Appendix D. Calibration Certificates

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

SUB-CONTRACTING REPORT

CONTACT	: HIN CHAN	WORK ORDER	:	**HK2215280**
CLIENT	: **MOTT MACDONALD HONG KONG LIMITED**			
ADDRESS	: 3/F, MANULIFE PLACE, 348 KWUN TONG ROAD, KWUN TONG, KLN	SUB-BATCH	:	1
		DATE RECEIVED	:	29-APR-2022
		DATE OF ISSUE	:	13-MAY-2022
PROJECT	: CALIBIRATION/PERFORMANCE CHECK OF DUST METER	NO. OF SAMPLES	:	1
		CLIENT ORDER	:	----

General Comments

- **Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in ambient condition. The result(s) related only to the item(s) tested.**
- **Sample information (Project name, Sample ID, Sampling date/time, etc.) is provided by client.**
- **Calibration was subcontracted to and analysed by Action-United Environmental Services & Consulting.**

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 is the Final Report and supersedes any preliminary report with this batch number.

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

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WORK ORDER	:	HK2215280
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.
HK2215280-001	S/N: 597337	Equipments	29-Apr-2022	S/N: 597337

Equipment Verification Report (TSP)

Equipment Calibrated:

Type:	Laser Dust monitor
Manufacturer:	Sibata LD-3B
Serial No.	597337
Equipment Ref:	Nil
Job Order	HK2215280

Standard Equipment:

Standard Equipment:	Higher Volume Sampler
Location & Location ID:	AUES office (calibration room)
Equipment Ref:	HVS 018
Last Calibration Date:	22 February 2022

Equipment Verification Results:

Testing Date: 3&4 May 2022

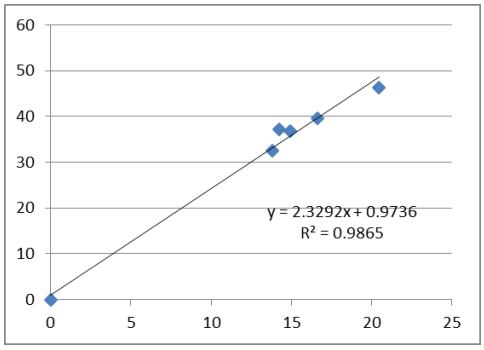
Hour	Time	Mean Temp °C	Mean Pressure (hPa)	Concentration in µg/m^3 (Standard Equipment)	Total Count (Calibrated Equipment)	Count/Minute (Total Count/min)
2hr01mins	10:01 ~ 12:02	26.6	1015.8	32.4	1669	13.8
2hr01mins	12:05 ~ 14:06	26.6	1015.8	37.2	1724	14.2
2hr01mins	14:10 ~ 16:11	26.6	1015.8	36.8	1801	14.9
2hr01min	13:21 ~ 15:22	24.6	1014.3	39.6	2003	16.6
2hr01min	15:24 ~ 17:25	24.6	1014.3	46.3	2467	20.5

Linear Regression of Y or X

Slope (K-factor): 2.3292 (µg/m3)/CPM

Correlation Coefficient (R) 0.9932

Date of Issue 11 May 2022



Remarks:

1. **Strong** Correlation (R>0.8)
2. Factor 2.3292 (µg/m3)/CPM should be applied for TSP monitoring

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

Operator : Fai So Signature : Date : 11 May 2022

QC Reviewer : Ben Tam Signature : Date : 11 May 2022

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location :	Gold King Industrial Building, Kwai Chung	Date of Calibration:	22-Feb-22
Location ID :	Calibration Room	Next Calibration Date:	22-May-22

CONDITIONS

Sea Level Pressure (hPa)	1010.8	Corrected Pressure (mm Hg)	758.1
Temperature (°C)	22.8	Temperature (K)	296

CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	1.99838
Model->	5025A	Qstd Intercept ->	-0.00903
Calibration Date->	27-Dec-21	Expiry Date->	27-Dec-22

CALIBRATION

Plate No.	H20 (L) (in)	H2O (R) (in)	H20 (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION	
18	5.8	5.8	11.6	1.713	54	54.13	Slope =	27.3242
13	4.7	4.7	9.4	1.543	49	49.12	Intercept =	7.2177
10	3.6	3.6	7.2	1.351	44	44.11	Corr. coeff. =	0.9997
8	2.3	2.3	4.6	1.080	37	37.09		
5	1.4	1.4	2.8	0.844	30	30.07		

Calculations :

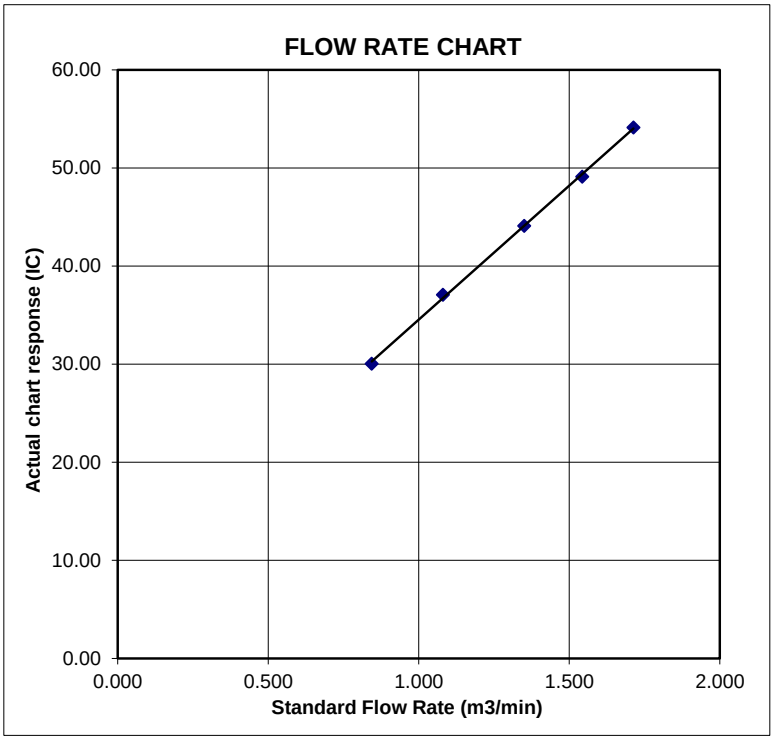
Qstd = 1/m[Sqrt(H20(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

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 27, 2022

Certificate of Calibration

Calibration Certification Information				
Cal. Date:	December 27, 2021	**Rootsmeter S/N:** 438320	**Ta:** 295	°K
Operator:	Jim Tisch		**Pa:** 740.4	mm Hg
Calibration Model #:	TE-5025A	**Calibrator S/N:** **1612**		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.3890	3.2	2.00
2	3	4	1	0.9760	6.4	4.00
3	5	6	1	0.8740	7.9	5.00
4	7	8	1	0.8320	8.8	5.50
5	9	10	1	0.6870	12.7	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)
0.9799	0.7055	1.4029	0.9957	0.7168	0.8927
0.9756	0.9996	1.9841	0.9914	1.0157	1.2624
0.9736	1.1140	2.2183	0.9893	1.1320	1.4114
0.9724	1.1688	2.3265	0.9881	1.1876	1.4803
0.9673	1.4079	2.8059	0.9828	1.4306	1.7853
QSTD	**m=**	**1.99838**	**QA**	**m=**	**1.25135**
	b=	**-0.00903**		**b=**	**-0.00574**
	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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