit was off-line for the entire day. Enter **<ND>** if the membrane unit sent any water to the clearwell, but you did not record any temperature-adjusted normalized filter flux data. You may not leave this cell blank.

### Transmembrane pressure [TMP (psi)]

You must measure and record the transmembrane pressure (in psi) applied to the membrane unit at least once each day in the **TMP (psi)** cell. If this value is recorded more than once each day, enter the average of all the readings taken during the day. Enter **<X>** if the unit was off-line for the entire

day. Enter **<ND>** if the membrane unit sent any water to the clearwell, but you did not record any transmembrane pressure data. You may not leave this cell blank.

### **Normalized specific flux (gfd/psi)** **CALC**

Do not enter anything in the **Norm. Spc. Flux (gfd/psi)** column. The temperature-adjusted normalized specific flux will be automatically calculated from the values entered for temperature-adjusted normalized filter flux and transmembrane pressure.

### **Daily maximum turbidity or particle count**

The **Daily Max. (mNTU or P. Count)** cell is used to record the highest level of turbidity (or particles) measured from each unit each day. You must monitor and record the turbidity or particle count of the filtered water produced by the membrane unit. These tests are referred to as indirect integrity tests (IITs) because they only provide an indirect, qualitative indication that the membrane unit is structurally intact.

You must conduct these IITs at least once every 5 minutes whenever the membrane unit is sending filtered water to the clearwell, unless you have a letter from TCEQ that allows you to monitor less frequently. You must record the highest of all IIT results each day in the applicable **Daily Max.** cell. You may not leave these cells blank.

The column heading will automatically indicate “**mNTU**” or “**P. Count**” based on your answers when you created your plant’s customized spreadsheet. If you reported that your plant uses laser turbidimeters, the column heading will instruct you to report your data in units of milliNTU (mNTU). If you reported that your plant uses particle counters or particle monitors, the column heading will instruct you to report results as particle count (P. count). For example, **Figure 1.2** indicates that this particular plant is using laser turbidimeters for its IITs.

To complete this section of the report, you must:

- Enter **<X>** if the unit was off-line for the entire day and sent no filtrate to the clearwell.
- Enter **<ND>** if the unit was used during the day, but you did not record any of the required filtrate turbidity data.
- Enter **<MD>** if:
  - The unit was used during the day and you recorded some, but not all, of the required filtrate turbidity data; *and*
  - All of the readings you did record were 150 mNTU or less (or less than last month's 95th percentile reading if you are using particle counters or monitors).

- Enter the daily maximum turbidity or particle count reading of the membrane unit's filtrate if:
  - There are any confirmed readings above 154 mNTU (or above last month's 95th percentile reading if you are using particle counters or monitors; *or*
  - You have recorded all of the required readings and none of them were above 154 mNTU (or last month's 95th percentile particle count reading).

**NOTE**

Do not record any value above 154 mNTU (or last month's 95th percentile particle count) unless it is confirmed by at least one consecutive reading that is also above 154 mNTU. Elevated readings that are not confirmed by a consecutive elevated reading should not be reported.

**Was a CIP performed? [CIP done?]**

Enter <YES> in the **CIP done?** cell if you conducted a full chemical clean-in-place on the membrane unit during the day. You should leave the cell blank if you conducted a mini-CIP or partial CIP, or if you did not conduct a CIP at all.

**DIT Data**

**Figure 3.3** shows the **DIT Data** section of the **Performance Data** table. As the figure shows, this section contains four columns. You must enter data in all four of these columns each day you conduct a DIT.

DIT Data			
P <sub>initial</sub>	Q <sub>air</sub>	DIT	C/A
psi	L/min	pass?	success?
		-	-

**Figure 3.3.** DIT Data Table for QBT Membranes

The number of DITs you must run each month depends on several factors. Specifically, you must run a DIT on the membrane unit:

- If you have a confirmed turbidity reading above 154 mNTU (or above last month's 95th percentile reading if you are using particle counters or monitors).
- After you conduct a full CIP procedure. You are not required to conduct a DIT after a mini-CIP or partial CIP.
- At least once each day if the LT2 is in effect at your plant, and your plant is assigned to Bin 2, 3, or 4.
- At least once every seven days if:
  - Your plant is assigned to Bin 1, *or*
  - Your plant is assigned to Bin 2, 3, or 4, and the LT2 is not yet in effect at your plant.

### **Initial pressure at start of DIT [ $P_{\text{initial}}$ (psi)]**

Enter the pressure (in psi) recorded at the beginning of the DIT in the  **$P_{\text{initial}}$  (psi)** cell. If more than one DIT was performed during the day, enter the lowest of all the initial pressure values. Leave the cell blank if a DIT was not run on the unit because it was not required. Enter **<X>** if the unit was off-line for the entire day. Enter **<ND>** if you did not conduct a DIT when one was required, or you conducted one or more DITs on the unit, but failed to record any initial pressure data.

### **Average air flow rate [ $Q_{\text{air}}$ (L/min)]**

Enter the average air flow rate (in L/min) that occurred during the DIT in the  **$Q_{\text{air}}$  (L/min)** cell. If more than one DIT was performed during the day, enter the highest of all the average air flow rates. Leave the cell blank if a DIT was not run on the unit because it was not required. Enter **<X>** if the unit was off-line for the entire day. Enter **<ND>** if you did not conduct a DIT when one was required, or you conducted one or more DITs on the unit, but failed to record any air flow rate data.

### **Did the unit pass the DIT? [DIT pass?] **CALC****

The SWMOR spreadsheet will automatically determine whether or not the unit passed the DIT by comparing the DIT data entered with the DIT criteria for the unit and place the result in the **DIT pass?** cell. You may not enter any results in this cell.

### Success of corrective action [C/A success?]

In the **C/A success?** cell, indicate whether corrective action was required following the DIT and, if so, whether the corrective action was completed successfully. To successfully complete corrective action, you must run, and pass, a subsequent DIT. If you cannot verify that the barrier is intact, you should stop producing water from the membrane unit, or you will receive a treatment technique violation.

Leave the cell blank if no DIT was performed, and therefore, no corrective action was taken.

If the unit passed the DIT, you should enter **<NA>** because corrective action is not required after the unit passes a DIT.

However, corrective action is required if:

- The unit failed the DIT (which will be indicated by **<NO>** in the **DIT pass?** cell), *or*
- You did not record the data from the DIT (which will be indicated by **<ND>** in the **DIT pass?** cell).

If corrective action is required, you must:

- Enter **<YES>** if you investigated why the unit failed the DIT and have demonstrated that the membrane unit is intact by passing a subsequent DIT. Enter **<YES>** even if the corrective action was just successfully repeating the DIT.
- Enter **<NO>** if you investigated why the unit failed the DIT, but the unit is still unable to pass a subsequent DIT. Enter **<NO>** even if the only corrective action you took was to repeat the DIT without success.
- Enter **<ND>** if you:
  - Have not yet investigated why the unit failed the DIT,
  - Investigated the problem, but have not yet conducted a subsequent DIT, *or*
  - Investigated the problem and conducted a subsequent DIT, but failed to collect the data needed to determine if the unit passed the DIT.



## Summary

At the end of each reporting month, you should finish the **Summary** section, which is shown in Figure 1.4. As indicated below, the quantitative data for IITs (**IIT**) and DITs (**DIT**) will be filled in automatically based on your daily data.

		Unit No. 1	
		IIT	Number of days with DIT triggered by high turbidity or particle count
Number of days with a monitoring violation			
DIT	Number of days with failure to pass a DIT		
	Number of days with a treatment technique violation		
SUMMARY	Comments	General Remarks	Additional Comments

**Figure 1.4.** Summary Tables for QBT Membranes

### **IIT: Number of days with DIT triggered by high turbidity or particle count** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which your plant needed to conduct a DIT due to high turbidity (or particle count) and enter the result in the appropriate cell.

### **IIT: Number of days with a monitoring violation** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which the membrane unit had one or more monitoring violations and enter the result in the appropriate cell. A monitoring violation occurs each time:

- You do not conduct the required IITs on a day that the membrane unit sends filtrate to the clearwell (i.e., you report **Daily Max.** = <MD> or **Daily Max.** = <ND>).
- You do not pass a DIT (or complete successful corrective action) on a day that a DIT is required.

### **DIT: Number of days with failure to pass a DIT** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which the membrane unit failed to pass a DIT and enter the result in the appropriate cell.

**DIT: Number of days with a treatment technique violation** CALC

You may not enter any data in this row. The SWMOR spreadsheet will automatically count the number of days in which the membrane unit had a treatment technique violation and enter the result in the appropriate cell. A treatment technique violation occurs each day you produce water after failing a DIT, but fail to successfully complete corrective action.

**NOTE**

The SWMOR assumes that you took the membrane unit off-line as soon as it failed a DIT. Consequently, you will not be cited for a treatment technique violation on the day that the unit failed its DIT. However, the SWMOR does not assume that corrective action was completed before you produced water on any subsequent day. Therefore, you must report successful corrective action at least one day before you report that the unit sent water to the clearwell.

**Comments**

The SWMOR provides a row for you to enter general remarks about the membrane treatment process, as well as comments about the performance of individual membrane units. However, this information is optional, and you may leave the cells in this row blank.

General comments should go in the **General Remarks** cells, whereas unit-specific information should go in the applicable **Additional Comments** cells. Some examples of unit-specific information that you may find useful to enter are: number of failed fibers, dates of any mini-CIPs or partial CIPs conducted, and descriptions of any successful corrective actions completed. However, this row is provided for your convenience, so you may use it in whatever way makes the most sense for your plant.