7. Filter Profile Studies and Reports

SWTPs may need to do special investigations and additional reporting if there are high IFE or CFE turbidity readings (i.e., filter exceedances) during the month. A filter profile report (FPR) is required for any of the following reasons:

- IFE turbidity of a specific filter exceeds 1.0 NTU for two consecutive 15-min. readings at any time during the month.
- The SWTP serves at least 10,000 people and the IFE turbidity exceeds 0.5 NTU for two 15-min. readings at the end of the first four hours of continuous filter operation. This only applies to the reading that is collected four hours after a filter is returned to service following a backwash cycle or is stopped and restarted.
- **For 2-Filter Plants only:** CFE turbidity exceeds 1.0 NTU for two consecutive 15-min. readings at any time during the month.

This chapter applies to all workbook users. If you do not prepare and submit an FAR when required, you may incur an M/R violation.

7.1 Filter Profile Report

The FPR form (TCEQ Form 10276) is a Microsoft Excel spreadsheet with many of the features described in Chapter 1. If you are required to submit an FPR with your MOR, download a blank form from our Filter Reports for Individual Filters webpage [6].

An example of a completed FPR is included for reference in Appendix C of this document. The form contains two pages - **Obvious Reasons** and **Narrative Description of Filter Profile**. Once you open and save a blank copy of the form, you can use the information in this chapter to complete and submit an FPR.

Each time an individual filter exceeds a turbidity trigger defined in the previous section, you must identify the reason or cause, or produce a filter profile on the filter within 7 days of the exceedance. There are multiple scenarios that trigger this requirement. For this reason, the **P.1 Summary** page is programmed to automatically report when an FPR is required. To ensure you meet the 7-day timeframe, you should enter data into your MOR workbook on a daily basis. The workbook will then alert you at any time during the month when an exceedance triggers an FPR.

Plant and Date Information

Enter the {PWS Name}, {Plant Name or Number}, and {PWS ID No.}. Make sure you enter this information exactly as you entered it in your MOR workbook.

Enter the {Month}, and {Year} in which the exceedance occurred. The month and year on the FPR must match the month and year on the MOR.

[6] www.tceq.texas.gov/drinkingwater/swmor/swmor/fpr

The information in this section is automatically copied into the corresponding cells on **P.2** of the FPR.

7.2 Obvious Reasons (P.1)

The **Obvious Reasons** section on **P.1** of the FPR is used to report and describe the information listed below:

- Filter(s) with the exceedance.
- Date, time, and duration of the exceedance.
- Maximum turbidity level recorded during the event.
- Cause, condition, or reason that led to the exceedance.

> If you can identify the cause of an exceedance on **P.1**, you do not need to complete **P.2** of the FPR form; otherwise, you need to complete the rest of the FPR.

Identifying the Filter and Exceedance

For each filter exceedance during the month, you must identify the filter, report when the event occurred, and summarize the severity and duration of the episode. **P.1** contains enough room to discuss up to six filter turbidity exceedances. If more than six events occurred in the month, you need to submit additional pages to describe them.

Filter Number

If you are conventional or non-conventional treatment plant, enter the {number of the filter} that did not meet the turbidity requirement as it appears on **P.3** of your workbook. Make sure the numbers match. If you are a 2-Filter plant, enter {CFE} in this cell.

Date and Time

Enter the {date} and the {time} the exceedance occurred.

Duration

Enter the [length of time (in hours)] that the exceedance lasted. Report the duration of the event in 0.25-hr increments.

Turbidity

Enter the {maximum turbidity (in NTUs)} recorded during the event.

Identifying the Reason for the Filter Exceedance

None Identified

Select [NONE IDENTIFIED] if you cannot identify an obvious reason for the filter exceedance. If you select this reason, do not select any other any other reason in this section of the report. You must also assign and record the profile number as a cross reference to the narrative description of the filter profile described on **P.2**.

Filter Problems

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

Post Backwash Turbidity Spike

Select if the 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

Select if the filter exceedance was caused by the filter being operated for a prolonged period that exceeded a typical filter run, and the prolonged filter run resulted in particle breakthrough.

Excessive Filter Loading Rate

Select if the filter exceedance occurred during a period when the filter was being operated at a loading rate above the maximum loading rate we allow. 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. Select this reason if the filter exceedance was caused, in part or in whole, by a flow control valve that was not working properly.

Media Defects

Select if the filter exceedance 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 following causes:

- Presence of mudballs.
- Surface cracking.
- Displaced media.

- Insufficient media depths.
- Poor media segregation (for dual media and mixed media filters).
- 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. Select this reason if the filter was not cleaned adequately during routine backwash. Backwash limitations include, but are not limited to the following causes:

- Inadequate filter backwash rate or filter bed expansion.
- Absence of a surface wash or air scour system.
- Damaged surface wash or air scour system.

Backwash Artifact

Select if the filter 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 essential. If the turbidimeter is not properly operated and maintained, you can get turbidity readings not indicative of actual filter performance. Select any turbidimeter problem identified below which, upon investigation, contributed to turbidity measurement error.

Incorrect Calibration

Filter exceedances can occur during a calibration procedure and be caused by improperly calibrated instruments. Select this reason, if you are certain that one of these problems caused the elevated turbidity readings. Be sure 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. You can also use the instrument's built-in electronic diagnostics designed to determine 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 reading. The instrument should measure correctly after the leak is fixed. Select this reason, if you found a leak during your investigation, and repairing it corrected the problem.

Debris

Excessive debris can accumulate in the turbidimeter and contribute to elevated turbidity. The instrument should measure correctly after it is thoroughly cleaned and recalibrated with a primary standard. Select this reason if your investigation revealed an excessive accumulation of debris that you believe contributed to the filter exceedance.

Chemical Feed Equipment Failure

The failure of a chemical feed pump or piece of equipment can contribute to turbidity exceedances. Select either [coagulant], [coagulant aid], or [filter aid] if malfunctioning equipment resulted in an improper dosage of one of these chemical types, and this contributed to the filter exceedance.

Poor Raw Water Quality

Select if you determined that the filter exceedance was 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 or Maintenance Activities

Select if some other major unit process failures or maintenance activities caused the filter exceedance. Specify the cause on the line below the box.

7.3 Narrative Description of the Filter Profile (P.2)

As specified previously, you must produce a filter profile and complete **P. 2** of this report if you cannot identify an obvious reason for a filter exceedance.

Filter and Exceedance Identifying Information

This information is copied automatically from **P.1**. Be sure the following information is copied exactly as you entered it on that page:

- Filter number corresponding to the filter profile.
- Number of the filter profile assigned on **P.1.**
- Date you began producing the filter profile.

Details

A filter profile is a graphical representation of filter performance based on turbidity readings recorded at 1-min. intervals for an entire filter run, from startup to backwash. The run length should be representative of a typical filter run and encompass the period when another filter is being washed. This section is used to describe the filter

profile. The description should identify significant events and include information such as:

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

In lieu of providing details in this section, you can annotate and attach your filter profile as described in the next section. If you choose to do this, refer to the information in the next subsection.

Total particle counts may be used in conjunction with turbidity measurements to offer additional insights to filter performance; however, you must take care in interpreting particle counts. The interpretation should focus on the change in count levels as opposed to specific count numbers.

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. Do not calibrate your online turbidimeter while you are collecting filter profile data.

Attaching a Filter Profile to the FPR

The filter profile in Figure 7.1 shows an example of typical plant filter run that includes the backwash of another filter. This profile has been annotated to identify significant events and explain turbidity spikes.

You must include your filter profile(s) with your FPR, if applicable, when you submit it with your MOR. Either attach the profile(s) electronically prior to printing or include a hardcopy.

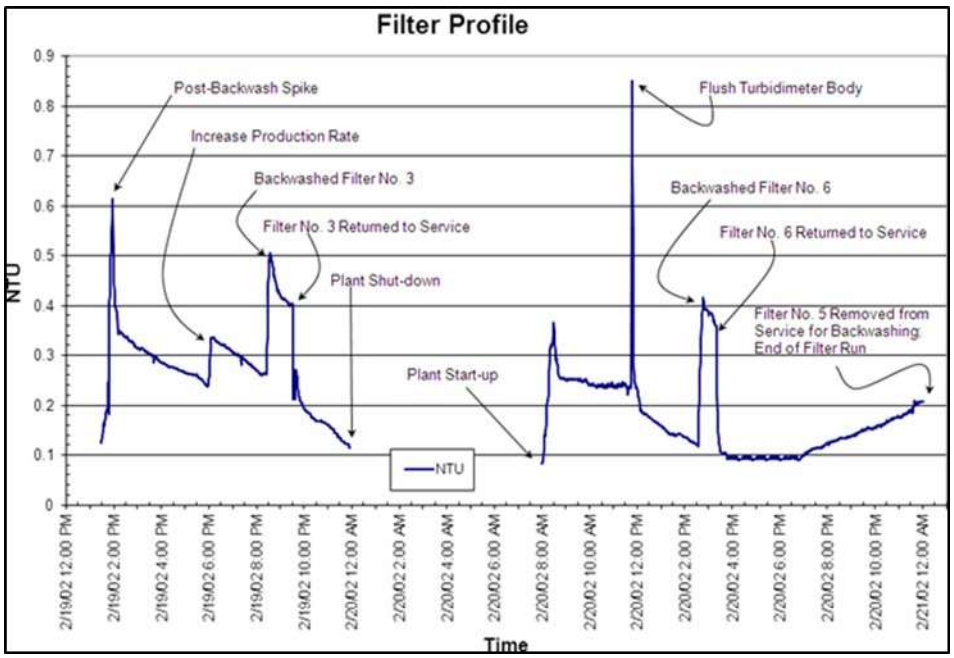

Figure 7.1. Example of an Annotated Filter Profile

7.4 Printing, Signing, and Submitting the FPR

Operator's Signature and Date

After printing the FPR, the operator in charge of preparing the report and producing the filter profile, if applicable, must sign and date each page. The signature must be handwritten, in ink. Stamped signatures or typewritten names are not acceptable.

The operator who signs the FPR may not be the same person responsible for the daily plant operations; therefore, the person who signs the FPR might not be the same person who signs the MOR.

Certificate Number and Grade

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