Appendix G: Equipment Calibration

SWTP Calibration Requirements and Procedures

SWTPs are responsible for ensuring the accuracy of data used for monthly compliance reporting. One extremely important way to ensure accuracy is to properly calibrate your instruments and equipment. Proper calibration includes written calibration procedures, acceptance criteria, traceable standards, good record keeping, and corrective action, when necessary.

This document describes the calibration requirements for instruments and equipment used to generate data for monthly reporting. It also provides or references procedures to implement the requirements. In addition to the requirements and procedures described herein, all calibration procedures and acceptance criteria must comply with manufacturer instructions, applicable EPA approved methods of analysis, and other standards, as applicable.

> The calibration requirements and acceptance criteria specified in this document reflect the minimum requirements defined by 30 TAC Chapter 290, Subchapter F, Section 290.46(s). More stringent or detailed requirements may be specified in the analytical methods, manufacturer instrument instructions, QA Standards, SOPs, etc. To ensure you meet all applicable requirements, follow the most stringent requirements.

Flowmeters

Flowmeters and other flow monitoring devices must be calibrated at least once every 12 months. The flowmeters may be checked using a pitot tube, a calibrated ultrasonic flowmeter, or similar calibration device. The accuracy of the meters may also be checked by filling or draining a known volume with water into (or from) a basin. If the meter does not read within the accuracy range specified by the manufacturer, recalibrate the unit, or implement corrective action.

pH Meters

Benchtop pH Meters

Bench top pH meters must be calibrated at least once each day according to manufacturer specifications. Each time you run a batch of samples you must verify the calibration with at least one buffer. If the pH meter does not accurately read the buffer, per the manufacturer instructions or analytical method, recalibrate the unit or implement other corrective action.

Online pH Meters

Online pH meters must be calibrated at least once every 30 days. The calibration must also be verified at least once each week with one of the following:

- Primary standard.
- Comparing the results from the online unit with the results from a properly calibrated benchtop unit.

If necessary, recalibrate the unit with primary standards or implement corrective action.

Turbidity Meters

Benchtop Turbidity Meters

Benchtop turbidity meters must be calibrated using primary standards at least once every 3 months. Each time you calibrate your meter with primary standards, you must standardize your secondary standards again.

Each time you run batch samples, you must verify the calibration with secondary standards. If the unit does not produce an acceptable reading, per the analytical manufacturer's instructions or analytical method, then recalibrate with primary standards or implement corrective action.

Online Turbidity Meters

Once every three months, you must calibrate online turbidity meters using primary standards.

Once every week you must verify the calibration of online turbidity meters with one of the following:

- Primary standards.
- Secondary standards.
- Manufacturer proprietary confirmation device.
- Comparing the results with a properly calibrated benchtop turbidity meter. (See next section.)

Regardless of which method you use to verify the calibration of the online turbidity meter, you must recalibrate the unit using primary standards if the unit does not provide an acceptable reading.

Calibration Verification Procedure

To verify the calibration of an online turbidity meter against a bench top meter, we recommend the following procedure:

1. Ensure your benchtop turbidity meter is properly calibrated by verifying it against a primary or secondary standard.
2. Record a turbidity reading shown on the online turbidity meter.

3. Immediately collect a sample from the inlet or outlet of the online turbidity meter.
4. Measure and record the turbidity of the sample from the online turbidity meter with the benchtop turbidity meter.
5. Compare the turbidity readings from the two instruments. If the values differ by 0.10 NTU or less, a complete calibration of the online meter is not required.
6. If the values differ by more than 0.10 NTU, follow the manufacturer's instructions and recalibrate both the online monitor using primary turbidity standards.
7. Repeat Steps 1–6. If the values still differ by more than 0.10 NTU, implement corrective action which may include contacting the instrument manufacturer for further instructions.
8. If a continuous recorder is used, compare the value reported by the recorder with the value reported by the monitor. No adjustment of the recorder is needed if the values differ by 0.05 NTU or less.
9. Adjust the recorder, if the values differ by more than 0.05 NTU.

Note: If the calibration is conducted when turbidity levels are above 1.0 NTU, you may accept differences of up to 10% when comparing the results of two turbidity meters and of up to 5% when comparing the recorder results with that of the turbidity meter.

Chemical Disinfectant Residual Analyzers

Manual Method

If you are using a manual method to test for chemical residuals, you must verify the instrument's calibration at least once every 90 days using a solution with a known concentration. If the instrument or method does not produce an accurate reading (i.e., within 15% of the expected value) you must recalibrate the instrument or take other corrective actions.

Continuous Monitoring Method

If you are using a continuous chemical analyzer, you must verify the instrument's accuracy at least once every 7 days using one of the following:

- Solution of known concentration.
- Comparing the results with a calibrated benchtop instrument (see next subsection).

Calibration Verification Procedure

If you compare the results with a calibrated bench top instrument, we recommend the following procedure:

1. Ensure your benchtop meter is properly calibrated by verifying its accuracy against a solution of known concentration.

2. Collect a sample from the inlet of the online monitor.
3. Measure and record the residual of the sample collected from the online monitor using an EPA-approved drinking water method listed.
4. Compare the two residual readings. If the values differ by 15% or less, a complete calibration of the online monitor is not required.
5. If the values differ by more than 15%, follow the manufacturer's instructions and recalibrate the online residual monitor.
6. Repeat Steps 1–3. If the values still differ by more than 15%, implement corrective action which may include contacting the instrument manufacturer for further instructions.
7. If a continuous recorder is used, compare the value reported by the recorder with the value reported by the monitor. If the values differ by 0.10 mg/L or less, no adjustment of the recorder is needed.
8. If the values differ by more than 0.10 mg/L, adjust the recorder.

UV Meters

Normal duty UV sensors must be properly calibrated. The calibration must be verified once per month using a reference UV sensor that has been calibrated by the manufacturer within the last year or sooner. UVT analyzers must be calibrated once each week per the manufacturer instructions.

Conductivity Meters

Conductivity or TDS instruments used for reverse osmosis and nanofiltration membrane systems should be calibrated at least once every 12 months.

Thermometers

Thermometers and other temperature monitoring devices must be properly calibrated and verified according to manufacturer instructions and method requirements. Calibration requirements include but not limited to periodic (e.g., annual) calibration against a NIST traceable thermometer, use of correction factors, etc. Otherwise, as applicable, we recommend you verify the accuracy of thermometers once each 90 to 180 days by stirring the thermometer in an ice bath. After two minutes, the thermometer should read 0ºC or 32ºF.

Pressure Sensors

Devices used to measure pressure during integrity tests must be calibrated once every 12 months, at a minimum.

Note: If the manufacturer of your pressure sensor(s) uses a different calibration or verification schedule, please provide us with the manufacturer's documentation. We will consider manufacturer documentation and may alter your pressure sensor calibration schedule accordingly.

Calibrations Records

Calibration records must be kept by the organization performing the calibration and be accessible for verification upon request, or during an evaluation. When applicable, hard copy or electronic calibration records include the following items:

- Manufacturer's name, serial number, or any other unique identity of items being calibrated.
- Name or initials of person performing calibration.
- Documentation of reference material.
- Calibration dates, results of calibrations, adjustments, correction factors, acceptance criteria, comments.
- Due date of the next calibration or the calibration interval.
- Details of any damage, malfunction, modification to, or repair of, the instrument or equipment.
- Corrective actions.

The calibration records addressed must be retained for at least three years, at a minimum (see Chapter 1.4.)