

1. PRINCIPLE

Calibration of thermometers used to monitor laboratory procedures and equipment is required for quality assurance of inventory and diagnostic techniques.

2. STANDARD/CONTROL

2.1. Use an NBS or NIST certified thermometer to calibrate working thermometers.

2.2. Working thermometers should measure temperature within one (1) degree Centigrade of the standard thermometer.

2.3. Working thermometers failing to register within one (1) degree Centigrade of the standard thermometer will be removed from service.

2.4. Check all thermometers in use by the Colorado Retrovirology Laboratory at a temperature close to that which the thermometer will monitor, against a NBS or NIST certified thermometer. The standardization of thermometers used to record temperatures in common research equipment monitored as a courtesy by CRL staff is at the discretion of the principal investigator.

2.5. Perform thermometer calibration for each new unit before placing in use, annually thereafter and whenever performance is suspect.

3. EQUIPMENT

3.1. Working thermometers used for temperature monitoring

3.2. An NBS or NIST calibrated standard thermometer with documentation

4. PROCEDURE

4.1. General

4.1.1. Assign a number to each working thermometer to be calibrated corresponding to the Thermometer Calibration Log entry.

4.1.2. Note the number of the thermometer, equipment assignment, and other appropriate information on the Log.

4.1.3. Record the temperatures of both the working thermometers and the standard thermometer on the Log.

4.1.4. If the working thermometer is out of range, document corrective action taken.

4.2. Refrigerator thermometers

4.2.1. Place a container of distilled water in the refrigerator and allow the water to equilibrate to 4°C along with the working refrigerator thermometers.

4.2.2. Place an NBS or NIST certified standard thermometer in the water and allow the thermometer to stabilize, about 5 minutes.

4.2.3. Record the temperatures of both the working thermometers and the standard thermometer on the Log.

4.3. Freezer Thermometers

4.3.1. Place all thermometers to be calibrated and the NBS or NIST certified standard thermometer in a freezer. Allow the temperature to equilibrate approximately 0.5 - 1 hour.

4.3.2. Record the temperatures of both the working thermometers and the standard thermometer on the Log

4.4. Water bath and heat block thermometers

4.4.1. Prepare a heat block or water bath at the temperature of use.

4.4.2. Place the working and standard thermometers in the block or bath and allow to equilibrate approximately 5 minutes.

4.4.3. Stir the thermometers in a stationary water bath to ensure an accurate reading.

4.4.4. Record the temperatures of both the working thermometers and the standard thermometer on the Log

4.5. Units with digital thermometers

4.5.1. Place the NBS or NIST certified standard thermometer in the unit to be calibrated.

4.5.2. Allow the temperature to equilibrate an appropriate amount of time, at least 0.5 hours for a freezer.

4.5.3. Record the temperatures of both the working digital thermometers and the standard thermometer on the Log.

4.5.4. If the digital reading is out of range, arrange for service to recalibrate the unit.

5. PRECAUTIONS

5.1. Thermometers with breaks in the liquid column are inaccurate. To join a separated a separated mercury column:

5.1.1. With the thermometer in an upright position, gradually immerse the BULB ONLY in a solution of dry ice and either alcohol or acetone so that the column retreats slowly into the bulb.

5.1.2. Take care not to cool the stem of the mercury column. Retract the bulb several times as necessary to slow down the action.

5.1.3. Continue until the main column as well as the separated portion retreats into the bulb. In some cases, it is necessary to remove the thermometer and swing it in a short arc, forcing all the liquid into the bulb. Allow the bulb to come to room temperature, keeping the thermometer in an upright position.

5.2. Observe UCHSC specific guideline for handling broken thermometers. Refer to the Hazardous Waste Manual.

5.3. Allow all thermometers appropriate time to stabilize before reading.

6. REFERENCES.

6.1. NCCLS Standard, "Temperature Calibration of Water Baths, Instruments and Temperature Sensors," 2nd Edition, Vol. 10, No. 3, 1990.

6.2. Henry, J.B., Clinical Diagnosis and Management by Laboratory Methods, W.B. Saunders Company, 1991.

7. ATTACHMENTS

7.1. Thermometer Calibration Log

7.2. Copies of Certification Documents for Standard Thermometers used in calibrations (attach to Log).