

How to Complete the Pre-filtration Worksheet of the SWMOR-Alt

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.

PREFILTERS MONTHLY OPERATING REPORT WORKSHEETS

The SWMOR-Alt spreadsheet contains one sheet for obtaining log removal credit for *Giardia* and *Cryptosporidium* based on removal of turbidity and/or total hardness in pre-filtration treatment systems. Accepted pre-filtration methods include pre-sedimentation with coagulation, two-stage lime softening, and bank filtration.

If the TCEQ has approved your plant for pre-filtration credit, the **PreFilters** worksheet should be a part of your SWMOR-Alt. The SWMOR-Alt spreadsheet automatically determines if this worksheet needs to be displayed based on the information you supplied when you customized the SWMOR for your plant. If your SWMOR-Alt requires this sheet, it appears as a tab at the bottom of the SWMOR-Alt spreadsheet, as shown in **Figure 1.1**.

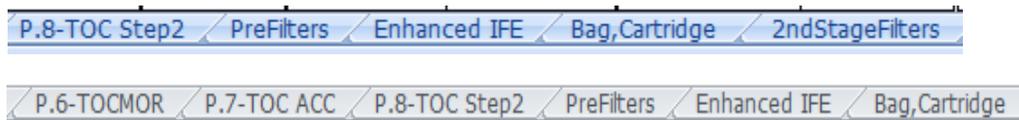


Figure 1.1. Tabs at the bottom of the SWMOR-Alt indicating the PreFilters sheet

The **PreFilters** worksheet will not be visible if you indicated in the customizing step that your plant does not have any pre-filtration processes among the non-conventional treatment technologies.

If your plant does have a pre-filtration treatment process and the appropriate **PreFilters** worksheet tab is not visible, you will need to close the file without saving, reopen it, and re-customize your spreadsheet. See Chapter 2 for more information about customizing the SWMOR-Alt for your particular plant.

At the top of the **PreFilters** worksheet, there is a block of information that describes your system, plant, and reporting period as shown in **Figure 1.2**. The spreadsheet copies this information from the data you entered on the **P.2-Turbidity Data** worksheet, and the data cannot be re-entered or edited on **PreFilters** worksheet.

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.)
Pre-Filters Data Page

PUBLIC WATER SYSTEM NAME: _____ PLANT NAME OR NUMBER: _____
 PWS ID No.: _____ Plant ID No.: _____ Month: _____ Year: _____

Figure 1.2. General plant Information at the top of the PreFilters worksheet

There are three accepted pre-filtration treatment methods that can be selected during SWMOR-Alt customization: presedimentation with coagulation, two-stage lime softening, and/or bank filtration. The **PreFilters** worksheet automatically displays two sections, the **PERFORMANCE DATA** table and **SUMMARY** table, for each pre-filtration treatment method selected. It is unlikely that a public water system will have more than one pre-filtration method, but for demonstration purposes, the **PERFORMANCE DATA** tables for every method are shown in **Figure 1.3**.

If only one pre-filtration method is selected, only the **PERFORMANCE DATA** and **SUMMARY** tables for the selected method will be shown; that is, other parts of the sheet will be invisible). Each pre-filtration method and the corresponding tables are explained below.

<i>Presedimentation with Coagulation</i>					<i>Two-Stage Lime Softening</i>					<i>Bank Filtration</i>							
PERFORMANCE DATA					PERFORMANCE DATA					PERFORMANCE DATA							
Date	100% of Plant Flow Treated?	Coagulant Added Prior to Basin	Presedimentation Turbidity (NTU)	Presedimentation Turbidity (NTU)	Date	100% of Plant Flow Treated?	Chemical Added Each Stage?	Total Hardness			Date	100% of Plant Flow Treated?	Bank Filter/Well No.				
	Yes/No	Yes/No	(NTU)	(NTU)		Yes/No	Yes/No	Raw Water (mg/L)	Stage 1 Effluent (mg/L)	Stage 2 Effluent (mg/L)		Yes/No	1	2	3		
1					1						1						
2					2						2						
3					3						3						
4					4						4						
5					5						5						
6					6						6						

Figure 1.3. Performance Data tables for each pre-filtration method in the PreFilters worksheet

1.1 PRESEDIMENTATION WITH COAGULATION

The TCEQ may approve up to 0.5 log *Cryptosporidium* removal credit for presedimentation if the basin treats 100% of the flow, coagulant is added continuously during operation, and if there is a monthly mean reduction of 68% or greater in turbidity.

Performance Data Table

Figure 1.4 shows the **PERFORMANCE DATA** section for **Presedimentation with Coagulation** table. Every day of the month, you must enter information into

four columns. If the plant treated no water on a given day, you must enter <X> in each of the four columns.

<i>Presedimentation with Coagulation</i>				
PERFORMANCE DATA				
	100% of Plant Flow Treated?	Coagulant Added Prior to Basin	Presed Basin Influent Turbidity (NTU)	Presed Basin Effluent Turbidity (NTU)
Date	Yes/No	Yes/No		
1				
2				

Figure 1.4. Performance Data table for Presedimentation with Coagulation in the PreFilters worksheet

100% of Plant Flow Treated

For each day, you must specify if 100% of the raw water was treated through the presedimentation basin. Use the drop down list to select [Yes] if 100% of the raw water passed through the basin or [No] if, at any point in the day, some raw water bypassed the basin. If the plant treated no water on a given day, enter <X>.

Coagulant Added Prior to Basin Yes/No

For each day, you must specify if coagulant was applied continuously upstream of the presedimentation basin. Use the drop down list to select [Yes] if coagulant was applied continuously to all raw water treated or [No] if the coagulant was not added continuously. If the plant treated no water on a given day, enter <X>.

Presedimentation Basin Influent Turbidity (NTU)

If the presedimentation basin treated all of the raw water and was operated under continuous coagulant addition for a given day, enter the raw water turbidity level in nephelometric turbidity units (NTU).

If the raw water turbidity was tested multiple times, enter the average value.

If the raw water turbidity was not tested at least once during the day, enter <ND> in this cell.

If 100% of the raw water was not treated or if coagulant addition was not continuous, leave this cell blank.

If the plant treated no water on a given day, enter <X>.

Presedimentation Basin Effluent Turbidity (NTU)

If the presedimentation basin treated all of the raw water and was operated under continuous coagulant addition for a given day, enter the turbidity level of the water leaving the presedimentation basin in NTU.

If the effluent turbidity was tested multiple times, enter the average value.

If the effluent turbidity was not tested at least once during the day, enter **<ND>** in this cell.

If 100% of the raw water was not treated or if coagulant addition was not continuous, leave this cell blank.

If the plant treated no water on a given day, enter **<X>**.

Presedimentation Basin Summary and Credit Table

Figure 1.5 shows the **SUMMARY** section for **Presedimentation with Coagulation**.

PRESEDIMENTATION BASIN SUMMARY & CREDIT	Monthly Mean	
	Treatment Criteria & Credit	
	Did 100% of the water being treated pass through the presed basin?	
	Was coagulant continuously added upstream of the presed basin each day?	
	Did the plant achieve at least a 0.5-log of turbidity removal?	
<i>Giardia</i> and <i>Cryptosporidium</i> Log Removal Credit Allowed For Presedimentation		

Figure 1.5. Summary table for Presedimentation with Coagulation in the PreFilters worksheet

Monthly Mean **CALC**

The SWMOR-Alt automatically calculates the **Monthly Mean** of the presedimentation basin influent and effluent turbidity data entered for each day of the month in the **PERFORMANCE DATA** table. This value is updated daily as that day's data is added into the appropriate cells, but only the value at the end of the month is important.

Did 100% of Plant Flow Pass Through the Presed Basin? **CALC**

If you reported in the **PERFORMANCE DATA** table that, during each day of treatment, 100% of the raw water passed through the presedimentation basin, the worksheet enters **Yes**.

If you reported that, on any given day, some raw water bypassed the presedimentation basin, the worksheet enters **No**.

Was Coagulant Continuously Added of the Presed Basin Each Day? **CALC**

If you reported in the **PERFORMANCE DATA** table that, during each day of treatment, coagulant was continuously added upstream of the presedimentation basin during operation, the worksheet enters **Yes**.

If you reported that, on any given day, coagulant was not added continuously upstream of the presedimentation basin, the worksheet enters **No**.

Did the Plant Achieve at Least a 0.5-log of Turbidity Removal? **CALC**

The **PreFilters** worksheet automatically calculates the log turbidity reduction between the monthly mean influent and effluent turbidity values. If the calculated log reduction is greater than 0.5 (greater than 68% removal), the worksheet enters **Yes**.

If the calculated log reduction is less than 0.5, the worksheet enters **No**.

If the answer to either of the previous two questions is **<No>**, the worksheet enters **NA**.

If either of the monthly mean influent or effluent turbidity values is missing, the worksheet enters **Unknown**.

If the answer to this question is either **<Yes>** or **<No>**, the worksheet enters the calculated log removal value achieved in the bottom half of the cell.

***Giardia* and *Cryptosporidium* Log Removal Credit Allowed for Presedimentation** **CALC**

To receive credit for pathogen removal using presedimentation basins, your plant must treat 100% of the raw water with continuous coagulant addition and achieve a 0.5 log reduction of the monthly mean influent turbidity level. The SWMOR-Alt worksheet automatically enters the *Giardia* and *Cryptosporidium* log removal credit allowed for the month in this cell.

If all of the three previous cells indicate **<Yes>** and the calculated value for the log removal is greater than or equal to 0.5, the worksheet enters **0.5**.

If the first two of those cells indicate **<Yes>** and the third indicates **<Unknown>** (i.e., all the water passed through the presedimentation basin and was continuously

dosed with coagulant but the influent or effluent monthly average turbidity data is missing), the worksheet enters **0.5 Assumed**.

If either of the cells for the first two questions (100% of the flow and coagulant addition) is blank, the worksheet leaves this cell blank. In all other cases, it enters **0**.

1.2 TWO-STAGE LIME SOFTENING

The TCEQ may grant up to a 0.5 log *Cryptosporidium* removal credit for two-stage lime softening if chemical addition and hardness precipitation occur in both stages. To receive the removal credit, 100% of plant flow must pass through the two-stage lime softening system.

Performance Data Table

Figure 1.6 shows the **PERFORMANCE DATA** section for the **Two-Stage Lime Softening** process. For each day of the month, you must enter information into five columns. If the plant treated no water on a given day, you must enter **<X>** in all five columns.

Two-Stage Lime Softening					
PERFORMANCE DATA					
Date	100% of Plant Flow Treated? Yes/No	Chemical Added Each Stage? Yes/No	Total Hardness		
			Raw Water (mg/L)	Stage 1 Effluent (mg/L)	Stage 2 Effluent (mg/L)
1					
2					
3					

Figure 1.6. Performance Data Table for Two-Stage Lime Softening in the PreFilters Worksheet

100% of Plant Flow Treated?

For each day of the month, you must specify if 100% of the raw water was treated through the two-stage lime softening system. Use the drop down list to select **[Yes]** if 100% of the raw water passed through both stages or **[No]** if, at any point in the day, some raw water bypassed either stage (or both stages). If the plant treated no water on a given day, enter **<X>**.

Chemical Added to Each Stage? Yes/No

For each day of the month, you must also specify if the chemical(s), such as lime and/or soda ash, was applied to each stage. Use the drop down list to select **[Yes]** if chemical was applied separately to both stages, or **[No]** if the chemical was added to only one (or neither) stage. If the plant treated no water on a given day, enter **<X>**.

Total Hardness

If the two-stage softening system treated all of the raw water and both stages received chemical addition for a given day, total hardness data, in mg/L as calcium carbonate, must be entered for the **Raw Water**, the **Stage 1 Effluent**, and the **Stage 2 Effluent**.

If total hardness was tested multiple times for any water, enter the average value.

If the total hardness was not tested at least once during the day for any water, enter **<ND>** in this cell.

If any bypass occurred or if chemical addition did not occur in both stages (that is, if either of the two cells to the left indicate **<No>**), leave this cell blank.

If the plant treated no water, enter **<X>**.

Two-Stage Lime Softening Summary and Credit

Figure 1.7 shows the **SUMMARY** section for **Two-Stage Lime Softening**.

TWO-STAGE LIME SOFTENING SUMMARY & CREDIT	Treatment Criteria & Credit	
	Did 100% of the water being treated pass through two softening stages?	
	Was lime or soda ash added at each stage each day?	
	Did Hardness removal occur in both stages of treatment each day?	
Giardia and Cryptosporidium Log Removal Credit Allowed For 2-Stage Softening		

Figure 1.7. Summary table for Two-Stage Lime Softening in the PreFilters worksheet

Did 100% of the Water Being Treated Pass Through Two Softening Stages? **CALC**

If you reported in the **PERFORMANCE DATA** table that, during each day of treatment, 100% of the raw water passed through the two-stage softening system, the worksheet enters **<Yes>**. If you reported that, on any given day, some raw water bypassed all or part of the two-stage system, the worksheet enters **<No>**.

Was Lime or Soda Ash Added at Each Stage Each Day? **CALC**

If you reported in the **PERFORMANCE DATA** table that, during each day of treatment, chemical was applied to both stages, the worksheet enters **Yes**. If you

reported that, on any given day, chemical was only added to one (or neither) of the stages, the worksheet enters **No**.

Did Hardness Removal Occur in Both Stages of Treatment Each Day? **CALC**

The **PreFilters** worksheet automatically checks to ensure hardness reduction after each stage. If hardness removal occurred in both stages every day, the worksheet enters **Yes**.

If hardness removal did not occur in both stages every day, the worksheet enters **No**.

If the answer to either of the previous two questions is **<No>**, the worksheet enters **NA**.

If there is any missing data, the worksheet enters **Unknown**.

***Giardia* and *Cryptosporidium* Log Removal Credit Allowed for Two-Stage Softening** **CALC**

To receive additional credit for pathogen removal using two-stage lime softening, your plant must pass 100% of the raw water through both stages, add chemical to each stage, and achieve hardness removal in each stage. The SWMOR-Alt worksheet automatically enters the log removal credit allowed this month for *Giardia* and *Cryptosporidium* based on two-stage softening performance in this cell.

If all of the three previous cells indicate **<Yes>**, the worksheet enters **0.5**.

If the first two of those cells indicate **<Yes>** and the third indicates **<Unknown>** (i.e., all the water treated at the plant passed through the two-stage softening process and was continuously dosed with chemicals for softening but some hardness data is missing), the worksheet enters **0.5 Assumed**.

If any of the three previous cells is blank, the worksheet leaves this cell blank. In all other cases, it enters **0**.

1.3 BANK FILTRATION

Bank filtration means pumping wells that are located near surface water—like a river—so the water is filtered through the riverbank. To achieve *Cryptosporidium* removal credit for bank filtration, the wells that induce surface water infiltration through the bank must be monitored. To be eligible for this credit, the aquifer must be unconsolidated and contain 10% fines. In addition, the average turbidity from each pumping well must be less than 1.5 NTU. Plants may be granted up to 0.5 log *Cryptosporidium* removal credit if the wells are located at least 25 feet from the

surface water source. Plants may be granted up to 1.0 log *Cryptosporidium* removal credit if the wells are located at least 50 feet from the surface water source.

Performance Data Table

Figure 1.8 shows the upper and lower portions of the **PERFORMANCE DATA** section for **Bank Filtration** table. Every day, you must confirm that 100% of the treated flow passed through the bank filtration and also enter the maximum daily turbidity measurement for each well. If the plant treated no water on a given day, you must enter **<X>** in each column. Enter the distance of the well from the source water in the lower portion of the table.

<i>Bank Filtration</i>				
PERFORMANCE DATA				
	100% of Plant Flow Treated?	Bank Filter/Well No.		
		1	2	3
Date	Yes/No	Daily Max Turbidity (NTU)	Daily Max Turbidity (NTU)	Daily Max Turbidity (NTU)
1				
2				
3				
29				
30				
31				
Monthly Avg.				
Distance (ft)				
Credit				

Figure 1.8. Performance Data table for Bank Filtration in the PreFilters worksheet; (a) upper portion and (b) lower portion of the table

100% of Plant Flow Treated?

Every day, you must specify if 100% of the raw water was treated through the bank filtration system; note that this question refers to the system as a whole, not to individual filters. Use the drop down list to select **[Yes]** if 100% of the raw water passed through the system or **[No]** if, at any point in the day, some raw water bypassed the system. That is, **[No]** means that some water was taken directly from the surface water source to the plant influent without passing through the bank filtration system. If the plant treated no water on a given day, enter **<X>**.

Bank Filter/Well Number Daily Maximum Turbidity

Every day, you must also enter in turbidity data for each well in the bank filtration system. Up to twenty wells can be accounted for in the **PreFilters** worksheet.

Turbidity measurements should be recorded from each well head every four hours. A particular well might be out of service for part of a day, in which case the requirement is that turbidity measurements are made every four hours that it is in service.

If 100% of the raw water passed through the bank filter system and the turbidity was measured at least once every four hours that a given well was in service, enter the highest turbidity reading for that day.

If 100% of the raw water passed through the bank filter system, the turbidity was measured less than once every four hours for any well, and the highest turbidity reading was 1.5 NTU or higher, enter the highest turbidity reading for that day.

If you collected some, but not all, of the required water turbidity data for a given well and all of the readings you did record were below 1.5 NTU, enter **<MD>**.

If no turbidity data was collected for a given well that was in service part or all of the day, enter **<ND>** in this cell.

If a given well was out of service for the entire day, leave the cell blank. If any bypass occurred, leave this cell blank. If the plant treated no water on a given day, enter **<X>**.

Monthly Average of Maximum Daily Turbidity Readings **CALC**

The **PreFilters** worksheet automatically calculates the monthly average of the maximum daily NTU readings for each well and displays the value in this cell.

If every value for the daily reading for the month is **<X>** (meaning that the plant treated no water that month), then the worksheet automatically enters **X**.

If there are no turbidity values reported for a given well, the worksheet automatically enters **ND**.

Distance from Surface Water Source

You must enter the distance of each well from the source surface water in feet. For vertical wells, the distance to the surface water is measured from the 100 year flood elevation to the well head. For horizontal wells, the distance to the surface water is measured from the normal flow stream bed to the well head.

Your TCEQ approval letter will document the number of feet from the well to the surface water.

Credit for a Given Well CALC

The **PreFilters** worksheet automatically enters the log credit for *Cryptosporidium* removal that the plant can claim for a given bank filter or well based on the maximum daily turbidity reading and the well distance from the source water.

If, for any day of the month, the well's turbidity reading exceeds 1.5 NTU, the worksheet enters 0.

If throughout the month, all required turbidity measurements were obtained and all were below 1.5 NTU, the worksheet enters:

- 0.5 if the well is between 25 and 50 feet from the source water, or
- 1.0 if the well is more than 50 feet from the source water.

If throughout the month, some required turbidity measurements were missing but all of those obtained were below 1.5 NTU, the worksheet enters:

- 0.5A (where "A" means "assumed") if the well is between 25 and 50 feet from the source water, or
- 1.0A if the well is more than 50 feet from the source water.

Bank Filtration Summary and Credit

Figure 1.9 shows the **SUMMARY** section for **Bank Filtration**.

Treatment Criteria & Credit	
BANK FILTRATION SUMMARY & CREDIT	Did 100% of the water treated being treated pass through a bank filter?
	Was the Monthly Average of max daily NTU readings for each filter below 1.5 NTU?
	<i>Giardia</i> and <i>Cryptosporidium</i> Log Removal Credit Allowed For Bank Filtration

Figure 1.9. Summary Table for Bank Filtration in the PreFilters Worksheet

Did 100% of the Water Treated Pass through a Bank Filter?

CALC

If you reported in the **PERFORMANCE DATA** table that, during each day of treatment, 100% of the raw water passed through the bank filter system, the worksheet enters Yes.

If you reported that, on any day of the month, some raw water bypassed the bank filter system, the worksheet enters **No**.

Was the Monthly Average of the Maximum Daily Turbidity Readings for Each Filter Less than 1.5 NTU? **CALC**

The **PreFilters** worksheet automatically checks to see if the monthly average turbidity measurement for each well was under 1.5 NTU. If so, the worksheet enters **Yes**.

If the monthly average turbidity reading for any well exceeded 1.5 NTU, the worksheet enters **No**.

If there is any missing data, the worksheet enters **Unknown**.

***Giardia* and *Cryptosporidium* Log Removal Credit Allowed for Bank Filtration** **CALC**

To receive pathogen removal credit for bank filtration, your plant must pass 100% of the raw water through the system and the maximum monthly average turbidity reading for each pumping well must be below 1.5 NTU. The SWMOR-Alt worksheet automatically enters the log removal credit allowed this month for *Giardia* and *Cryptosporidium* based on bank filtration performance in this cell.

If the previous two cells for the above questions indicate **<Yes>**, the entire plant receives the minimum log credit achieved by any of the wells; this value is automatically entered in this cell. For example, if the **PERFORMANCE DATA** table shows that one well received **<0.5>** credit and other wells received **<1.0>** credit, the plant will receive an overall **0.5** log removal credit for bank filtration.

If either of the previous two cells for the above questions indicates **<No>**, the worksheet enters **0**.

If the cells for either of the answers to the above two questions are empty, the worksheet leaves this cell blank.