	<b>PREMIER MAGNESIA - GILES CHEMICAL</b>		
	<b>COMPANY PROCEDURE</b>		
	<b>USP Eppendorf Pipettes Calibration</b>	Page : 1 of 3	Revision : 00 Effective Date : 02/23/2012
	Author: <b>Stephen Ballew</b> Procedure Number: <b>QA-LAB-45</b>		

### Frequency:

An Eppendorf pipette calibration will be performed by a quality analyst on a quarterly basis.

### Equipment:

- Eppendorf Pipettes
- Pipette tips for all pipettes
- Balance-Mettler Toledo X5105Du, B13929Z316
- Thermometer (room temperature range in °C)
- 250-mL Beaker
- Weighing bottle with glass stopper
- Nitrile gloves
- Laboratory Tissue Wipers

### Procedure:


- 1) Fill 250-mL beaker with DI H<sub>2</sub>O.
- 2) Place 250-mL beaker near area where the calibration will take place and place thermometer in beaker.
- 3) Allow the water and thermometer to come to thermal equilibrium with the surround area by letting them set for a few minutes.

**All the steps that follow must be performed on each pipette in turn.**

- 4) Check for leaks by holding the pipette vertically for approximately 15 seconds with a tip filled from the 250-mL beaker. Do not touch the pipette tip. Observe the meniscus of the liquid in the tip. If there is a leak, a droplet will be visible on the pipette tip. If the pipette is leaking it will need to be repaired before proceeding.

**There is a page in for QA-LAB-45-F1 for each pipette. These pages list the three volumes to be tested for each pipette. The following steps must be performed for each volume.**

- 5) Enter the temperature of the water in the 250-mL beaker onto the appropriate page and for the volume to be tested.
- 6) Enter the air pressure onto the appropriate page and for the volume to be tested. The air pressure in Waynesville (in inches of Hg) can be found at <http://waynesvilleweather.com/Current+Conditions/Waynesville>.
- 7) Attach the appropriately-sized pipette tip onto the nose cone of the pipette.
- 8) Set the pipette to the volume which is to be tested.
- 9) Put on nitrile gloves to prevent error from transfer of oil from fingers.
- 10) Place the weighing bottle with lid on the balance and tare the balance.
- 11) Pre-wet the tip.
- 12) Aspirate and dispense the set volume three times and finish with a blow-out (reaching the second stop of the control button).

	<b>PREMIER MAGNESIA - GILES CHEMICAL</b>		
	<b>COMPANY PROCEDURE</b>		
	<b>USP Eppendorf Pipettes Calibration</b>	Page : 2 of 3	Revision : 00 Effective Date : 02/23/2012
	Author: <b>Stephen Ballew</b>	Procedure Number: <b>QA-LAB-45</b>	

- 13) Hold the pipette in a vertical position in the beaker of water.
- 14) Immerse the tip so that 2-3mm is in the liquid.
- 15) Aspirate the test volume slowly and in a uniform fashion. Be sure to allow for a waiting period at the end of the aspiration to ensure completion.
- 16) Remove the pipette tip from the liquid slowly and again uniformly. Remove any drops that may be on the outside of the tip by wiping the tip against the beaker.
- 17) Remove weighing bottle from balance, and lid from bottle.
- 18) Place the filled tip at a 30° angle against the side of the weighing bottle.
- 19) Dispense the test volume slowly up to the first stop and again allow for a waiting period at the end. Press the button to the second stop to dispense any remaining liquid.
- 20) While holding the control button at the second stop, slowly drag the tip along the inside of the weighing vessel to remove it.
- 21) Replace lid on weighing bottle, place bottle back into balance, and close the balance door.
- 22) Write down the value that appears on the balance display after it has stabilized onto the appropriate page and for the volume to be tested.
- 23) If necessary, empty the weighing bottle to make room for the next test volume. Use a laboratory tissue wiper to dry the lip of the weighing bottle.
- 24) Repeat steps 11 – 19 nine more times for a total of ten replicates.
- 25) Repeat steps 5 – 21 for each of the volumes remaining to be tested for the current pipette.
- 26) Use a Microsoft Excel worksheet to calculate the systematic error and the random error for each volume and evaluate each error against the error limits in accordance with ISO 8655-2.
- 27) Enter the results onto the appropriate page and for the volume to be tested.
- 28) If any of the tests fail, repeat the tests with a fresh pipette tip, paying close attention to the troubleshooting section below. If it fails again, adjustments need to be made to the pipette. Follow the manufacturer's instructions for adjustment.
- 29) If a pipette failed and was adjusted make a note on the worksheet and perform the calibration procedure again after adjustment.
- 30) Repeat steps 4 – 23 for all remaining pipettes to be calibrated.

### Troubleshooting:

- 1) If you see droplets of fluid inside the pipette tip, you should attach a new tip as there was uneven wetting of the plastic wall inside the tip.
- 2) If your pipette drips or dispenses the incorrect volume there are many possible causes:
  - a. Loose tip: try pushing the tip on tightly.
  - b. Incorrect tip: Check operator's manual for correct tip to use.
- 3) A leaky pipette or jammed control button may be due to contaminated or damaged seals or piston. Clean and lubricate the piston and replace the seals. Also be sure the nose cone is secured tightly.

For further information, consult your operator's manual.

[illegible]