ANNUAL CALIBRATION TIMING

JOJEAN BOLTON
FAIRFAX WATER

QUALITY ASSURANCE

- Program-wide not batch
- Emphasize traceability of measurements
- Focus on support equipment
- DW requirements

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TERMS & DEFINITIONS

- Traceability of Measurements: Ability to demonstrate an unbroken chain of comparisons to standards of known, documented, and certified quality. Results can directly be traced back to the certified materials by documentation.
  - The property of a result of a measurement whereby it can be related to appropriate standards, generally international or national standards, through an unbroken chain of comparisons" (1VAC 30-45 40).
  - The ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for the quality of the project" (2009 TNI VIM2 3.1).

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TERMS & DEFINITIONS

- Support Equipment: Equipment or instruments that are not used in direct measurement for an analysis, but are used to measure factors that demonstrate consistency of conditions and adherence to approved methodology.
- NIST: National Institute of Standards and Technology
- ASTM: American Society for Testing and Materials

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WHY DO WE CARE?

- Regulatory Compliance
- Consistency
- Trending & Troubleshooting

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TRACEABLE CERTIFIED STANDARDS

- Thermometers
- Weights
- Certifications

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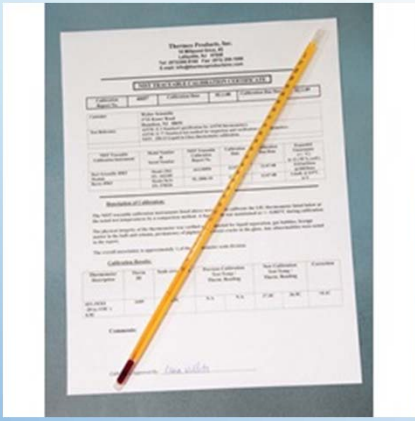
TRACEABLE CERTIFIED STANDARDS THERMOMETERS



- NIST certified
- Certify by qualified external source at minimum every 5 years (or as necessary)
- Used to calibrate working thermometers

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TRACEABLE REFERENCE MATERIALS
WEIGHTS

Type of use	Balance Readability	ASTM Class Type Required
High precision; analytical balances	0.0001g	Class 1
High precision; top-loading balances	0.001g – 0.01g	Class 2
Moderate precision	0.01g – 0.1g	Class 3

- ASTM - certified
- Recertify by qualified external source at minimum every 5 years (or as necessary)
- Used to calibrate balances

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THERMOMETERS

- Types
  - Liquid, Digital, Infrared
- Ranges
- Measurement Frequency

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THERMOMETERS
LIQUID-FILLED

- Includes spirit/alcohol/mercury thermometers used in refrigerators, incubators, waterbaths, digestion blocks, ovens
- Use NIST-certified thermometer to establish correction factor
- Establish correction factor
  - If correction factor is >±1.0°C, replace thermometer
  - Label each thermometer with correction factor, date, initials
- Determine correction factor at minimum annually and when exposed to temperature extremes

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THERMOMETERS
DIGITAL/THERMOCOUPLES

- Includes digital thermometers used in refrigerators, incubators, waterbaths, digestion blocks, ovens
- Use NIST-certified thermometer to calibrate*
- Perform at minimum quarterly
- Tip: Don’t forget ATC (automatic temperature compensation) probe of pH meters!

*may be performed external source

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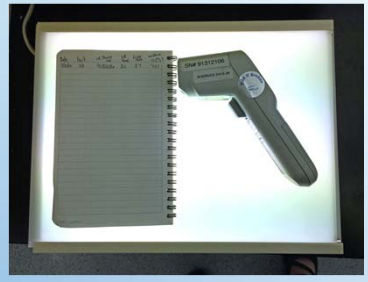
THERMOMETERS
INFRARED



- Includes IR thermometers used to measure temperature of samples
- Calibrate with NIST-certified thermometer*
- Perform at least every 6 months at full range of temperatures of use. Examples: iced (4°C), frozen (4°C), ambient (21-25°C), etc.
- Perform daily check at temperature of interest. Must be within ±0.5°C.

*may be performed external source

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AUTO-PIPETTES & DISPENSERS

- Types
  - Static, Adjustable
- Ranges
- Frequency

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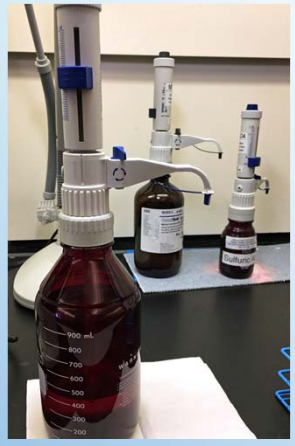
AUTO-PIPETTES & DISPENSERS
DISPENSERS



- Includes bottle top dispensers that must dispense specified amounts
- Perform checks gravimetrically using an analytical balance; 1 mL = 1 g
- Perform over range of use or at static level
- Checks must be within acceptable limits
- Perform checks at minimum annually or when necessary (recommend quarterly)

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AUTO-PIPETTES & DISPENSERS
PIPETTES

- Includes pipettes used in analysis-related activities such as preparing standard/sample dilutions, adding preservatives/reagents, etc.
- Perform checks gravimetrically using an analytical balance; 1 mL = 1 g
- Perform over range of use or at static level
- Perform checks at minimum annually or when necessary (recommend quarterly)

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BALANCES

- Types
  - Analytical, Top Loading
- Ranges
- Frequency

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BALANCES
ANALYTICAL

- Includes balances that are directly used in analyses such as total suspended solids, total solids, etc.
- Calibrate using the appropriate ASTM Class weights over the range of use at minimum annually; Check your verification weights at the same time as calibration*
- Perform verifications with each use at the daily levels; Perform verification over the entire range of use quarterly
- Verifications must be within ASTM weight acceptable limits

*usually performed by external source

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BALANCES
TOP LOADING

- Includes balances that are not directly used for analyses but are used to prepare reagents or perform QC checks (e.g., volume checks, etc.)
- These balances require less sensitivity
- Calibrate using the appropriate ASTM Class weights over the range of use at minimum annually; Check your verification weights at the same time as calibration*
- Perform verifications with each use at the daily levels; Perform verification over the entire range of use quarterly
- Verifications must be within ASTM weight acceptable limits

*usually performed by external source

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TURBIDIMETERS

Calibration

Secondary Standards

Frequency

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TURBIDIMETERS

- Includes balances that are not directly used for analyses but are used to check regulatory samples (e.g., metals)
- Calibrate with primary standards (liquid formazin) at minimum quarterly; Establish secondary standards (sealed standards) values and acceptable limits at the same time as calibration
- Perform verifications with each use at the daily levels
- Verifications must be within acceptable limits

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SPECTROPHOTOMETERS

- Ranges
  - Visible, UV, Infrared, Other wavelengths
- Frequency

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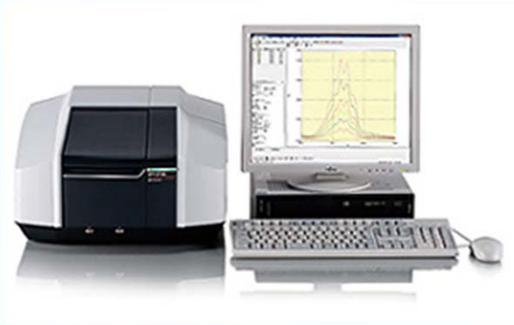
SPECTROPHOTOMETERS



- Perform checks on ranges in use (e.g., UV, visible)
- Checks will measure performance of lamp, confirm proper wavelengths
- Refer to manufacturer's manual for requirements
- Perform at minimum annually (or as needed)

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REAGENT GRADE WATER SYSTEMS

- Checks
- Frequency
- Microbiology

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REAGENT GRADE WATER SYSTEMS

Parameter	Limits	Frequency
Conductivity	>0.5 megaohms or <2 µmhos/cm at 25°C	Monthly
Pb, Cd, Cr, Cu, Ni, Zn	<0.05 ppb per contaminant; Collectively <0.1 ppm	Annually
Total Chlorine Residual	<0.1 ppm	Monthly
Heterotrophic Plate Count	<500 CFU/mL	Monthly

- For microbiology laboratories only

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AUTOCLAVES

- Checks
- Frequency
- Temperature
- Timing

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AUTOCLAVES

- Monthly, run spore strips or ampoules to confirm sterilizing performance
- Check the autoclave internal timer at minimum quarterly for accuracy using an external timer
- Annually, check the autoclave for proper temperature cycling using external thermometers and timer*

*usually performed by external source

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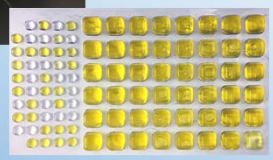
QUANTITRAY SEALER



Leak Check

Frequency

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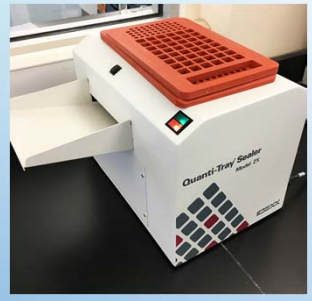
QUANTITRAY SEALER



- Monthly, test sealer by analyzing an aliquot of water dosed with food dye
- Ensure that all liquid is in the tray and none has leaked into the sealer

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GLASSWARE

- Checks
- Frequency
- pH
- Glassware Inhibitory Residue

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GLASSWARE

- For glassware used in microbiology analyses, a glassware inhibitory residue test is performed before initial use of a detergent or whenever a new washing procedure is used*
- For all glassware, pH is checked per batch using 0.04% bromothymol blue (or equivalent indicator).
  - A neutral color reaction demonstrates no alkali or acid residue from the washing process

*usually performed by external source

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IMPORTANT POINTS

- Refer to program requirements (DW, VELAP, etc.)
- Follow the specific SOP and reference method
- Pay attention to frequency

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THANK YOU!

If you have questions, please contact me at:

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