Appendix D. Calibration Certificates

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

SUB-CONTRACTING REPORT

CONTACT	: KELVIN CHEUNG	WORK ORDER	: HK2437361
CLIENT	: MOTT MACDONALD HONG KONG LIMITED		
ADDRESS	: 3/F, MANULIFE PLACE, 348 KWUN TONG ROAD KWUN TONG, KOWLOON, HONG KONG	SUB-BATCH DATE RECEIVED DATE OF ISSUE	: 1 : 13-SEP-2024 : 8-OCT-2024
PROJECT	: CALIBIRATION/PERFORMANCE CHECK OF DUST METER	NO. OF SAMPLES CLIENT ORDER	: 1 :---

General Comments

- **Sample information (Project name, Sample ID, Sampling date/time, etc.) is provided by client.**
- **Result(s) of sample(s) is/are reported on as received basis, unless otherwise specified. The result(s) is/are related only to the item(s) tested.**
- **Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in ambient condition.**
- **Calibration was subcontracted to and analysed by Action-United Environmental Services & Consulting (AUES).**

Signatories

This document has been signed by those names that appear on this report and are the authorised signatories

Signatories	*Position*
Richard Fung	Managing Director

This report supersedes any previous report(s) with the same work order number.

All pages of this report have been checked and approved for release.

ALS Technichem (HK) Pty Ltd
Part of the **ALS Laboratory Group**

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WORK ORDER	:	HK2437361
SUB-BATCH	:	1
CLIENT	:	MOTT MACDONALD HONG KONG LIMITED
PROJECT	:	CALIBIRATION/PERFORMANCE CHECK OF DUST METER

ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2437361-001	S/N:296098	Equipments	13-Sep-2024	S/N:296098

-------- END OF REPORT --------

Equipment Verification Report (TSP)

Equipment Calibrated:

Type:	Laser Dust monitor
Manufacturer:	Sibata LD-3B
Serial No.	296098
Equipment Ref:	Nil
Job Order	HK2437361

Standard Equipment:

Standard Equipment:	Higher Volume Sampler
Location & Location ID:	AUES office (calibration room)
Equipment Ref:	HVS 018
Last Calibration Date:	15 August 2024

Equipment Verification Results:

Testing Date: 3 & 4 October 2024

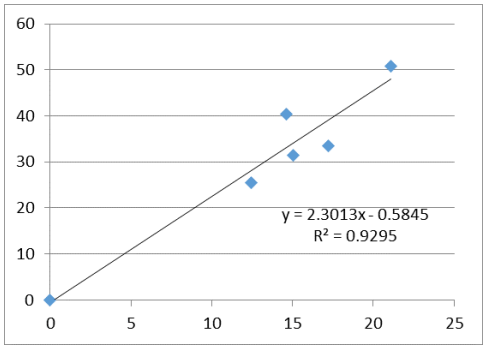
Hour	Time	Mean Temp °C	Mean Pressure (hPa)	Concentration in µg/m³ (Standard Equipment)	Total Count (Calibrated Equipment)	Count/Minute (Total Count/min)
2hr00min	09:45 ~ 11:45	26.1	1013.2	40.4	1757	14.6
2hr01min	11:58 ~ 13:59	26.1	1013.2	33.6	2077	17.2
2hr24min	14:16 ~ 16:40	26.1	1013.2	31.5	2173	15.0
2hr01min	09:36 ~ 11:37	27	1014.4	50.7	2557	21.1
2hr11min	11:48 ~ 13:59	27	1014.4	25.4	1629	12.5

Linear Regression of Y or X

Slope (K-factor): 2.3013 (µg/m3)/CPM

Correlation Coefficient (R) 0.9641

Date of Issue 8 October 2024



Remarks:

1. **Strong** Correlation (R>0.8)
2. Factor 2.3013 (µg/m3)/CPM should be applied for TSP monitoring

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

Operator : Martin Li Signature : Date : 8 October 2024

QC Reviewer : Ben Tam Signature : Date : 8 October 2024

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location :	Gold King Industrial Building, Kwai Chung	Date of Calibration:	15-Aug-24
Location ID :	Calibration Room - TISCH Higher Volume Sampler (Model TE-5170) S/N:1260	Next Calibration Date:	15-Nov-24

CONDITIONS

Sea Level Pressure (hPa)	1005.2	Corrected Pressure (mm Hg)	753.9
Temperature (°C)	27.7	Temperature (K)	301

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	2.13163
Model->	5025A	Qstd Intercept ->	-0.03523
Calibration Date->	15-Dec-23	Expiry Date->	15-Dec-24

CALIBRATION

Plate No.	H20 (L) (in)	H2O (R) (in)	H20 (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	6.4	6.4	12.8	1.681	46	45.61	Slope = 31.2876
13	5.2	5.2	10.4	1.517	40	39.66	Intercept = -7.3464
10	4	4	8.0	1.332	35	34.70	Corr. coeff. = 0.9981
8	2.5	2.5	5.0	1.057	25	24.79	
5	1.6	1.6	3.2	0.849	20	19.83	

Calculations :

Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]

IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate

IC = corrected chart respones

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)[Sqrt(298/Tav)(Pav/760)]-b)

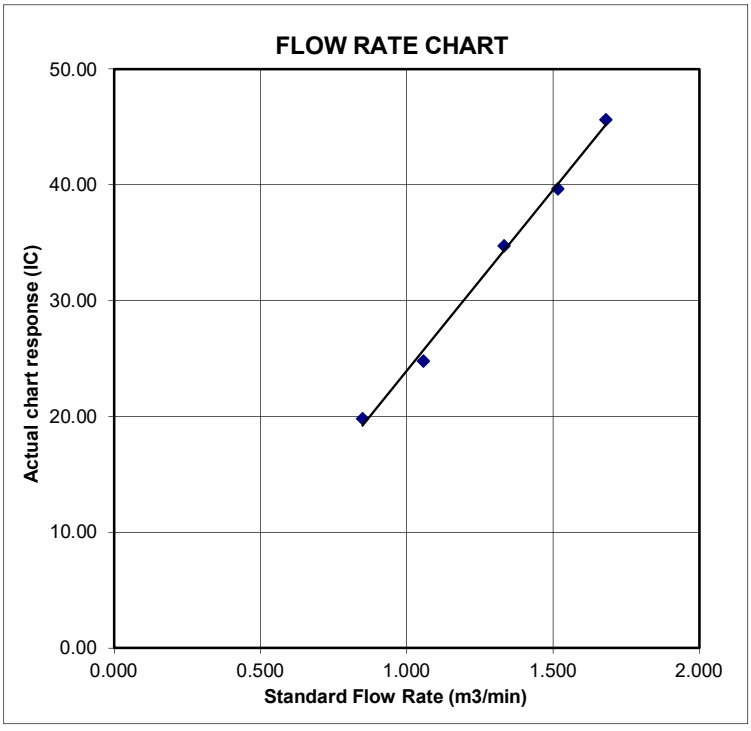
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure



TISCH Environmental

RECALIBRATION DUE DATE:
December 15, 2024

Certificate of Calibration

Calibration Certification Information				
Cal. Date:	December 15, 2023	**Rootsmeter S/N:** 438320	**Ta:** 295	°K
Operator:	Jim Tisch		**Pa:** 748.5	mm Hg
Calibration Model #:	TE-5025A	**Calibrator S/N:** **1941**		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4590	3.2	2.00
2	3	4	1	1.0360	6.4	4.00
3	5	6	1	0.9260	8.0	5.00
4	7	8	1	0.8840	8.9	5.50
5	9	10	1	0.7290	12.9	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)	$\sqrt{\Delta H\left(Ta/Pa\right)}$ (y-axis)
0.9907	0.6790	1.4106	0.9957	0.6825	0.8878
0.9864	0.9522	1.9949	0.9914	0.9570	1.2556
0.9843	1.0630	2.2304	0.9893	1.0684	1.4037
0.9831	1.1121	2.3393	0.9881	1.1178	1.4723
0.9778	1.3413	2.8213	0.9828	1.3481	1.7756
QSTD	**m=**	**2.13163**	**QA**	**m=**	**1.33479**
	b=	**-0.03523**		**b=**	**-0.02217**
	r=	**0.99999**		**r=**	**0.99999**

Calculations

Vstd=	ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	**Va=**	ΔVol((Pa-ΔP)/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= $1/m\left(\left(\sqrt{\Delta H\left(Ta/Pa\right)}\right)-b\right)$

Standard Conditions	
Tstd:	298.15 °K
Pstd:	760 mm Hg

Key
ΔH: calibrator manometer reading (in H2O)
ΔP: rootsmeter 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

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