

Appendix D. Calibration Certificates

Equipment Verification Report (TSP)

Equipment Calibrated:

Type: Laser Dust monitor
Manufacturer: Sibata LD-3B
Serial No. 296098
Equipment Ref: Nil
Job Order HK2541540

Standard Equipment:

Standard Equipment: Higher Volume Sampler
Location & Location ID: AUES office (calibration room)
Equipment Ref: HVS 018
Last Calibration Date: 15 August 2025

Equipment Verification Results:

Testing Date: 3 & 6 October 2025

Hour	Time	Mean Temp °C	Mean Pressure (hPa)	Concentration in $\mu\text{g}/\text{m}^3$ (Standard Equipment)	Total Count (Calibrated Equipment)	Count/Minute (Total Count/min)
2hr01min	09:50 ~ 11:51	29.7	1012.5	22.2	972	8.1
2hr03min	11:53 ~ 13:56	29.7	1012.5	11.6	598	4.9
2hr01min	13:59 ~ 16:00	29.7	1012.5	15.2	804	6.7
2hr01min	09:45 ~ 11:46	28.6	1013.1	27.3	1069	8.8
2hr01min	11:55 ~ 13:56	28.6	1013.1	24.6	1126	9.3

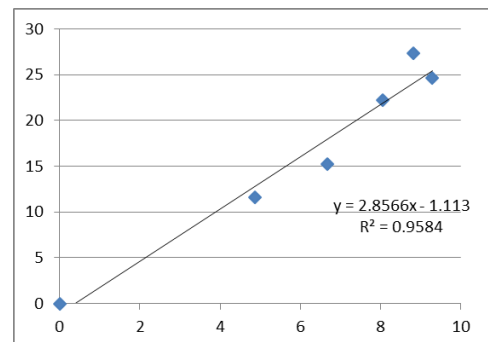
Linear Regression of Y or X

Slope (K-factor): 2.8566 ($\mu\text{g}/\text{m}^3$)/CPM
Correlation Coefficient (R) 0.9790
Date of Issue 13 October 2025

Remarks:

1. **Strong** Correlation ($R > 0.8$)
2. Factor 2.8566 ($\mu\text{g}/\text{m}^3$)/CPM should be applied for TSP monitoring

*If $R < 0.5$, repair or re-verification is required for the equipment



Operator : Jeff Ip Signature : [Signature] Date : 13 October 2025

QC Reviewer : Ben Tam Signature : [Signature] Date : 13 October 2025

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location : Gold King Industrial Building, Kwai Chung Date of Calibration: 15-Aug-25
 Location ID : Calibration Room - TISCH Higher Volume Sampler (Model TE-5170) S/N:1260 Next Calibration Date: 15-Nov-25

CONDITIONS

Sea Level Pressure (hPa)	1008.9	Corrected Pressure (mm Hg)	756.675
Temperature (°C)	27.5	Temperature (K)	301

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	2.09671
Model->	5025A	Qstd Intercept ->	-0.01852
Calibration Date->	16-Dec-24	Expiry Date->	16-Dec-25

CALIBRATION

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	8.1	8.1	16.2	1.916	45	44.71	Slope = 32.3575 Intercept = -16.8348 Corr. coeff. = 0.9996
13	6.7	6.7	13.4	1.744	40	39.75	
10	5.7	5.7	11.4	1.609	36	35.77	
8	3.5	3.5	7.0	1.263	24	23.85	
5	1.5	1.5	3.0	0.830	10	9.94	

Calculations :

$$Qstd = 1/m[\text{Sqrt}(H2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart responses

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pstd = actual pressure during calibration (mm Hg)

For subsequent calculation of sampler flow:

$$1/m((I) [\text{Sqrt}(298/Tav)(Pav/760)]-b)$$

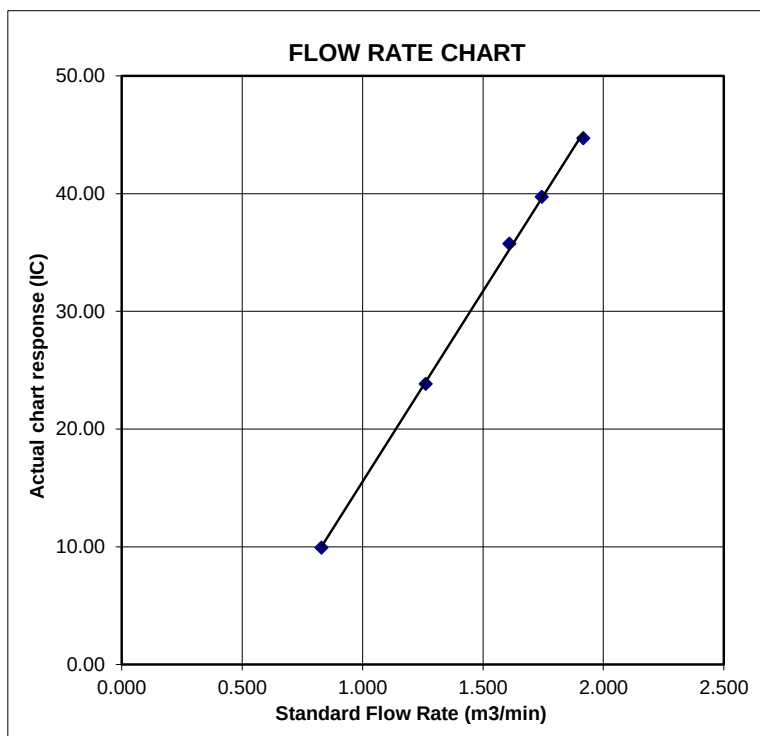
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure





Certificate of Calibration

Calibration Certification Information

Cal. Date: December 16, 2024 Roots-meter S/N: 438320 Ta: 293 °K
Operator: Jim Tisch Pa: 749.0 mm Hg
Calibration Model #: TE-5025A Calibrator S/N: 4064

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4600	3.2	2.00
2	3	4	1	1.0300	6.4	4.00
3	5	6	1	0.9220	8.0	5.00
4	7	8	1	0.8770	8.8	5.50
5	9	10	1	0.7250	12.8	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)}$ (y-axis)
0.9981	0.6836	1.4159	0.9957	0.6820	0.8845
0.9938	0.9649	2.0024	0.9915	0.9626	1.2509
0.9917	1.0756	2.2388	0.9893	1.0730	1.3985
0.9906	1.1296	2.3480	0.9883	1.1269	1.4668
0.9853	1.3590	2.8318	0.9829	1.3557	1.7690
QSTD	m=	2.09671	QA	m=	1.31292
	b=	-0.01852		b=	-0.01157
	r=	0.99999		r=	0.99999

Calculations

Vstd=	$\Delta Vol((Pa-\Delta P)/Pstd)(Tstd/Ta)$	Va=	$\Delta Vol((Pa-\Delta P)/Pa)$
Qstd=	Vstd/ΔTime	Qa=	Va/ΔTime
For subsequent flow rate calculations:			
Qstd=	$1/m \left(\left(\sqrt{\Delta H \left(\frac{Pa}{Pstd} \right) \left(\frac{Tstd}{Ta} \right)} \right) - b \right)$	Qa=	$1/m \left(\left(\sqrt{\Delta H \left(\frac{Ta}{Pa} \right)} \right) - b \right)$

Standard Conditions

Tstd: 298.15 °K
Pstd: 760 mm Hg

Key

ΔH: calibrator manometer reading (in H2O)
ΔP: roots-meter manometer reading (mm Hg)
Ta: actual absolute temperature (°K)
Pa: actual barometric pressure (mm Hg)
b: intercept
m: slope

RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30