

Work Instruction

Wichita Water Lab

Topic: Cleaning, Calibration and Calibration Check of Filter Gallery Turbidity Meters At the MWTP

Issue date: 01/22/24

Summary:

This online (SCADA) turbidimeter is a continuous read meter as the flow of water through the meter is constant. Water flows through the sample vial located in the Nephelometric turbidimeter at a rate of 150 to 200 mL/min. A class 2 laser is directed through the bottom of the sample vial and scattered by the water sample. The light scattered by the sample at 90° to the incident light path is picked up by light sensors. The higher the intensity of scattered light the higher the turbidity. The on-line turbidimeters are for compliance to LTESWTR, which requires water treatment plants to continuously monitor the turbidity of the effluent of individual filters and combined filter effluent. There are a total of 17 online turbidimeters; one meter per each of 14 filters, one meter on each of the clear wells, and one meter for the CBA (cat house).

The on-line turbidimeters are to be calibrated on a quarterly basis and the calibration is checked once a month and as needed. If performing the quarterly calibration, make sure to immediately perform the calibration check afterwards.

1. The **calibration** is a single point calibration using the **20 NTU** formazin standard solution.
2. The **monthly calibration check** uses the **10 NTU** formazin standard solution.

Interferences:

Interferences may include debris such as coarse sediment, dirty glassware, the presence of air bubbles, and watercolor due to dissolved substances that absorb light. Turbidity can also be affected by the type of particles in the sample referring to the size, shape, and refractive index of the particles.

Safety:

Standard laboratory PPE is required if using acid to clean— lab coat & safety glasses. Hard hats are also required in the pipe gallery where the on-line turbidimeters are located.

Reagents and Standards:

Hach 20 NTU formazin solution – calibration std

Hach 10 NTU formazin solution – calibration check std

Equipment and Supplies:

1. Hach standards (10 and/or 20 NTU)
2. Sample vial cleaning tool – “squeegee”
3. Sample vial removal tool – blue cup with notches at the top
4. 60 ml plastic syringe with a tygon tubing attachment piece
5. Flathead screwdriver
6. Kimwipes
7. Calibration lid to go over calibration standards (black plastic lid)
8. Radio
9. Turbidimeter record keeping notebook

Online/Offline SCADA System Procedure:

Before any calibration, calibration check or cleaning of the meter, the meter should be taken offline from the SCADA system. Follow the process below to do so.

1. Taking the turbidimeter offline from SCADA:
 - a. On the system controller select **MENU**
 - b. Scroll down to **TEST/MAINT – ENTER**
 - c. Scroll down to **HOLD OUTPUTS – ENTER**
 - d. On the display **ACTIVATION** should be highlighted – **ENTER**
 - e. On the display **LAUNCH** should be highlighted – **ENTER**
 - f. Now press the **HOME** button on the system controller to return to the original screen
 - g. Flashing NTU value signifies the meter is offline
Note: The meter is still reading the turbidity of the water but is not sending the value to SCADA
2. Putting the turbidimeter back online to SCADA:
 - a) On the system controller select **MENU**
 - b) Scroll down to **TEST/MAINT – ENTER**
 - c) Scroll down to **HOLD OUTPUTS – ENTER**
 - d) On the display **ACTIVATION** should be highlighted – **ENTER**
 - e) On the display **RELEASE** should be highlighted – **ENTER**
 - f) Now press the **HOME** button on the system controller to return to the original screen

- g) The NTU value on the screen should not be flashing which signifies the meter is back online

Note: The NTU reading on the screen should not be flashing which signifies the meter is back online and reporting to SCADA

Cleaning the vial:

1. Before starting, take meter offline from SCADA.
2. Turn off water flow to the meter by turning the ball valve on the water inlet (red knob).
3. Use flathead screwdriver to loosen the three silver screws on top of the meter on the black plastic lid.
4. Remove the top—it can hang off the effluent line that it's attached to.
5. Take the syringe with tubing and remove 5-10mL of water from vial.
6. Using the vial cleaning tool, clean vial by moving tool up and down in a twisting motion to clean the sides of the vial. No more than 10-15 seconds is needed.
7. Replace the black plastic lid and retighten the screws.
8. Return water flow to meter by turning the ball valve on water inlet back to open. Check to make sure there is flow coming out of the effluent line.
9. Now that water flow is restored, wait for the flashing NTU value on the display to return or original or hopefully a lower value since a cleaning was done.
10. Once the NTU value has stabilized, put the turbidity meter back online to SCADA.

Calibration:

1. Take the meter offline from SCADA.
2. Visually check flow of water to and out of the meter. Water should flow from plastic tubing into the drain. Do not adjust flow until meter has been taken offline.
3. Turn off the water flow by closing the ball valve on the inlet line to the meter (orange knob).
4. Start calibration using the 20 NTU Formazin standard:
 - a) On the System Controller select **MENU**
 - b) Scroll down to **Sensor Setup – Enter**
 - c) Scroll down to **Calibration – Enter**
 - d) Follow the prompts on the screen – **Enter**
 - e) The last screen on the system controller will state if the calibration passed or didn't pass
 - f) **Enter** – to save the calibration result
5. Write results down in turbidity meter notebook
6. Once the turbidity meter lid has been screwed back into place and water flow restored, wait for turbidity reading to stabilize before putting meter back on SCADA.
7. Put the Turbidimeter back online to SCADA

Calibration Check:

1. Take the meter offline from SCADA
2. Visually check the flow of water in and out of the meter (if you haven't already done this when performing the calibration or cleaning). Do not adjust flow until meter has been taken offline.
3. Turn off the water flow by closing the ball valve on the inlet line to the meter (orange knob)
4. Start calibration check using the 10 NTU Formazin standard:
 - a) On the system controller select **Menu**.
 - b) Scroll down to **Sensor Setup – Enter**
 - c) Scroll down to **Verification – Enter**
 - d) Follow the prompts on the screen
 - e) For the calibration check to pass the NTU value on the screen should be between 9.00 NTU and 11.00 NTU
 - f) **Enter** – to save the calibration check result
 - g) Follow prompts to exit calibration mode
5. Enter calibration result in the record keeping notebook
6. Once the turbidimeter lid has been screwing back into place and water flow restored, wait for turbidity reading to stabilize before putting meter back on SCADA.
7. Put the turbidimeter back online to SCADA.