



# TENNESSEE BUREAU OF INVESTIGATION

## Forensic Services Division

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### Toxicology Quality Assurance and Procedures Manual

#### 6.8 Pipettes

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Fixed volume, variable volume, and repeater pipettes are used to provide precise volume measurements of sample specimens, reference standard solutions, and reagents.

**6.8.1** A certificate of calibration, conformity, or tolerance should be obtained by the manufacturer and maintained in the Toxicology Unit.

**6.8.2** All pipettes shall be externally calibrated annually by an authorized vendor to ensure their accuracy. The calibration results shall be documented and maintained in the Toxicology Unit.

**6.8.3** All pipettes shall be uniquely identified and traceable to the annual calibration.

**6.8.4** Pipettes shall be maintained in good operating condition and visually monitored with each use to ensure adequate volume delivery.

**6.8.5** If a pipette appears to be out of calibration between normally scheduled calibration checks, the use of the pipette shall be discontinued and it shall be repaired by an authorized vendor. Any repairs shall be documented and include the calibration certificate issued by the vendor.

**6.8.6** If the pipette can not be repaired, it shall be destroyed and this destruction shall be documented.

**6.8.7** If at any time the examiner feels an internal calibration check is needed, the following method should be used. This calibration check is not a replacement for annual certification by an authorized vendor.

**6.8.7.1** Using a calibrated analytical balance, place a clean container on the balance and tare.

**6.8.7.2** Weigh 1 mL of water using the pipette in question.

**6.8.7.3** Obtain the density of water at room temperature (see *Density of Water (g/mL vs. Temperature (°C) Table* in the Appendix section).

**6.8.7.4** Calculate the actual volume by multiplying the mass of the pipetted water times the inverse of the density of water at room temperature (e.g., If the density of water at 22°C is 0.997770 g/mL and the pipetted water mass is 1.027 g, then  $(1.027 \text{ g}) \times (1/0.997770 \text{ g/mL}) = 1.029 \text{ mL}$ ). This information will be recorded and maintained in the Toxicology Unit.

**6.8.7.5** For repeater and variable volume pipettes, five measurements will be taken at two different volumes determined by the range of their intended use. For fixed volume pipettes, five measurements will be taken at the specific volume of the

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pipette. Small volume pipettes (less than 20  $\mu\text{L}$ ) shall be within  $\pm 10\%$  and anything larger shall be within  $\pm 5\%$ .

**6.8.7.6** If for any reason the pipette does not meet this criterion, its use shall be discontinued until repair, etc. Pipettes shall never be adjusted by anyone other than an authorized vendor.

**6.8.8** Pipettes shall be cleaned with either isopropanol, a bleach solution, or disinfectant spray before leaving the Toxicology Unit or when needed.