PS1 SAMPLER CALIBRATION INSTRUCTIONS

----------SECTION I - ADMINISTRATIVE DATA----------

1. **Sampler ID** – Unique ID of sampler (e.g. serial number or MMCN number)
2. **Location** – Camp or location of calibration
3. Country – Country in which location or camp is located.
4. Operation – Name of operation ongoing in the area of the sample [e.g. Operation Allied Force (OAF), etc] if applicable
5. **Calibration Date** – Date calibration was conducted
6. **Julian Day** – Corresponding year specific Julian day calibration was conducted. A Julian day is the sequential numeric day of the year. The database can be used to calculate the Julian day of the year.
   Example: 01-Jan-1999 would be Julian day 99001 where "99" is the last digit of the year and "001" is the day of the year.
   Example: 31-Dec-2000 would be Julian day 00366 where '00" is the last digit of the year and "366" is the day of the year (leap year).
7. **Operator** – Name of person conducting the calibration.
8. **Ambient Temperature (Ta) -** Ambient temperature at the time of calibration in °C
9. **Ambient Pressure (Pa) -** Atmospheric pressure at the time of calibration in inches of mercury (in Hg)

(All orifice calibration data can be obtained from the calibration sheet located with the orifice calibrator)

10. **Orifice Calibration SN** – The serial number of the calibration orifice
11. Orifice Calibration Date – Date calibration orifice was calibrated to a primary standard.
12. **Slope (M_{oc})** – Slope of Orifice Calibration curve.
13. **Intercept (B_{oc})** – Slope of Orifice Calibration curve.
14. **Correlation Coefficient (R_{oc})** – Slope of Orifice Calibration curve.
15. Calibration Notes – General notes on the calibration

---------- SECTION II – SAMPLER CALIBRATION DATA----------

16. Reading – Calibration reading number predetermined to be (1, 2, 3 4, 5, and 6).
17. Magnehlic Reading - Magnehelic reading from sampler, pre-determined to be *(5, 10,* 15, 20, 25, and 30)
18. **Manometer Reading ($H_{orifice}$) -** Manometer reading from the calibration orifice for each magnehelic flow setting in inches of water
19. **Q_{std} (X-Axis) -** derived from the orifice calibration relationship using the following equation:

$$Q_{std} = \frac{\sqrt{Manometer * \frac{Pa * 25.4}{760} * \frac{298}{Ta + 273}} - B_{oc}}{M_{oc}}$$

Manometer = manometer reading from calibration ofificein inches of water
Pa = Ambient barometric pressure in inches of of mercury (in Hg)
Ta= Ambient temperature in degrees celcius (°C)
Boc = Intercept obtained from the calibration orifice
Moc = Slope obtained from the calibration orifice

20. **M_{std} (Y-Axis) -** Magnehelic reading corrected to standard temperature and pressure using the following equation:

$$M_{std} = \sqrt{Magnehelic * \frac{Pa * 25.4}{760} * \frac{298}{Ta + 273}}$$

Magnehelic = magnehelic reading in inches of water
Pa = Ambient barometric pressure in inches of mercury (in Hg)
Ta= Ambient temperature in degrees celcius (°C)

<u>Conduct linear regression of Qstd (X-axis) and Mstd (Y-Axis), either by using regression worksheet, calculator or spreadsheet to obtain sampler calibration</u>:

Slope (Msc), Intercept (Bsc) and Correlation Coeffecient (Rsc) if *Rsc < 0.98 calibration must be redone.*

21. **Q'_{std} (Derived Flow) -** Standard flow calculated using the following equation:

$$Q'_{std} = \frac{(M_{std} - B_{sc})}{M_{sc}}$$

Mstd = Mstd from previous equation
Bsc = Intercept obtained from the PS1 sampler calibration.
Msc = Slope obtained from the PS1 sampler calibration.

22. **%Deviation** - Percent deviation from Q'_{std} and Q_{std} Orifice

$$\%Deviation = \frac{(Q_{std} - Q'_{std})}{Q'_{std}} * 100$$

If % deviation is greater than 4% calibration must be redone.

23. **Slope (M_{SC})** – Sampler calibration slope derived from linear regression
24. **Intercept (B_{SC})** – Sampler calibration intercept derived from linear regression
25. **Correlation (R_{SC})** – Correlation coeff of calibration