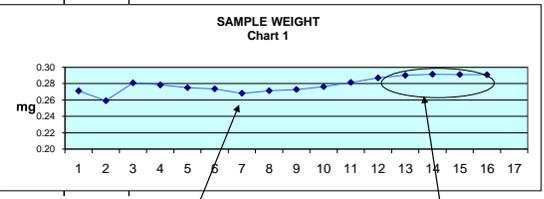


| | | | | | | | | | | | | |
|---------------------|--|-------------------|-------------------|---------------|--------------|--------------|--|----------|--------------|------|---------------------|------------------|
| Customer | | | | | | Date | 8/10/2010 | | | | | |
| Material | Polyethylene glycol (PEG-SS2) | Est. Bulk Density | 0.23 - 0.24 gm/cc | Particle size | 30-60 micron | 1 cc VIAL gm | tare | wt. (gm) | Bulk density | vial | vial wt. empty (gm) | |
| Desired Sample size | 0.275 gm, into customer supplied vials | | | | rh | 44% | 2.225 | 0 | 0.23 | 0.23 | 1 2 | 4.7688 4.7918 |
| Desired accuracy | Repeatability of samples | | | | | Pipette Size | 0.145 dia. X4.39 inch long PIPETTE (special proto) | | | | | |
| | | | | | | | 0.094 ID X 5.5 inch long PIPETTE (special proto) | | | | | |

| 0.125 Tip | Sample weight | Control unit settings |
|--------------------|--------------------|-----------------------------|
| Micrometer setting | gm | Vacuum (in hg) Air (psi) |
| 0.30 | 10u filter | 22 10 |
| | no scraper | |
| | 0.2711 | |
| | 0.2590 | |
| | 0.2809 | |
| | 0.2783 | |
| | 0.2750 | |
| | 0.2736 | |
| | 0.2682 sift powder | |
| | 0.2713 | |
| | 0.2728 | |
| | 0.2762 | |
| | 0.2814 | |
| | 0.2669 | |
| | 0.2902 | |
| | 0.2914 | |
| | 0.2911 | |
| | 0.2908 | |



| | |
|--------|---------|
| 0.2786 | Av |
| 0.2785 | Mean |
| 0.0095 | Std Dev |

0.2988 High
0.2590 Low
0.15 % Range

| Cycle Time sec | Aspirate | Level | Dispense | Total |
|----------------|----------|-------|----------|-------|
| | 2 | 0" | 1 | 3 |

Notes/observations:

- Setup/calibration time was approx 15 minutes for initial calibration.
- Material condition: Smooth white powder of varying particulate size. PEG is a hygroscopic powder with a high angle of repose that will gain weight with exposure to atmospheric moisture. A "sticky" powder that adheres to the tip as the moisture content increases. PEG sample required periodic sifting to normalize particle size distribution. Sample repeatability is somewhat dependent on particle size.
- Samples tended to pack in the pipette using the flat scraper surface. Causes tap density variation and can cause pipette to clog. This step eliminated to prevent clogging of tip.
- A special tip fabricated to fit vial neck opening.
Vial wt. 4.869 gm
- Limited amount of powder in supply vessel affected sample weights due to tap density variation as supply was depleted. (See notes by graphs). More PEG in supply vessel would normalize the tap density.
- This tip requires higher than normal air pressure to eject powder. Some blowback of powder (aerosol) from the if tip inserted into capsule during dispense due the ratio of dispensed material v. vial diameter. No effort made to optimize to minimize blowback. Would require additional study.
- Small amount of PEG tended to stick to outside of pipette and was brushed off during before dispensing into vial. Suggest passing the tip over a fine bristle brush to remove the excess powder accumulating on the tip. This could be attached to the scraper/leveling plate.
- Cycle time: average cycle time was 3 sec/sample after calibration.
- Attempted to fill the vials via the small opening. Constructed a .092 ID pipette 5 inches long. This pipette would only aspirate .11 - .14 gm of powder. To achieve the target weight of .2750 gm required a minimum of 3 dispenses /vial to achieve the target weight
Lengthening the pipette to aspirate the target weight would be impractical
- No repeatability data taken for this pipette.



