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# Calibrating turbidity meters

Turbidity meters (known as “turbidimeters”) measure the clarity of your water and provide an important “window” you can use to judge the effectiveness of your treatment process. To ensure turbidimeters are accurate, the state Department of Health requires surface-water treatment plant operators to calibrate them at least as often as recommended by the manufacturer.

If your last calibration was more than three months ago, it’s probably time for a check up.

## Calibrating your turbidity meter

It is important to start by confirming that your turbidimeter is operating properly.

The validity of any turbidity reading depends on the accuracy of the standard used to calibrate it. There are two ways to check the accuracy of a turbidimeter:

1. **Calibration by comparison to a known standard.** Use this method for quarterly checks.
2. **Calibration by comparison to another turbidimeter.** Use this method weekly to *verify* the performance of on-line reporting meters. This method assumes the meter used for comparison is calibrated properly.

A properly calibrated turbidimeter allows you to judge the effectiveness of your treatment process and helps ensure the water you deliver to your customers is safe to drink.

- Clean the turbidity meters first.
- Calibrate turbidity meters with primary standards on a quarterly basis.
- Verify the precision of a reporting turbidity meter with another turbidimeter on a weekly basis.
- Check secondary standards against primary standards on a quarterly basis.
- Discard expired stocks of formazin solution.
- Follow the manufacturer's instructions for instrument calibration.
- Record your calibration readings and adjustments in the instrument logbook.

## Treatment standards

All surface-water treatment plants must achieve the following clarity levels:

Turbidity limits (nephelometric turbidity units (NTU))		
Treatment Technology	No measurement may exceed	At least 95% of measurements in a calendar month must be less than or equal to
Unfiltered	5.0	n/a
Rapid sand filtration	1.0	0.30
Slow sand	5.0	1.0
Diatomaceous Earth	5.0	1.0
Alternative Technology	Technology specific. Contact the Office of Drinking Water.	



## Turbidity standards

A turbidity *standard* is a liquid sample or other material with a defined and reproducible turbidity value. There are two types of turbidity calibration standards:

1. **Primary standards** are used to calibrate a meter directly, or to calibrate a secondary standard. Primary standards are the “gold standard” for turbidity. All calibrations must eventually be traceable to a primary standard.

Formazin is the most commonly acceptable form of primary standard. The other is a commercially manufactured liquid suspension of Styrene divinylbenzene polymer beads (SDB). Either is acceptable because it gives repeatable results.

Formazin standards may be produced in the laboratory or purchased in various prepared forms, such as StablCal™. While a 4,000 NTU stock solution may be good for a year, more dilute solutions must be discarded after one week or per the manufacturer’s instructions. SDB solutions are more costly, but remain stable almost indefinitely. Check the expiration date on the bottle.

2. **Secondary standards** include common examples such as liquid latex, SDB, or Gelex™ solutions in a sealed sample container. They may also include glass rods or plates, plastic cylinders, and mirror devices tailored for use in a specific manufacturer’s turbidimeter. These standards are convenient, easy to use, cheap, and reliable for daily calibration checks.

However, to meet monitoring requirements, you must first calibrate every secondary standard to a primary standard. In addition, since the secondary standard is likely to degrade with time, it is important to recheck its value against a primary standard as required by the manufacturer.

## For more information

Call the Office of Drinking Water at the:

**Eastern Region**, Spokane Valley (509) 329-2100

**Northwest Region**, Kent (253) 395-6750

**Southwest Region** – Tumwater (360) 236-3030

