

Table 5.3
Biology Instrument Calibration

Laboratory Instrument Calibration

Instrument/ Analysis	Calibration	Rejection Criteria	Frequency
<i>Ammonia</i>	Calibrated per manufacturer's method with 1.4 mg/L and 14 mg/L standards. Recorded on bioassay bench sheets. HACH kits – Blank and 1 mg/L, 2 mg/L and 3 mg/L standards	Slope = - 57 ±3 ± 0.5 mg/L	Before each use and hourly Before use
<i>Autoclave</i>	Check timer to ensure minimum sterilization Check temperature with a minimum/maximum thermometer	At least 15 min at 121°C	Quarterly With every use
<i>Autoclave</i>	Check with <i>Bacillus stearothermophilus</i> , a heat-resistant bacterium killed only when exposed to 121° C for 15 min.	Viable spores	Monthly
<i>Balances</i>	Class S weights are used to verify accuracy. Maintenance contract exists for annual cleaning and calibration.	Exceeds ± 1%	When used and Quarterly Annually
<i>Compound and Inverted microscopes</i>	Calibrated according to Standard Methods, 1002 E—Whipple grid calibrated with a stage micrometer.	NA	Annually and after any repairs
<i>Conductivity</i> Engineering parameter	Toxicity: Meters are calibrated before each day of use by comparing probe readings to commercially available certified conductivity standards. Daily calibration is recorded in the meter calibration log. Microbiology: Meter is calibrated once per week with a calibration verification prior to use for the day. Daily verification is recorded in meter calibration log.	Exceeds ± 5% Exceeds ± 5%	Daily before use (calibration also verified at end of day for Tox) Weekly. (Calibration verified before daily use)
<i>Dissolved Oxygen</i> Engineering parameter	Calibrated according to Standard Methods 4500-O and manufacturer's methods. These consist of calibration in a saturated air environment to the appropriate values for the air temperature. Meters are adjusted to correct for sample salinity if appropriate. Daily calibration is recorded in the meter calibration logbook.	Failure to calibrate ± 0.3 mg/L	Before each use (also at end of day for Tox)
<i>Fluorometer</i>	Calibrated according to EPA Method 445.0 using commercially purchased chlorophyll- <i>a</i> standard.	Slope RSD exceeds 25%	Upon instrument changes or temperature fluctuations greater than 3°C
<i>Incubators</i>	Temperature recorded by a calibrated thermometer and adjusted if necessary. Temperatures for some incubators are continuously recorded in the laboratory's temperature monitoring system.	Exceeds ± 1.0 °C	Daily (Twice daily for Micro) Every 15 minutes

Laboratory Instrument Calibration

Instrument/ Analysis	Calibration	Rejection Criteria	Frequency
<i>Micropipettors</i>	Calibrated by pipetting deionized water onto a balance. Expected weight compared to actual weight.	Exceeds manufacturer determined accuracy and/or precision	Quarterly
<i>Particle counter (Model Multisizer 4e)</i>	Calibration check using standard 10 µm reference particles from the Coulter Co., according to procedures in the Coulter Counter operation manual. Results saved into AGP calibration folder. If the calibration is incorrect, the machine is corrected before use for diluent variation using methods from the same source.	Failure to calibrate. Exceeds $\pm 1.5\%$ of reference. Background count > 400	Monthly
<i>pH</i> Engineering parameter	Toxicology: The pH meters are two-point calibrated according to Standard Methods 4500-H ⁺ using pH buffers chosen to bracket the sample pH. Daily calibrations are recorded in the meter calibration logbook. QC check standards are used to check calibration. Microbiology: Meter calibrated prior to use.	Failure to calibrate	Before each use and hourly Before each use
<i>Spectrophotometer</i>	The spectrophotometer is calibrated by running instrument diagnostics to check wavelength accuracy and repeatability.	Exceeds instrument diagnostics	Annually
<i>Temperature (thermistor)</i> Engineering parameter	Some measurements of water temperature are performed using a D.O. probe outfitted with a thermistor. The D.O. meter is calibrated by comparison to a calibrated thermometer before use. Daily calibration is recorded in the meter calibration logbook.	Failure to calibrate	Annually
<i>Temperature (thermometer)</i> Engineering parameter	Calibrated at two temperatures that bracket the temperature of use against a NIST-certified thermometer. Any necessary corrections are recorded on the thermometer.	Exceeds $\pm 0.5^{\circ}\text{C}$	Annually
<i>Water Baths</i>	Temperature recorded from calibrated thermometer and entered into instrument logbook.	44.5° $\pm$ 0.2°C 41.0° $\pm$ 0.5°C 35.0° $\pm$ 0.5°C	Twice daily