

# 4. FILTER-PROFILE REPORTS

## SPECIAL INSTRUCTIONS FOR SWMOR2 USERS

Throughout this chapter, we talk about monitoring requirements and results for individual filters. However, you are monitoring CFE turbidity levels instead of IFE turbidity levels. Consequently, we are really talking about your CFE monitoring requirements and results.

All of the statements regarding special filter studies and reports for individual filters contained in Chapter 4 apply to your CFE monitoring point. For example, when we say that a plant with IFE monitors must prepare a special report if:

- the turbidity level at the outlet of an individual filter exceeds 1.0 NTU in two consecutive 15-minute readings

it means that you must prepare the same report if:

- the turbidity level at your CFE monitoring point exceeds 1.0 NTU in two consecutive 15-minute readings

Because that would be the only difference between the two sets of instructions, this chapter applies to all surface water treatment plants.

If you get high IFE turbidity readings at the outlet of an individual filter, we may require you to complete one or more special studies to determine the cause. The type of special study that must be conducted depends on the size of your public water system, how high the turbidity level went, and how often high readings were recorded.

The filter profile is one of the special studies that you might need to conduct. You only have to complete the filter-profile report, or FPR, if *either*:

- the IFE turbidity level exceeds 1.0 NTU in two consecutive 15-minute readings at any time during the filter run
- or*
- your plant serves at least 10,000 people *and* the IFE turbidity level exceeds 0.5 NTU in two 15-minute readings at the end of the first four hours of continuous filter operation

Note that this second condition occurs only at plants that serve at least 10,000 people and only applies to the reading that is collected four hours after a filter (1) is returned to service following a backwash cycle or (2) was stopped and restarted for some other reason.

Both of these situations are generically referred to as “filter exceedances” throughout this chapter. Determining if you have to complete an FPR is not difficult, but it can be monotonous. Consequently, we have included a feature in the SWMOR and SWMOR2 spreadsheets that tells you if you have to include an FPR with your monthly report.

The FPR shares many common features with the SWMOR and SWMOR2 spreadsheets. For example:

- The FPR is an Excel spreadsheet that contains many comment boxes and drop-down menus. If you are unfamiliar with these spreadsheet features, you may learn more about them in Section 1.5
- You must complete the FPR electronically.
- You may download a copy of the FPR at our website, or we can send you a copy on the SWMOR CD-ROM.

In addition to the plant and operator information, the FPR contains two major sections: **Obvious Reasons** on page 1, and the **Narrative Description of Filter Profile** on page 2. If the IFE turbidity level at the outlet of an individual filter goes above 1.0 NTU for two consecutive 15-minute readings on several occasions, you may have to conduct more special studies and submit additional reports.

## 4.1 PLANT AND OPERATOR INFORMATION

You will only need to complete the **plant** and **operator information** blanks on page 1 of the FPR. Once you fill in that information, it is copied into the corresponding cells on page 2.

### **Public Water System Name**

Enter the name of your public water system. The water system name on the SWMOR and FPR must be identical.

### **Plant Name or Number**

If your water system has more than one treatment plant, enter the name of the plant that collected the data contained in this specific report. You do not have to complete this blank if your water system has only one treatment plant. Again, to avoid confusion, please make sure that the plant name shown on the SWMOR or SWMOR2 matches the one you enter here.

### **PWS ID No.**

Enter your water system's seven-digit PWS ID number.

### **Month/Year**

Select from the drop-down lists the month and the year in which your plant collected the data.

### **Operator's Signature**

The operator who was in charge of producing the filter profile must sign each page of the FPR. This signature must be handwritten. Stamped signatures or typewritten names are not acceptable.

The operator who signs the FPR may or may not be the same person who is responsible for the daily operation of the plant. Consequently, the individual who signs the FPR might not be the same person who signs the SWMOR.

## Certificate No. and Grade

Enter the certificate number and the grade of the operator who signs the FPR.

## Date

Enter the date that the operator signs the FPR.

## 4.2 OBVIOUS REASONS

Figure 4.1 shows the **Obvious Reasons** section of the **Filter Profile Report**. Unless we have approved a corrective-action plan for a specific filter, you must complete this portion of the FPR *if*:

- the IFE turbidity level at the outlet of an individual filter exceeds 1.0 NTU in two consecutive 15-minute readings at *any* time during the filter run
- or
- your plant serves at least 10,000 people *and* the IFE turbidity level at the outlet of an individual filter exceeds 0.5 NTU in two 15-minute readings at the end of the first four hours of continuous filter operation

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
1	<b>FILTER PROFILE REPORT FOR INDIVIDUAL FILTERS</b>																	
2	FOR PUBLIC WATER SYSTEMS THAT ARE USING SURFACE WATER SOURCES OR GROUND WATER SOURCES UNDER																	
3	THE INFLUENCE OF SURFACE WATER THAT ARE REQUIRED TO CONDUCT ADDITIONAL INDIVIDUAL FILTER MONITORING																	
4																		
5																		
6	PUBLIC WATER SYSTEM NAME: <u>City of Bobo</u>							PLANT NAME OR NUMBER: <u>New Plant</u>										
7																		
8	PWS ID No.: <u>2560001</u>							Month: <u>February</u>			Year: <u>2009</u>							
9																		
10																		
11	<b>OBVIOUS REASONS</b>																	
12				FILTER NO.: <u>1</u>			FILTER NO.: <u>1</u>			FILTER NO.: <u>5</u>								
13				DATE: <u>02-04-09</u>			DATE: <u>02-04-09</u>			DATE: <u>02-04-09</u>								
14				TIME: <u>10:00 AM</u>			TIME: <u>4:15 PM</u>			TIME: <u>11:45 AM</u>								
15				DURATION: <u>45:00</u>			DURATION: <u>15:00</u>			DURATION: <u>15:00</u>								
16				TURBIDITY: <u>1.32</u>			TURBIDITY: <u>0.57</u>			TURBIDITY: <u>1.05</u>								
17	<i>OBVIOUS REASONS (Check all that apply)</i>																	
18	NONE IDENTIFIED - A Filter Profile must be submitted <input type="checkbox"/> (See Profile No. ___) <input type="checkbox"/> (See Profile No. ___) <input type="checkbox"/> (See Profile No. ___)																	
19	<b>Filter Problems</b>																	
20	Post-Backwash Turbidity Spike <input type="checkbox"/>																	
21	Prolonged Filter Run Time <input checked="" type="checkbox"/>																	
22	Excessive Filter-Loading Rate <input type="checkbox"/>																	
23	Rate-of-Flow Control Valve Failure <input type="checkbox"/>																	
24	Media Defects (insufficient depth, mudballs, etc.) <input type="checkbox"/>																	
25	Inadequate Surface Wash or Backwash Facilities <input type="checkbox"/>																	
26	Backwash Artifact <input type="checkbox"/>																	
27	<b>Turbidimeter Errors</b>																	
28	Incorrect Calibration <input type="checkbox"/>																	
29	Air Bubble <input type="checkbox"/>																	
30	Debris <input type="checkbox"/>																	
31	<b>Chemical Feed Equipment Failure</b>																	
32	Coagulant <input type="checkbox"/>																	
33	Coagulant Aid <input type="checkbox"/>																	
34	Filter Aid <input type="checkbox"/>																	
35	Poor Raw Water Quality <input type="checkbox"/>																	
36	Other Major Unit Process Failures/Maintenance Activities <input type="checkbox"/>																	
37	Specify: _____ Backwash Filter No. <u>1</u>																	
38																		
39																		

Figure 4.1. Obvious Reasons section of the filter-profile report.

Completing the **Obvious Reasons** section of the FPR does two things. First, it identifies the filter that experienced the IFE exceedance; the date, time, and duration

of the event; and the maximum turbidity level that was recorded during the event. Second, it gives you an opportunity to describe the condition or combination of conditions that led to the elevated turbidity level.

If you are able to identify the cause or causes of a particular exceedance, you will not be required to prepare a complete filter profile or to complete the **Narrative Description of Filter Profile** portion of the FPR. However, if you are not able to identify what caused the exceedance, you will need to prepare a filter profile and complete the rest of the FPR.

To complete this portion of the report, you must identify the event and check all boxes that apply. To check (or to uncheck a box that already contains a check), place your cursor over the box and click the left mouse button. Page 1 of the FPR contains enough room to discuss up to six elevated-turbidity events. If more than six events occurred during the month, you will need to submit additional pages to describe them. The FPR must describe each event that occurred during the month.

## Identifying the Filter and Exceedance

Each time an IFE turbidity level exceeds one of the triggers that we described earlier in this chapter, you will need to identify the filter, tell us when the event occurred, and summarize the severity and duration of the episode.

### Filter No.

Enter the number of the filter that did not meet the IFE turbidity requirements for individual filters. You must enter the number of the filter as it appears on page 3 of the SWMOR. For example, if page 3 of the SWMOR identifies the filter as Filter No. 6, the filter must be identified as Filter No. 6 on the FPR.

### NOTE

Systems that use the SWMOR2 should enter  in these cells. However, you may also enter  or ; we will understand that it is really a CFE reading because the FPR form will accompany your SWMOR2.

### Date/Time

Enter the date and the time the IFE exceedance occurred.

### Duration

Enter the length of time, in hours, that the IFE exceedance lasted. Report the duration of the event in ¼-hour, or 0.25 hour, increments.

### Turbidity

Enter the maximum IFE turbidity level recorded during the event.

## None Identified

You should check the  **[NONE IDENTIFIED]** box only if you cannot identify an obvious reason for the IFE exceedance. If the  **[NONE IDENTIFIED]** box is checked, no other box in this portion of the report should be marked, and a filter profile must be produced within seven days of the exceedance. If you check this box you must also assign and record the profile number as a cross-reference to the narrative description

of the filter profile on page 2. See Section 4.3 for more information about completing page 2 of the FPR.

## Filter Problems

Filter performance can be affected by the design, operation, and maintenance of a filter. Check the box next to any filter problem that resulted in (or even contributed to) the turbidity exceedance event that you are describing.

### Post-Backwash Turbidity Spike

Check this box if the IFE exceedance occurred during a post-backwash turbidity spike when the filter was returned to service after backwash or after a period of inactivity.

### Prolonged Filter Run Time

Check this box only if the IFE exceedance was caused by the filter being operated for a prolonged period of time that exceeded a typical filter run, *and* the prolonged filter run resulted in particle breakthrough.

### Excessive Filter-Loading Rate

You should check this box only if the event occurred during a period when the filter was being operated at a loading rate above the maximum loading rate allowed by the TCEQ. Typically, this excessive loading rate occurs during peak operating flow or when one or more other filters are taken offline.

### Rate-of-Flow Control Valve Failure

A malfunctioning rate-of-flow control valve can cause hydraulic surges in the filter. Sudden changes in hydraulic loading rates can force particles to surge through the filter media. Consequently, you should check this box if the elevated turbidity level was caused, in part or in whole, by a flow-control valve that was not working properly.

### Media Defects

Check this box if the elevated turbidity level was caused by problems with the condition and placement of the filter media or the support system. Media defects include, but are not limited to, the presence of mudballs, surface cracking, displaced media, insufficient media depths, poor media segregation (for dual-media and mixed-media filters), and damaged or disturbed support media and underdrains as evident from boils or vortexing during backwash.

### Inadequate Surface-Wash or Backwash Facilities

Filters that are not backwashed well can produce elevated turbidity readings. You should check this box if the filter is not being cleaned adequately during routine backwash. Backwash limitations include, but are not limited to:

- inadequate filter backwash rate or filter-bed expansion
- absence of a surface-wash or air-scour system
- a damaged surface-wash or air-scour system

### **Backwash Artifact**

Check this box if the IFE exceedance occurred during the backwash of another filter *and* you believe that the backwash procedure caused a hydraulic surge that resulted in an elevated turbidity reading in the filter you are evaluating.

## **Turbidimeter Errors**

The ability to accurately measure turbidity is absolutely essential. If the turbidimeter is not properly operated and maintained, you can get spurious readings that are not indicative of actual filter performance. Check the box next to any turbidimeter problem that you identified when you investigated the turbidity exceedance that you are describing in the FPR.

### **Calibration Problems**

Elevated IFE readings can occur during a calibration procedure and can be caused by improperly calibrated instruments. If you are certain that one of these problems caused the elevated readings, check this box. Be sure to verify that the error exists by verifying the instrument performance using primary or secondary standards, or by comparing the reading from the online unit with one from a properly calibrated turbidimeter. Calibration verification may also be completed using the instrument's built-in electronic diagnostics designed to assist in determining proper calibration. The turbidimeter should measure correctly after it is thoroughly cleaned and recalibrated with a primary standard.

### **Air Bubble**

A leak in the supply line may cause air to be introduced into the turbidimeter, resulting in an erroneous turbidity measurement. The instrument should measure correctly after the leak is fixed. Check this box only if you found a leak during your investigation and repairing the leak corrected the problem.

### **Debris**

Excessive debris can accumulate in the turbidimeter and contribute to an elevated IFE turbidity level. The instrument should measure correctly after it is thoroughly cleaned and recalibrated with a primary standard. You should check this box only if your investigation revealed an excessive accumulation of debris that you believe contributed to the elevated IFE readings.

## **Chemical Feed Equipment Failure**

Check one or more of these boxes if you discovered that the chemical feed pumps or equipment malfunctioned and caused a disruption in chemical feed, or resulted in an improper dosage of coagulant, coagulant aid, or filter aid *and* that failure contributed to the elevated turbidity readings you are investigating.

## **Poor Raw Water Quality**

Check this box if you have determined that the elevated IFE turbidity readings were the result of unusually poor raw-water quality, such as an elevated raw-water turbidity level or some unusual chemical makeup that made coagulation difficult.

## Other Major Unit Process Failures/Maintenance Activities

If some other major unit process failures or maintenance activities caused the filter exceedance, check this box and specify the cause on the line below the box.

### 4.3 NARRATIVE DESCRIPTION OF FILTER PROFILE

If you cannot identify any obvious reason for the abnormal filter performance, you must produce a filter profile within seven days of the IFE exceedance. A filter profile is a graphical representation of individual filter performance based on turbidity readings recorded at one-minute intervals for an entire filter run, from start-up to backwash. Although total particle counts may be used in conjunction with turbidity measurements to offer additional insights to filter performance, take care in interpreting particle counts. The interpretation should focus on the change in count levels as opposed to particular count numbers.

#### **IMPORTANT**

Do not calibrate your online turbidimeter while you are collecting filter-profile data. To ensure the accuracy of the data reported in the profile, we encourage you to calibrate the online turbidimeter, or at least verify its accuracy, before beginning the profile.

#### **Filter No.**

Enter the number of the filter on which the filter profile was produced. To avoid confusion, please make sure that the number you enter here matches the filter number on page 1.

#### **Profile No.**

Enter the number of the filter profile as assigned on page 1 of the FPR for cross-reference.

#### **Date of Profile**

Enter the date on which you began conducting the filter profile.

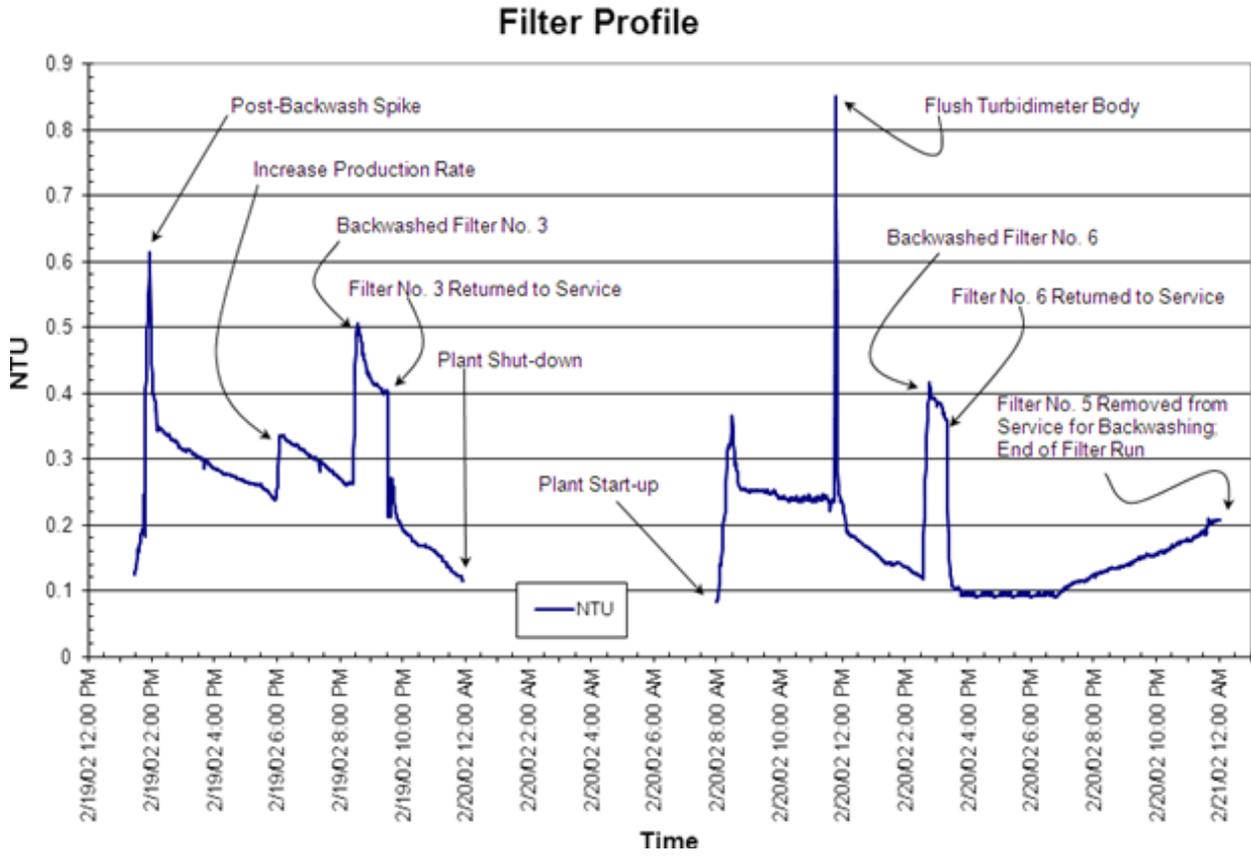
#### **Details**

The filter profile must be based on turbidity readings recorded at one-minute intervals over an entire filter run, from start-up to backwash. The run length during this assessment should be representative of a typical filter run, and should encompass the period when another filter is being washed. The profile should include an explanation of the cause of any filter performance spikes during the run. It must be annotated to identify significant events, such as:

- filter start-up and shutdown
- filter backwash
- any filter-to-waste events and idle periods
- any changes in filter-loading rates
- any turbidity deviations over 0.1 NTU

### Example 4.1: Filter Profile

An example of a filter profile. The filter run represents a typical plant filter run that includes the backwash of another filter. The profile has been annotated to identify significant events and explain turbidity spikes during the run.



## 4.4 SUBMITTING THE REPORT

The completed and signed FPR and, if applicable, the filter profile must be included when you mail your SWMOR to the TCEQ.