8. Filter Assessments and Reports

SWTPS may need to conduct a filter assessment and submit a filter assessment report (FAR) if a filter consistently produces water with elevated IFE or CFE turbidity levels (i.e., filter exceedances). A filter assessment and an FAR are required for either of the following reasons:

- IFE turbidity exceeds 1.0 NTU for two consecutive 15-min. readings on three separate occasions during any consecutive 3-month period.
- **2-Filter plants only**: CFE turbidity exceeds 1.0 NTU for two consecutive 15-min. readings on three separate occasions during any consecutive 3-month period. If this occurs, you will not know which of the two filters is causing the filter exceedance; therefore, you must do a filter assessment and prepare an FAR on both filters.

> This chapter applies to conventional and 2-Filter Plants, as well as some plants that utilize alternative treatment. However, it does not apply to all alternative filtration technologies. If you are using an alternative technology and have a filter exceedance described above, contact a SWTR Coordinator for information about doing a filter assessment. If you do not perform a filter assessment when required, you may incur a M/R violation.

Note: A filter assessment requires that you physically access the filter to make physical measurements and excavate some of the media. Make sure you follow standard operating procedures (SOP) when you do this and be very careful to avoid injuries or damage to the filter media. Appendix B contains an example SOP to assist in developing your own procedure.

8.1 Filter Assessment Report

The FAR form (TCEQ Form 10277) is a Microsoft Excel spreadsheet that has many of the MOR form features described in Chapter 1. If you are required to submit an FAR with your MOR, download and save a blank form from the Filter Reports for Individual Filters webpage. [7]

The form contains six pages. Once you open and save a blank copy of the form, use the information in this chapter to perform a filter assessment, fill out the report, and submit a completed FAR. An example of a completed FAR is included for reference in Appendix D of this guidance.

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

Each time there is a filter exceedance, you must perform a filter assessment within 14 days of the exceedance. There are multiple scenarios that trigger this requirement. For this reason, we programmed the **P.1 Summary** page to automatically report when a filter assessment is required. To ensure you meet the 14-day timeframe, you should enter data into your MOR workbook daily. The workbook will then alert you at any time during the month when an exceedance triggers an FAR.

8.2 Design Specifications and Operating Procedures (P.1)

Plant and Date Information

Enter the {PWS Name}, {Plant Name or Number}, {PWS ID No.}, and {Plant ID No.} on **P. 1**. Make sure you enter this information exactly as you entered it in your MOR workbook.

For plants other than 2-Filter plants, enter the {Number} of the filter being evaluated exactly as it appears on **P. 3** of your MOR workbook. For 2-Filter plants, enter {CFE} in this cell.

The filter number may not correspond with the numbering system you use at your plant, so there is enough space to add some additional information to aid in identification. For example, your entry might look like the example shown in Figure 8.1.

Figure 8.1. Filter Number Example

Once you fill in the information in this section, it is automatically copied into the corresponding cells on **P. 2**, **3**, **4**, **5,** and **6**.

Events

Enter the {first date}, the {second date}, and the {third date} the filter produced consecutive readings above 1.0 NTU. If this is a voluntary filter assessment and there were not three consecutive days above 1.0 NTU, enter {NA} or {None}.

Design Specifications

This section contains the design specifications of the filter under evaluation. To complete this section, you need the following information:

- Design information from a variety of sources including engineering drawings for the plant.
- Specifications for the filter, filter media, and appurtenances.
- Information from pump curves and other plant documentation.

Filter Type

From the drop-down list, select the [filter type]. Table 8.1 contains each option in the list and its description.

Table 8.1. Filter Types and Descriptions

Type	Description
Gravity	Filter is open to the atmosphere. In these filters, settled water usually flows by gravity from the clarifier or sedimentation basin into the filter.
Pressure	Filter is completely enclosed. A transfer pump is usually used to pump settled water into the filter.
Permutit	Proprietary gravity filter that is fully enclosed. The filter discharges to a backwash tank immediately above the filter bed.
Other	None of the filter types above apply. If this is the case, or you are unsure what kind of filter you have, select this option and describe the filter in the **Additional Remarks** cell; or include a copy of the filter's engineering drawings with the FAR.

Operating Mode

From the drop-down list, select the [filter operating mode]. Table 8.2 contains each option in the list and its description.

Table 8.2. Filter Operating Modes and Descriptions

Mode	Description
Constant Rate/ Constant Level	The outlet of these filters is typically equipped with a mechanical rate of flow controller or a SCADA controlled motorized flow control valve. As the head loss through the filter increases, the flow controller automatically opens more to maintain the preset flow rate. Typically, the inlet to these filters is completely submerged, and the water level is essentially the same in all filters during the entire filter run.
Constant Rate/ Variable Level	The flow rate in these filters is typically controlled by a weir, a telescoping valve, or some other device located at the inlet of the filter rather than at its outlet. As the water passes though the flow control device, it falls through an air gap into the filter inlet pipe. Once the water passes through the air gap, there is no way for it to be redirected to another filter. Consequently, as the head loss increases, the water level in the filter rises. The rising water level provides the additional head needed to maintain the desired flow rate.
Declining Rate	The inlet piping to the filters is completely common and no attempt is made to maintain a uniform flow rate through the filter. At the beginning of the filter run, the flow rate is limited by an orifice plate (or flow control valve and flowmeter) located at the filter outlet. As the head loss in a filter increases the flow rate decreases and water tends to be redirected to other, cleaner filters.
Other	None of the modes above apply. In this case, or you are unsure what filter operating mode you have, select this option and then describe the filter's operating mode in the **Additional Remarks** cell, or on a separate page.

Media Bed Dimensions

Diameter (ft), Length (ft), and Width (ft)

If you are conducting an assessment on a round filter, enter the {diameter (in ft.)} of the filter bed, and leave the length and width cells empty. If the filter has a rectangular bed, enter the {length (in ft.)} and the {width (in ft.)}, and leave the diameter cell empty.

Surface Area (ft^2) CALC

The form will automatically report the surface area of the media bed in this cell if you entered the filter bed dimensions correctly. If you made a mistake, the word ERROR will appear.

Freeboard (ft)

Enter the {distance (in ft.)} from the top of the filter bed to the upper edge of the backwash water trough.

Max Head Loss (ft)

Enter the {maximum available head loss (in ft.)} for the filter. This is the maximum head loss that can be achieved during a filter run. This information can often be obtained from engineering drawings or filter specifications. If these sources do not provide the information, refer to Figure 8.2 below.

The feature that controls the maximum water level in the filter can be any of the following:

- Overflow elevation of the filter wall.
- Bottom of the filter overflow pipe.
- Maximum water level that can be achieved in the clarifier.

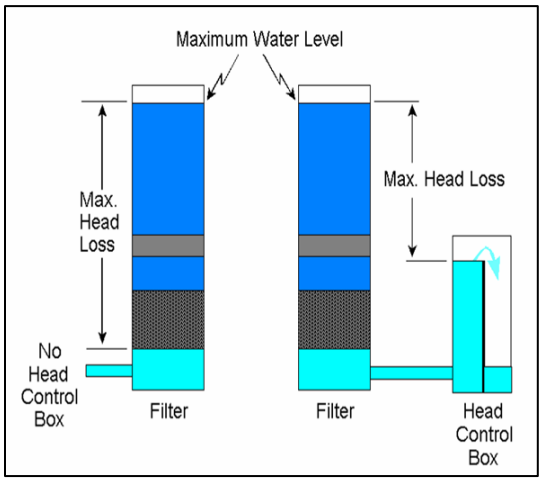

Figure 8.2. How to Determine Maximum Available Head Loss

Media Type

From the drop-down list, select the [media type] based on the original filter design. Make your selection based on information obtained from engineering drawings or filter specifications; and not on information obtained during a filter excavation. Table 8.3 contains each option in the list and its description.

Table 8.3. Media Types and Descriptions

Type	Description
Multiple Media	Filter has at least three different media materials. The most common design uses garnet, sand, and anthracite media.
Dual Media	Filter has exactly two different types of media. The most common design incorporates sand and anthracite.
Rapid Sand	Filter has only sand media.
Deep bed Mono Media	Filter has at least 48 inches of a single type of media. These filters commonly contain either anthracite or granular activated carbon.
Other	None of the media types above apply. In this case, select this option and describe the media bed in the **Additional Remarks** cell, or on a separate page.
Unknown	You are unsure of the media type, and do not have any engineering drawings or media specifications describing the media.

Media Specs

Material

From the drop-down list, select the [type of filter material] in each layer of the filter bed. If the filter contains fewer than four layers, select the materials used in each of the layers and leave the other layers blank.

If you do not have the specifications for the media in the filter being evaluated, select [Unknown] for the material used in Layer 1 and leave the rest of this section blank.

Depth (inches)

Enter the {thickness (in inches)} of each media layer.

Minimum Size (mm) and Maximum Size (mm)

If the media specifications include a range of acceptable sizes for each layer, enter the {minimum size (in mm)} and the {maximum size (in mm)} for the size range. If the specifications include only one a single size, enter that value in both the minimum and maximum cells.

UC

Enter the {UC} for each of the media materials used in the filter. Enter {Unknown} if the specifications do not include a UC for one or more of the materials.

Specific Gravity

Enter the {specific gravity} of the filter media in the appropriate cell. Enter {Unknown} if no specific gravity specification is available.

Total Depth (inches) CALC

If you entered the depth of each media layer, the spreadsheet automatically reports the total depth. However, if you do not have the media specifications and selected Unknown for the material in Layer 1, the form automatically reports Unknown.

L/D Ratio CALC

The form uses the information that you entered about media depth and size to automatically report the L/D ratio for the filter.

Underdrain Type

From the drop-down list, select the [underdrain type].

Support Gravel

Number of Grades

If your filter contains one or more layers of support gravel, enter the {number of different sizes} specified in the filter specifications. If you are using one of the gravel-less underdrain systems and have no support gravel, enter {None} in the **No. of Grades** cell, and leave the rest of the cells blank.

Minimum Size (inches) and Maximum Size (inches)

If your filter contains support gravel, Enter the {maximum gravel size (in inches)} and the {minimum gravel size (in inches)}.

Total Depth

Enter the {total thickness (in inches)} of the gravel support layer.

Troughs

Number

Enter the {number} of backwash troughs in the filter you are evaluating.

Separation (inches)

Enter the {distance (in inches)} between the edges of two adjacent troughs. If the troughs are not the same distance apart, enter {Variable} and describe the arrangement in the **Additional Remarks** cell. Also, if the edge of the last trough is farther from the filter wall than the distance between adjacent troughs, include this measurement in the **Additional Remarks** cell.

Supplemental Backwash

From the drop-down list, select the [supplemental backwash system type] used in the filter. Table 8.4 contains each option in the list and its description.

Table 8.4. Supplemental Backwash System Types and Descriptions

Type	Description
None	Filter has no supplemental backwash equipment.
Surface Wash	Filter has a supplemental backwash system with fixed or rotating arms that are designed to wash the surface of the media at the beginning of the filter backwash cycle.
Subsurface Wash	Filter has a fixed or rotating arm system that is designed to operate beneath the surface of the media when the bed has been expanded during the backwash cycle.
Air Scour	Filter was equipped with an integral air scour backwash system during its initial construction or a major renovation. Usually, this choice applies whenever the air scour system is incorporated into the design of the underdrains
Air Scour (retrofit)	Filter had an air scour system installed after construction. Usually, these systems are not an integral part of the underdrain design and utilize a network of laterals that are installed on top of the support gravel layers.
Other	The options above do not apply. If this is the case, or you are unsure what supplemental backwash system you have, select this option and describe the system in the **Additional Remarks** cell, or on a separate page.

Filter to Waste

From the drop-down list, select [Yes] or [No] to indicate whether the filter has the capability of filtering to waste.

Filter Flow Rate (gpm)

Regulatory Std CALC

The form automatically reports the allowable filter flow rate based on the following factors:

- Surface area of the filter bed.
- Data you entered in the **Filter Type** and **Operating Mode** cells.
- Maximum allowable filter loading rate.

Design

Enter the {flow rate (in gpm)} at which the filter is designed to operate. This is the flow rate specified in the engineering plans and specifications.

Typical

Enter the {typical flow rate (in gpm)} through the filter when it is operating under normal conditions.

During Backwash

Enter the {typical flow rate (in gpm)} through the filter when one of the other filters is being backwashed.

Maximum

Enter the {maximum flow rate (in gpm)} that routinely occurs during a typical filter run.

App'd Exception

If you have received written approval from us to operate at a flow rate above the normal regulatory limit, enter that {flow rate (in gpm)}. Enter the {date} of the approval letter in the **Additional Remarks** cell. If you have not received approval to operate at higher a flow rate, leave this cell empty.

Loading Rate (gpm/ft^2)

Regulatory Std CALC

The form automatically reports the maximum filter loading rate allowed by our rules based on the data you entered in the **Filter Type** and **Operating Mode** cells.

Design, Typical, During Backwash, and Maximum CALC

The form automatically reports the filter loading rate for each of the operating conditions based on the size of the filter bed and the flow rate information you provided.

App'd Exception

If your plant has received written approval from us to operate at a filter loading rate above the normal regulatory limit, enter that {loading rate (in gpm)}. Enter the {date} of the approval letter in the **Additional Remarks** cell. If you have not received written approval to operate at a higher loading rate, leave this cell empty.

Backwash Flow Rate (gpm)

Regulatory Std CALC

The form automatically reports the minimum backwash flow rate allowed by our rules and the maximum backwash flow rate that we typically recommend. Both values are based on the reported surface area of the filter bed.

Design

Enter the {maximum backwash flow rate (in gpm)} that can be achieved during a backwash cycle.

The design backwash flow rate can be limited by the following factors:

- Design capacity of the backwash pump.
- Maximum flow rate that can be achieved through the remaining filters.
- Hydraulic capacity of the backwash supply header.

In some cases, it may not be possible to determine a design capacity of the backwash system. If you cannot determine the designed backwash flow rate, enter {Unknown}.

Typical

Enter the {typical backwash flow rate (in gpm)} that occurs during a backwash cycle. If the backwash flow rate changes during a routine cycle, enter the rate that is maintained during the main part of the cycle. Do not enter the backwash flow rate during the surface wash or air scour cycle unless that rate is maintained throughout the entire backwash cycle. If the backwash cycle includes ramp up and ramp down periods, do not enter the flow rate that occurs during those stages.

Maximum

Enter the {maximum backwash flow rate (in gpm)} that routinely occurs during a typical filter backwash cycle.

Backwash Loading Rate (gpm/ft^2)

Regulatory Std CALC

The form automatically reports the minimum backwash loading rate allowed by our rules, and the maximum rate we typically recommend.

Design, Typical, and Maximum CALC

The form automatically reports the filter loading rate for each of the operating conditions based on the size of the filter bed and the flow rate you entered.

Filter Influent

Controller

From the drop-down list, select the [controller type] used to control the rate of flow into the filter. Only consider those devices used to proportion or otherwise regulate the flow rate into the filter. Do not include the valves if they are only used to isolate the filter; that is, to stop the settled water flowing into the filter during a backwash cycle. Table 8.5 contains each option in the drop-down list and its description.

Table 8.5. Influent Flow Rate Controller Types and Descriptions

Type	Description
None	The inlet piping of the filter does not have a rate of flow control device; or the filter inlet has a flow control valve that is only used to isolate the filter during backwash or is only used in the fully open or fully closed positions.
Fixed Weir Splitter	Flow rate into the filter inlet is controlled by a splitter box with a fixed weir or gate that was not designed to be raised or lowered; and the splitter box has drop pipes that control the distribution of water to the filters.
Variable Weir Splitter	Flow rate to the filter inlet is controlled by a splitter box with a weir or gate that was designed to be raised or lowered.
Manual Telescoping	Filter is supplied by a trough containing an adjustable telescoping valve.
Manual Butterfly	A manual butterfly valve is used to regulate the flow rate into the filter. Choose None if the valve is only used in the fully open or fully closed position.
Mechanical ROFC	Filter has a mechanical rate of flow controller on its inlet piping.
Mot. Valve (Auto.)	Filter has a motorized valve on its inlet pipe that automatically maintains the desired flow rate.
Siphon (Vacuum) Pipe	Feed rate into the filter is controlled by the size of a siphon pipe. This control mechanism is used in a proprietary design as in the Greenleaf filter.
Orifice Plate	Flow rate into the filter is limited by an orifice plate.
Other	The rate of flow controller types listed in this table do not apply. If you are sure that you have a flow control valve, but you do not know what kind it is, select this option and describe the device in the **Additional Remarks** cell, or on a separate page.

Meter

From the drop-down list, select the [meter type] used to monitor the flow rate into the filter. Table 8.6 contains each option in the drop-down list and its description.

Table 8.6. Meter Types and Descriptions

Type	Description
None	There is no way to determine the flow rate into the filter.
Proportional	Filter is equipped with a nonadjustable rate of flow controller such as a fixed weir, siphon tube, or orifice plate; or, the overall flow rate to the filter battery is metered at some point upstream of the filters.
Venturi Orifice Ultrasonic Propeller Nutating Disk Paddle V-notch Weir Flat Weir Parshall Flume	Flow rate is determined using a flow rate indicator method using one of these types of devices.
Other	None of the options above adequately describe the method used to determine flow rate. In this case, select this option and describe the method in the **Additional Remarks** cell, or on a separate page.

Turbidimeter

If the inlet of the filter is equipped with an online turbidimeter, enter the {make and model number}. If there is no online turbidimeter at the filter inlet, enter {None}.

Filter Effluent

Controller

From the drop-down list, select the [controller type] used to control the rate of flow at the filter outlet. Refer to Table 8.5 for a description of each option. Only consider those devices that are used to proportion or otherwise regulate the flow rate as it leaves the filter. Do not include the valves if they are only used to isolate the filter; that is, to stop the flow of filtered water during a backwash cycle. Remember, this cell applies to the flow control devices at the filter outlet, rather than the inlet.

Meter

From the drop-down list, select the [meter type] used to monitor the flow rate the filter outlet. Refer to Table 8.6 for a description of each option in the list. This cell also applies to the metering device located at the filter outlet, rather than the inlet.

Turbidimeter

If the outlet of the filter is equipped with an online turbidimeter, enter the {make and model number}. If there is no online turbidimeter at the filter outlet, enter {None}.

LOHG

From the drop-down list, select the [LOHG type] used. Table 8.7 contains each option in the drop-down list and its description.

Table 8.7. LOHG Types and Descriptions

Type	Description
None	There is no way to determine the head loss in the filter.
Differential Gauge	Filter has a single gauge or indicator that gives a direct head loss reading. This type of device is commonly incorporated into SCADA systems.
Two Gauges	Head loss is manually determined by subtracting the readings from two separate gauges.
Water Level Indicator	Head loss is determined using a ruled water level indicator. This type of device is commonly used on constant rate, variable level filters.
Other	You are sure that you have a way of determining head loss but none of the options above adequately describe the method. In this case, select this option and describe the method in **Additional Remarks** cell, or on a separate page.

Backwash Water

Source

From the drop-down list, select the [backwash water source] used to deliver backwash water to the filter. Table 8.8 contains each option in the drop-down list and its description.

Table 8.8. Backwash Water Sources and Descriptions

Source	Description
Filter Effluent	The only source of backwash water is the output of the other filters. This means that a filter cannot be backwashed unless the other filters are in operation. In some designs, the backwash water is supplied directly by the other filters. In other designs, the water enters a head control box, which then supplies the backwash water.
Filters & Pump	The principal source of backwash water is the other filters; and the plant can augment the filter output with additional water from the clearwell or distribution system. Again, the filter cannot be backwashed unless the other filters are in operation. The clearwell/distribution system is only used to ensure an adequate backwash rate when the other filters are not producing enough water.
Dedicated Backwash Pump	The filter is backwashed using a dedicated backwash pump that draws water from a clearwell or filtered water sump. In this design, the other filters do not have to be in operation during a backwash cycle. The backwash pump has enough capacity to adequately backwash the filters, whether or not the plant is treating water.
Elevated Backwash Tank	The plant has an elevated storage tank that it uses to supply backwash water for the filters. In this design, the elevated tank serves no other purpose than to backwash the filters; it is not connected to the distribution system.
Service Pump	The backwash water is supplied by the same pumps that discharge to the distribution system.
Distribution	The plant uses the distribution system as the principal source of its backwash water.
Other	None of the options above adequately describe the source of the backwash water. In this case, select this option and describe the method in the **Additional Remarks** cell, or on a separate page.

Controller

From the drop-down list, select the [flow rate controller type] used to regulate the backwash water flow rate. Refer to Table 8.5 for a general description of each option in the list. Only consider those devices used to regulate the flow rate of the backwash water. Do not include the valves if they are only used to isolate the filter (i.e., to start and stop the flow of backwash water).

Meter

From the drop-down list, select the [meter type] used to monitor the backwash water flow rate. Refer to Table 8.6 for a description of the options. Remember, this box applies to the metering device located on the backwash water supply line rather than the one located at the filter inlet.

Turbidimeter

If the filter is equipped with an online turbidimeter to measure the turbidity of the spent or dirty backwash water, enter {make} and the {model number} of the unit. If the turbidity of the spent backwash water is not monitored using an online turbidimeter, enter {None}.

Additional Remarks

If you need to explain or clarify any of the information that you provided in the **Filter Design** area of the form, enter it in this cell. If you need more space, enter {See attached sheet} and include your remarks on a separate page.

Operating Procedures

This section of the FAR contains information about the way the filter is operated and maintained. Refer to the plant's operating and maintenance procedures to complete this portion of the form.

Calibration

Methods: Flow Meter, Backwash Meter, and Mech. ROFC

From the drop-down list for each cell, select the [method] used to calibrate the flowmeters and mechanical ROFCs. Table 8.9 contains each option in the drop-down list and its description.

Table 8.9. Flowmeter Calibration Method Types and Descriptions

Type	Calibration Method
Unknown	You do not know what method used to calibrate the flowmeters and rate of flow controllers the last time they were calibrated. This option applies only when the calibration was checked or adjusted by a third-party contractor. If you select this option, enter the {name of the company} that performed the service in the **Additional Remarks** cell.
Weir	Calibrated using a weir.
Flume	Calibrated using a flume.
Ultrasonic	Calibrated using an ultrasonic meter.
Time & Volume	Calibrated the flowmeter or ROFC by measuring the volume of water that was discharged within a given time period.
Other	None of the options above apply. Select this option if you or a third-party contractor used some other method to calibrate the flowmeter or rate of flow controller. Describe the method in the **Additional Remarks** cell, or on a separate page.

Methods: NTU (Primary) and NTU (Secondary)

From the drop-down lists, select the [Primary NTU Standard Type] and the [Secondary NTU Standard Type] used when calibrating the online turbidimeters. Table 8.10 contains the options in each list and their descriptions.

Note: Primary standards are used to conduct a full calibration of the turbidimeter. Secondary standards are used to verify the calibration of the online turbidimeter.

Table 8.10. Turbidimeter Calibration Standard Types and Descriptions

Type	Description
Formazin	4000 NTU formazin calibration solution. This method requires you to make one or more dilute solutions to calibrate the instrument.
Stablized formazin	Stabilized formazin product.
Polymer beads	Polymer bead product.
Gel	Prepared gelatin standard.
Comparison	Calibration based on the results from another turbidimeter.
Proprietary device	Calibration with an online monitor using a manufacturer's proprietary device.
Other	None of the options above apply. In this case, select this option and describe the method in the **Additional Remarks** cell, or on a separate page.

Frequency (each device)

From the drop-down list, select the [frequency] at which you calibrate each filter device. The options include annual, semiannual, quarterly, monthly, etc.

Date of Last (each device)

Enter the {date} and the {time} that you calibrated each device the last time.

Data Consistency

Frequency and Span

Enter the {number} of times the data recorder or SCADA system records an IFE turbidity reading. Also, enter the {highest turbidity reading (in NTUs)} that can be recorded.

Date and Time

Enter the {date(s)}and the {time(s)} that you checked the consistency of the IFE turbidity reading on the various instruments and data recorders.

NTU Meter Display

Enter the {IFE turbidity (in NTUs)} corresponding to each date from the filter's online turbidimeter display. Enter {NA} if the turbidimeter does not have a display.

SCADA Display

Enter the corresponding {IFE turbidity (in NTUs)} displayed on the SCADA system's screen. Enter {NA} if the plant does not have a SCADA system or the SCADA system does not display IFE turbidity readings.

Data Recorder

Enter the {turbidity (in NTUs)} recorded by the data recorder or data historian.

Grab Sample

Enter the {grab-sample turbidity (in NTUs)} measured with a benchtop turbidimeter.

Backwash

Criteria

For each of the criteria listed in this area, enter the {value} that triggers a backwash cycle at your plant.

Monitoring Interval

Enter the [frequency] that you monitor each of the criteria (e.g., daily, hourly, 15 minutes, 10 seconds).

Written SOPs

From the drop-down list, select the [status] that describes the listed SOP for each task. Table 8.11 contains each option in the drop-down list and its description.

Table 8.11. Status of SOPs and Descriptions

Status	Description
Complete	SOP lists the steps and equipment needed to complete the specific task and is up to date.
Partial	SOP is up to date but does not include all required steps or does not identify all the equipment required to complete the listed task.
Out of date	SOP is complete but does not accurately describe the procedures currently in use.
None	The operators do not follow an existing SOP, or a SOP does not exist.

Additional Remarks

If you need to explain or clarify any of the information that you entered in the **Operating Procedures** section of the FAR, enter it here. If you need more space, enter {See attached sheet} and include your remarks on a separate page.

8.3 Current, Media Surface, and Backwash Conditions (P.2)

Current Conditions

The **Current Conditions** section of **P.2** is used to document information about the current state of the filter when you begin the filter assessment before accessing it to observe the filter bed's surface conditions. To complete this portion of the FAR, you need to record some observations both before and after you take the filter offline as specified in the following subsections.

Date and Time

Enter the {start date} and the {start time} of the filter assessment.

Turbidity (NTU)

Enter the [turbidity (in NTU)] of the water leaving the filter at the beginning of the assessment.

LOH (ft)

Enter the {loss of head (in ft.)} immediately before taking the filter offline.

Flow Rate (gpm)

Enter the {flow rate (in gpm)} through the filter immediately before beginning the assessment. If you cannot determine the flow rate through the individual filter, enter {Unknown}.

Run Time (hr)

If you monitor the length of time that the filter is in service between backwash cycles, enter the {number of hours} that the filter has been in operation since the last backwash cycle. If you do not track this information, enter {Unknown}.

Run Volume (gal)

Enter the {volume of water (in gal)} that has been filtered since the last backwash cycle. If you do not track or know this information, enter {Unknown}.

Physical Condition

In this section of the FAR form, you will describe the physical condition of the filter after taking it offline.

Walls and Troughs

From the drop-down list, select the physical condition of the filter walls and the backwash troughs. Table 8.12 contains each option in the drop-down list and its description.

Table 8.12. Conditions of Walls and Troughs and Descriptions

Condition	Description
Excellent	No rust or corrosion. Coating materials in like new condition.
Good	Slight corrosion or coating material damage that has no impact on filter performance or filter life.
Minor Damage	Minor corrosion or filter wall damage that does not impair filter performance but requires repair during next scheduled filter renovation or repair.
Moderate Damage	Small leaks or other damage in troughs, walls, or other internal structural components that require immediate repair in order to ensure proper filter performance and avoid catastrophic filter failure.
Severe Damage	Severe leaks. The filter is at or near the point of catastrophic failure and needs major renovation or replacement. Describe the nature of this damage in the **Additional Remarks** cell, or on a separate page.
Other	The options above do not apply. In this case, describe the condition of the filter walls in the **Additional Remarks** cell, or on a separate page.

Suppl. Backwash, Flowmeter, Rate-of-Flow Controllers, etc.

From the drop-down list, select the operational condition of the filter appurtenances (equipment and attached devices). Table 8.13 contains each option in the drop-down list and a description of each.

Table 8.13. Filter Appurtenances Conditions and Descriptions

Condition	Description
Fully Operational	No apparent or detectable malfunction of any sort.
Slight Malfunction	Device has a slight malfunction that does not affect the ability to control or monitor filter performance. The problem is detectable but does not apparently impair filter performance. A surface wash arm with one or two damaged or missing nozzles is an example of a slight malfunction.
Moderate Malfunction	Device is malfunctioning to the extent the ability to monitor or control the filter is impaired. A rotating surface wash arm with several damaged or missing nozzles but still rotates is an example.
Severe Malfunction	Device is malfunctioning to the point that you are almost completely unable to monitor or control the filter. An example includes a rotating surface wash arm that will not rotate.
Other	The options above do not apply. In this case, select this option and describe the situation in the **Additional Remarks** cell, or on a separate page.

Additional Remarks

If you need to explain or clarify anything you entered in the **Current Conditions** section, enter the information here. For example, if you selected any type of filter appurtenance malfunction, be it slight, moderate, or severe; describe it in this cell. If you need more space, enter {See attached sheet} and include your remarks on a separate page.

Media Surface Conditions

The **Media Surface Conditions** section of **P.2** is used to document information about the appearance and condition of the filter media. To complete this portion of the FAR, the filter must be drained so you can observe the appearance and condition of the filter media. You will observe and record the required information twice for this section – before backwashing and after backwashing.

Mounds

Number

Enter the {number of mounds} that you observe before and after backwashing the filter. Do not backwash the filter until you have performed the probing and excavating portion of the filter assessment. Only include mounds that rise more than 1.0 inch above the height of the surrounding media. If there are no mounds over 1.0 inch, enter {0} in the cell.

Length (inches), Width (inches), Height (inches)

Enter the {size (in inches)} of the mounds entered in the **Number** cells. If the mound dimensions vary, enter the range of the dimensions. For example, if the mounds range in height from 1.5 inches to 3.5 inches, enter 1.5 to 3.5 in the cell. If there are no mounds, leave these cells blank. (See following example.)

Mound Data Example

In this example, an operator counted, prior to backwashing, seven mounds 8 inches wide ranging in height from 1.5 to 3.5 inches After backwashing the filter, the operator counted two mounds. Although both mounds were rather large (about 42 inches in diameter), neither was more than one inch in height. Based on this example, the operator entered the data in the **Before BW** cells and **After BW** cells as shown in Figure 8.3. The length, width, and height of the **After BW** cells are left blank because there were no mounds greater than one inch in height after backwashing.

	Before BW	After BW
MOUNDS		
Number	7	0
Length (inches)	8 - 36	
Width (inches)	8 - 8	
Height (inches)	1.5 - 3.5	

Figure 8.3. Mound Data Example

Depressions

Number

Enter the {number} of depressions you observe before and after backwashing the filter. Do not include the depressions unless they extend more than one inch. below the level of the surrounding media. If there are no depressions in the filter bed, enter {0}.

Length (inches), Width (inches), Depth (inches)

Enter the {size (in inches)} of the depressions. If none of the depressions are deeper than 1 inch, leave the cells blank.

Accumulated Floc

Thickness

Enter the {thickness (in inches)} of the floc mat before and after backwashing the filter. If the floc mat varies in thickness, enter the range of results. For example, if the floc mat ranges in depth from 0 inches to ¼ inches, you would enter 0–0.25 in the cell.

Distribution

From the drop-down list, select the [description] that explains how extensively the floc mat covers the surface of the filter media. Table 8.14 shows each option in the drop-down list and a description of each. If there is no floc accumulation on the surface of the media, leave the cell blank.

Table 8.14. Floc Accumulation and Descriptions

Accumulation	Description
Uniform	The floc mat is evenly dispersed on the top of the filter. It covers most of the media surface and there is no area that seems unusually free of floc.
Localized	Most of the filter has no accumulation of floc. Whatever floc is present is isolated to a few areas within the filter.
Other	The floc mat is relatively uniform but there are isolated, well-defined areas where there is an unusual absence of surface floc. In this case, describe the condition in the **Additional Remarks** cell, or on a separate page.

Retraction

Number

Enter the {number} of areas where the filter media has separated from the filter wall. Do not count the area unless the retraction is more than any of the following:

- 12 inches long
- ¼ inch wide
- ½ inch deep

If there are no such areas where the filter media has separated, enter {0}.

Length (inches), Width (inches), Depth (inches)

Enter the {size (in inches)} of the retractions defined above. Leave these spaces blank if there are no retractions.

Cracks

Number

Enter the {number} of cracks in the filter media. Do not count a crack unless it is more than the following:

- 12 inches long
- ¼ inch wide
- ½ inch deep

If there are no such cracks in the media, enter {0}.

Length (inches), Width (inches), Depth (inches)

Enter the {size (in inches)} of the cracks defined above. Leave these spaces blank or enter {NA} if there are no cracks.

Mudballs

Number per ft2

Enter one of the following options in this cell:

- {Number of mudballs} present on each square foot of media surface.
- {TNTC} if the mudballs are too numerous to count.
- {0} if there are no mudballs.
- {Minimum and maximum number of mudballs observed} if the distribution is not uniform across the media bed (e.g., 0–4, 2–15, and so forth).

Size (inches)

Enter one of the following options in this cell:

- {Size (in inches)} of the surface mudballs.
- {<.5} is the mudballs are all less than ½ inch in diameter.
- {6} if the size of the mudballs exceeds 6 inches in diameter.
- {Size range (in inches)} if the size of the mudballs varies (e.g., 0.5–9.0).
- Leave blank, if there are no mudballs on the surface of the media bed.

Distribution

From the drop-down list, select the {description} that best describes how the mudballs are spread across the surface of the filter media. Refer to Table 8.14 for a description of each option in the list.

Additional Remarks

If you need to explain or clarify anything you entered in the **Media Surface Conditions** section, enter that information here. If you need more space, enter {See attached sheet} and include your remarks on a separate page.

Backwash Conditions

The **Backwash Conditions** section on **P.2** is used to record information about the plant's backwashing processes. Backwashing should only be performed after you have probed and excavated the filter; therefore, you complete this portion of the form after you have completed and documented the probe and excavation step. (See **P.3.**)

BW Flow Rate (gpm)

Enter the {backwash flow rate (in gpm)}] maintained during the main part of this backwash cycle. Do not enter the initial backwash rate, the final backwash rate, or the flow rate that was maintained during a simultaneous air-water backwash cycle unless this was also the flow rate used during the main part of the water-only backwash cycle.

Rise Rate (inches/min) CALC

The form automatically reports the rise rate achieved during this backwash cycle. This calculation is based on the surface area of the filter and the backwash water flow rate you entered above.

Loading Rate (gpm/ft2) CALC

The form also automatically reports the backwash loading rate. This calculation is based on the backwash water flow rate you entered and the surface area of the filter bed.

Duration (minutes)

Enter the {length of time (in min.)} that you backwashed the filter at the flow rate you entered in the **BW Flow rate** cell.

Total Volume (gallons)

Enter the {total volume (in gal.)} of backwash water used during the backwash cycle. When entering this number, include water used during any ramp-up and ramp-down periods, and any water used by supplemental backwash facilities.

Troughs

Levelness

From the drop-down list, select the [description] that describes the levelness of the filter trough. Table 8.15 contains each option in the drop-down list and a description of each.

Table 8.15. Trough Levelness and Descriptions

Levelness	Description
Level	Backwash water comes over the top of all the weirs at about the same time.
Slightly Unlevel	Backwash water comes over the top of one weir or over one end of the weirs before it comes over the rest of the weirs. However, the water ultimately comes over the entire top of all of the weirs before the maximum backwash water flow rate is achieved.
Moderately Unlevel	Backwash water comes over one weir or the ends of the weirs, and the problem persists until the maximum backwash flow rate is achieved.
Severely Unlevel	Even at the maximum backwash flow rate, water is not flowing over the entire length of the weirs. For example, water doesn't flow over both sides of one or more weirs, or water does not flow over an end of one or more weirs.

Flooding

From the drop-down list, select the [description] that describes any flooding that occurs during the backwash cycle. Table 8.16 contains each option in the drop-down list and a description of each.

Table 8.16. Trough Flooding and Descriptions

Flooding	Description
None	No flooding in any of the weirs.
Slight	Some flooding on one end of weirs, but they are not completely flooded, and the flow of spent backwash water does not appear to be obstructed.
Moderate	Significant flooding on one or more weirs, and the flow of spent backwash water appears to be affected. However, no part of any weir is completely submerged, and the velocity and direction of the floc particles in the area of the flooding appear to be unaffected.
Severe	One or more weirs are almost completely submerged. The flow of spent backwash water is clearly obstructed. Floc particles in the area of the flooding are not moving at the same velocity and in the same direction as the floc particles throughout the filter.
Complete	All weirs are completely submerged. The backwash water flow rate is restricted, and floc particles are not being effectively removed from the filter.

Suppl. Backwash

Duration (minutes)

Enter the {length of time (in minutes)} the supplemental backwash facilities were operated during the backwash cycle.

Effectiveness

From the drop-down list, select the [description] that describes the effectiveness of the supplemental backwash facilities. Table 8.17 contains each option in the drop-down list and a description of each.

Table 8.17. Supplemental Backwash Effectiveness and Descriptions

Effectiveness	Description
Excellent	Supplemental backwash facilities are completely effective in breaking up the floc throughout the entire filter bed.
Adequate	Supplemental backwash facilities are very effective, but do not affect all of the filter bed. Most of the large floc particles are broken into smaller ones that can be removed during the main part of the backwash cycle. However, the supplemental facilities appear to be less effective in the corners of the filter or on one side of the filter.
Poor	Supplemental backwash facilities are only somewhat effective. Large floc particles remain in the filter even after the completion of the supplemental backwash cycle. Even in the area where the supplemental backwash facilities appear to be fully operational, large floc is not broken into smaller particles that can be efficiently removed during the main backwash cycle.
Ineffective	Supplemental backwash process seems to have minimal effect on the size of the floc particles.

Jetting

Number of Sites

Enter the {number} of areas where significant jets are noted during the main part of the backwash cycle. During the initial phases of the cycle, some jetting may occur as the filter bed is expanded. Do not count these sites unless they continue to be noticeable during the main part of the backwash cycle, or they appear in the same spot each time that a backwash cycle is initiated.

Severity

From the drop-down list, select the [description] that describes the severity of the jetting problem. Table 8.18 contains each option in the drop-down list and a description of each.

Table 8.18. Backwash Jetting Severity and Descriptions

Severity	Description
Slight	Jets in the media during the backwash cycle, but they are small and do not seem to be affecting the overall effectiveness of the backwash cycle.
Moderate	Jets are rather large and you can see the media in the jetting area rising above the media in the adjacent areas. However, the media in the other areas of the filter is being effectively agitated; the filter grains are still moving well in all areas of the filter; and the floc particles are being effectively removed from all areas of the filter.
Severe	Jetting appears to be causing lower media layers to reach the surface of the expanded bed; or the jetting has reached a point where the media in other areas of the filter is not being agitated sufficiently, and the floc particles in the other areas of the filter are not being removed effectively.

BW Water Distribution

From the drop-down list, select the [description] that describes the distribution of the backwash facilities. Table 8.19 shows each option in the drop-down list and a description of each.

Table 8.19. BW Water Distribution and Descriptions

Distribution	Description
Uniform/Even	Backwash water is evenly distributed throughout the filter. The turbulence in the expanded filter bed appears to be relatively uniform everywhere in the filter.
Uneven	Some areas of the expanded filter bed are significantly more turbulent than others. Still, there is some media motion in all areas of the filter and floc is rising in all areas.
Inadequate	Some areas of the filter bed have adequate turbulence while other areas have no motion at all. The floc in some areas of the filter is being effectively removed while the floc in other areas remains virtually motionless.
Other	The options above do not apply. If this is the case, describe the distribution in the **Additional Remarks** cell, or on a separate page.

Spent BWW Turbidity

After the backwash cycle is finished, enter the {turbidity (in NTU)} of a water sample collected from above the filter media.

Expansion (inches)

You must make two measurements to determine the expansion obtained during the backwash cycle. First, while backwashing at the maximum flow rate, measure the distance from a fixed reference point (such as the top of the filter wall) to the top of the expanded filter bed. After the backwash cycle is over, measure the distance from that same reference point to the top of the unexpanded (settled media) filter bed. The expansion is the difference between these two measurements. Enter the {filter expansion (in inches)}.

Expansion (percent) CALC

The form automatically reports the percentage of bed expansion based on the inches of expansion that you achieved during the backwash cycle and the average media depth that you measured as you probed the backwashed filter.

Yield (percent) CALC

The form also automatically reports the yield or percentage of filtered water sent to the distribution system during this filter run. This percentage is based on the volume of filtered water produced during the filter run and the total volume of water used to backwash the filter. In other words, this percentage is based on the Run Volume you entered in the **Current Conditions** section divided by the Total Volume you entered in the **Backwash Conditions** section.

Additional Remarks

If you need to explain or clarify any of the information that you provided in the **Backwash Conditions** section of the FAR, enter that information here. If you need more space, enter {See attached sheet}, and include your remarks on a separate page.

8.4 Filter Probe, Filter Excavation, Additional Studies, and Conclusions (P.3)

Filter Probe

The **Filter Probe** section of **P.3** contains the information obtained when you probe the filter to measure the thickness of the media layer and the levelness of the media support system. Before completing this portion of the FAR, you must have already collected the information required to complete both the **Current Conditions** section and the **Media Surface Conditions (Before BW)** section on **P.2**.

Number of Sites

Enter the {number} of sites you probed to measure the thickness of the filter bed and to assess the levelness of the support gravel or underdrain.

The space between the sites may not exceed two ft. You must reduce the spacing between measurements if significant differences are detected between adjacent measurements for the distance to the support gravel, or the media depth.

If the distance or depth between adjacent measurements varies by more than 2 inches, make an additional set of measurements at the midpoint between the points If the distance or depth continues to vary by more than 2 inches, continue to measure at midpoints until the distance between the measurements is only 3 inches.

Media

Max. Thickness (inches), Min. Thickness (inches)

Enter the {maximum thickness (in inches)} and the {minimum thickness (in inches)} you measured when probing the filter to determine the thickness of the filter media.

Typ. Thickness (inches)

Enter the {typical thickness (in inches)} of the media layer. You can determine this by averaging all the thickness measurement results. If most of the measurement results are the same, you can use this one value to avoid having to averaging the results. For example, if you probed the filter at 60 sites and 46 of the measurements were the same, you can enter the value that you got 46 times without calculating the average or typical thickness (even if the other measurements varied by as much as several inches).

Support Material

To determine the elevation of the support gravel (or underdrain), you must determine the distance from the top of the backwash troughs (or some other fixed reference point) to the top of the support gravel. You can determine this distance by either of the following methods:

- Measure from the top of the backwash trough to the top of the support gravel directly. This method may require a probe that is at least 7 or 8 ft. long.
- Measure from the top of the backwash trough to the surface of the media (A), measure the thickness of the media (B), then add the two readings to determine the total distance to the top of the support gravel. (See Figure 8.4.)

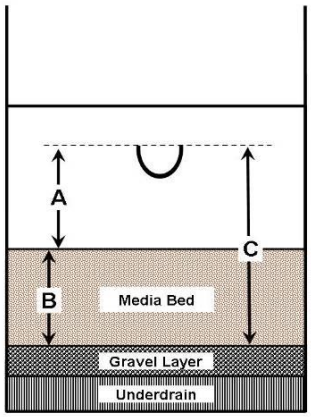

Figure 8.4. Filter Media Cross-section

Max. Elevation (inches), Min. Elevation (inches)

Enter the {maximum elevation (in inches)} and the {minimum elevation (in inches)} you measured to determine the distance to the top of the support gravel.

Typ. Elevation (inches)

Enter the {typical distance (in inches)} to the top of the support gravel. Calculate this value by averaging all of the elevation measurements. If most of the measurements are the same, you can use this one value to avoid having to calculate the average elevation. For example, if you probed the filter at 60 sites and 46 of the measurements were the same, you can enter the value that you got 46 times without calculating the true average, even if the other measurements varied by as much as several inches

Additional Remarks

If you need to explain or clarify anything you entered in the **Filter Probe** section of the FAR, enter that information here. If you need more space, enter {See attached sheet}, and include your remarks on a separate page.

Filter Excavation

This portion of the FAR form is where you summarize filter excavation results. The form provides space to enter data for up to 12 excavation sites. If you excavate fewer sites, leave the extra spaces blank. If you excavate more than 12 sites, include a comment in the **Additional Remarks** cell, and attach a separate page showing the additional data.

You must complete at least one excavation for each 100 square ft of filter surface. For example, a filter bed 20 by 30 ft (600 sq ft) must be excavated in at least six locations. You must also excavate the media at every site where you observe a significant filter problem. (See next section.)

Site Characteristics

You must excavate at least one site where there are no filter problems. This site is termed the reference site. The number and location of the remaining sites depend on the number, severity, and location of any filter or backwash problems identified in previous steps. From the drop-down list for each site, select the [explanation] that describes why you picked each site. Table 8.20 shows each option in the drop-down list and a description of each.

Table 8.20. Excavation Site Explanations and Excavation Requirements

Explanation	Excavation Requirement and Explanation Description
Normal	Excavate at least one site where no filter problems were observed. If no such site exists, excavate a site where the filter media appears to be in the best possible condition. No filter problems observed at the excavation site.
Media Mound	Excavate each site where the mound is at least 2 inches above the surface of the rest of the filter. Media mound present on the surface of the filter after the backwash cycle.
Media Depression	Excavate each site where the depression is at least 2 inches below the surface of the rest of the filter. Depression present on the media surface before or after the backwash cycle.
Crack	Excavate each site where you observe a crack that is at least 12 inches long, at least ½ inch wide, or at least 1 inch deep. Crack in the surface of the filter after the backwash cycle.
Retraction	Excavate each site where the retraction is at least 12 inches long, at least ½ inch wide, or at least 1inch deep. Filter media retracted from the filter wall after the backwash cycle.
Floc Accumulation	Excavate the site where you observed the heaviest accumulation of floc. Excessive floc accumulation on the surface of the media before the backwash cycle.
Gravel Mound	Excavate each site where the mound rises at least 2 inches above the rest of the support gravel. Filter probe indicated a possible gravel mound under the media.
Gravel Depression	Excavate each site where the gravel layer drops at least 2 inches lower than the rest of the support gravel. Filter probe indicated a possible depression in the gravel layer beneath the media.
Poor Suppl. BW	Excavate at least one site where the supplemental backwash system seemed particularly ineffective. Supplemental backwash facilities seemed significantly less effective in the area of the excavation site.
Jetting	Excavate every site where you identified severe jetting during the backwash cycle. If there were no severe jets identified, excavate at least one site where you observed moderate jetting. Jet observed during the backwash procedure.
Poor BW Distr.	Excavate each area where no media movement was observed, and the floc was not being removed from the filter. Little if any media movement at the excavation site during the backwash cycle
Other	Excavate each site where you think that some other observation suggests that a severe filter problem exists. The explanations above do not apply. For example, you excavated the site because there was no floc accumulation at the site while the rest of the filter had 1/8 inch accumulation. If you select this option, describe the condition in the Additional Remarks cell, or on a separate page.

Media Layers and Interfaces

Starting at the filter surface, enter the {depth (in inches)} and the {name} of the filter material in each of the media layers you identified during the excavation. Figure 8.5 shows how to fill in these cells. Only complete the cells for which layers exist. Leave the other cells blank.

	REFERENCE
CONDITION	**Normal**
LAYER 1 (Top Layer)	18 in. anthracite
INTERFACE 1	4 inches
LAYER 2	10 in. sand
INTERFACE 2	1 inch
LAYER 3	3 in. garnet
INTERFACE 3	
LAYER 4	

Figure 8.5. Media Layers and Interfaces

Mudballs

From the drop-down list, select the [description] that most describes how many mudballs you found during excavation. Options include none, few, several, and many.

Max. Size (inches), Min. Size (inches)

Enter the {maximum size (in inches)} and the {minimum size (in inches)} of the mudballs you found during filter excavation.

Max. Depth (inches)

Enter the {maximum depth (in inches)} the mudballs have penetrated the filter bed. Measure the distance from the surface of the media.

Media Condition

Sharpness

From the drop-down list, select the [description] that describes the sharpness of the filter grains. Table 8.21 shows each option in the drop-down list and a description of each.

Table 8.21. Media Sharpness and Descriptions

Sharpness	Description
Excellent	The media grains in each of the layers are irregularly shaped and have sharp edges. The size, shape, and feel are very much like new media.
Good	The media grains in one or more layers have begun to lose their sharp edges but continue to have irregular shapes. The material is still about the same size and shape as new media but no longer looks and feels that way.
Worn	The media grains in one or more of the layers has worn to the point that they no longer have sharp edges. They are worn to the point where they all have essentially the same shape. The grains no longer have the size and shape of new media.
Other	The above options do not apply. Different media materials frequently wear out at different rates. For example, one of the materials like anthracite may be worn while another material like sand) is still in good shape. If you believe that a single media layer is contributing to poor filter performance, select this option, and describe the condition of each media layer in the **Additional Remarks** cell, or on a separate page.

Encrustation

From the drop-down list, select the [description] that describes the degree to which the filter grains are coated with precipitate. Table 8.22 shows each option in the drop-down list and a description of each.

Table 8.22. Media Encrustation and Description

Encrustation	Description
None	There is no apparent precipitate coating on the filter grains. The media looks and feels like new media.
Slight	There is visible coating on the filter grains in the upper layers of the filter. However, the shape of the media in the upper layers is not changed. There is little, if any, coating on the media in the lower levels.
Moderate	There is significant coating on the media throughout the filter. Some of the media has become so encrusted that the filter grains are beginning to change shape. However, most of the media is still in pretty good shape.
Heavy	The problem has become so severe that the different media materials have begun to have a common color and shape.

Uniformity

From the drop-down list, select the [description] that best describes how uniform the size of the media grains is in each filter layer. Table 8.23 shows each option in the drop-down list and a description of each.

When evaluating the uniformity of the filter grains, compare the size of larger and smaller grains with the size of typical grains. Do not pick the absolute, largest and smallest grains for the comparison.

Table 8.23. Media Uniformity and Descriptions

Uniformity	Description
Good	The media grains in each layer of the filter are almost the same size as each other.
Marginal	There is a significant range in the size of the media grains in one or more layers. The size of the larger (and smaller) grains is noticeably different from the size of the typical grain. However, there are few fine grains in the layer.
Poor	The sizes of the media grains in one or more layers vary so much that it is difficult to select a typical grain size for the layer.
Other	The options above do not apply. Different media materials frequently wear out at different rates. For example, harder materials like as garnet may have good uniformity while softer materials like GAC have poor uniformity. If you believe that a single media layer is contributing to poor filter performance, select this option and describe the condition of each media layer in the **Additional Remarks** cell, or on a separate page.

Additional Remarks

If you need to clarify any of the information in the **Filter Excavation** section of the FAR, enter the information here. If you need more space, enter {See attached sheet}, and include your remarks on a separate page.

Additional Studies

Additional study is required if one or more of the excavation sites contain several or many mudballs. If you only found a few mudballs when excavating the media, the study is optional. If you found no mudballs at any of the excavation sites, the study is unnecessary.

If Filter Profile is Attached

Select [Yes] or [No] from the drop-down list. This question is included to remind you to include a filter profile when you submit your report.

Percent Mudballs

If several of the excavation sites contained more than a few mudballs, you should mix the media from several of the sites before determining the mudball concentration in the composite sample before making the measurements for this section. On the other hand, if the mudballs seem to be concentrated in one area of the filter, you may want to focus on that area of the filter when you prepare your composite sample.

If you are measuring the mudball concentration, you must separate the mudballs from the media. Then you must measure the volume of the mudballs, and the volume of the mudball-free media.

Media Volume (mL)

Enter the {volume (in mL)} of the mudball-free media that you recovered from the excavation site (or sites). Leave blank if you did not do any additional study on mudballs.

Mudball Volume (mL)

Enter the {volume (in mL)} of the mudballs that you recovered from the excavation site (or sites) in this space. Leave blank if you did not do any additional study on mudballs.

% Mudballs CALC

Once you have entered the information in **Mudball Volume** cell and the **Media Volume** cell, the form automatically reports the percentage of mudballs present in the sample.

Additional Remarks

If you need to explain or clarify anything you provided in the **Additional Studies** section of the FAR, enter that information here. If you need more space, enter {See attached sheet} and include your remarks on a separate page.

Also, if you conduct any other special studies such as a media solubility test or a media sieve analysis, enter these results here. If you need more space for this, enter {See attached sheet} and include your results on a separate page.

Conclusions

If you were able to determine what caused the filter performance problems, you must explain your conclusions. If you have developed a plan to prevent the problems from occurring in the future, you may also give us that information although we do not require it. If you need more space, enter {See attached sheet} and include your findings on a separate page.

If Corrective Action Plan is Attached

Select [Yes] from the drop-down list if you have developed a CAP you would want to provide. Select [No] if you prefer not to provide the CAP or have not yet developed one.

If you have decided what corrective actions you are going to implement and have developed a schedule for making the changes, we encourage you to provide this information on **P.6**. If we agree with your proposal, we will prepare a bilateral agreement. Once we both have signed the agreement, we will waive additional assessments on this filter for as long as you fulfill your part of the agreement.

If You Need Technical Assistance from TCEQ

If you have been unable to determine why the filter is malfunctioning and would like some technical assistance from us, select [Yes] from the drop-down list. If you would prefer to address this performance problem using other technical resources, select [No].

8.5 Filter Schematic (P.4)

This page is for a filter schematic which shows the locations of the following items:

- Backwash troughs and supplemental backwash facilities.
- Any filter media anomalies such as mounds, depressions, cracks, retraction, excessive or unusually light floc accumulation, or large accumulations of surface mudballs.
- Any significant backwash anomalies such as jetting or unusually low media movement.
- Sites where you probed the filter and the measurements you collected at each site.
- Sites where you excavated the filter.

Refer to the example of the completed FAR form in Appendix D to complete this page.

If you need more room for the filter schematic, use a separate sheet. You can also make a copy of **P.4** and put part of the information on each page. If you use a separate sheet, enter {See attached page}.

8.6 Narrative Description of Filter Profile (P.5)

Describe the filter profile on **P.5**. Refer to the example FAR in Appendix D. The description should include the cause of any turbidity spikes greater than1.0 NTU and any interruption in the data. In lieu of a narrative in this section, you can annotate the graph of your filter profile. Enter {See attached sheet} in this section.

You must include the filter profile when you submit your FAR. You can attach it electronically before printing the report, or include a hardcopy attachment.

8.7 Corrective Action Plan (Optional) (P.6)

Describe the corrective actions your system has taken or plans to take. Include a completion date for each corrective action. Instead of listing your corrective actions, you can reference and attach your CAP. Enter {See attached sheet} and attach it electronically or as a hardcopy.

Note: Submitting the CAP is optional, as indicated in Section 8.4.

8.8 Printing, Signing, and Submitting the FAR

After you complete the FAR, you must print and sign every page. The completed and signed FAR, including the filter profile must be included when you submit your MOR.

Operator's Signature, Name, and Date

After printing the report, the operator in charge of the filter assessment must sign and date each page of the FAR. This signature must be handwritten, in ink. Stamped signatures or typewritten names are not acceptable.

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

Certificate Number and Class

Enter the {certificate number} and {class} of the operator who signs the FAR.