



## ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

### SUB-CONTRACTING REPORT

CONTACT	: MR K.W. FAN	WORK ORDER	: <b>HK2144588</b>
CLIENT	: <b>ENVIROTECH SERVICES CO.</b>		
ADDRESS	: RM113, 1/F, MY LOFT, 9 HOI WING ROAD, TUEN MUN, N.T. HONG KONG	SUB-BATCH	: 1
		DATE RECEIVED	: 2-NOV-2021
		DATE OF ISSUE	: 11-NOV-2021
PROJECT	: ----	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.

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

11/F, Chung Shun Knitting Centre 1 - 3 Wing Yip Street Kwai Chung N.T. Hong Kong  
Tel. +852 2610 1044 Fax. +852 2610 2021 [www.alsglobal.com](http://www.alsglobal.com)

WORK ORDER : HK2144588  
SUB-BATCH : 1  
CLIENT : ENVIROTECH SERVICES CO.  
PROJECT : ----



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2144588-001	S/N: 276019	Equipments	02-Nov-2021	S/N: 276019

## Equipment Verification Report (TSP)

### Equipment Calibrated:

Type: Laser Dust monitor  
Manufacturer: Sibata LD-3B  
Serial No. 276019  
Equipment Ref: Nil  
Job Order HK2144588

### Standard Equipment:

Standard Equipment: Higher Volume Sampler (TSP)  
Location & Location ID: AUES office (calibration room)  
Equipment Ref: HVS 018  
Last Calibration Date: 5 November 2021

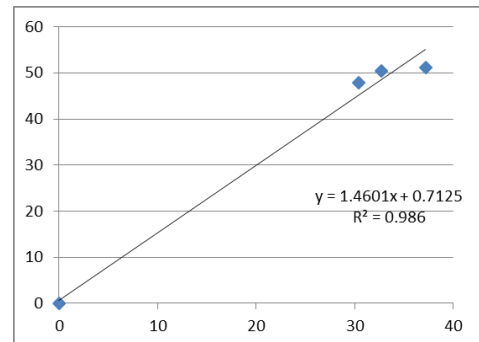
### Equipment Verification Results:

Verification Date: 5 November 2021

Hour	Time	Mean Temp °C	Mean Pressure (hPa)	Concentration in ug/m <sup>3</sup> (Standard Equipment)	Total Count (Calibrated Equipment)	Count/Minute (Total Count/min)
2hr01min	09:11 ~ 11:12	25.6	1012.5	51.2	4508	37.2
2hr01min	11:15 ~ 13:16	25.6	1012.5	47.8	3690	30.4
2hr02min	13:20 ~ 15:22	25.6	1012.5	50.4	3979	32.7

### Linear Regression of Y or X

Slope (K-factor): 1.4601 (µg/m<sup>3</sup>)/CPM  
Correlation Coefficient (R) 0.9930  
Date of Issue 8 November 2021




### Remarks:

- Strong** Correlation ( $R > 0.8$ )
- Factor 1.4601 (µg/m<sup>3</sup>)/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 : 8 November 2021

QC Reviewer : Ben Tam Signature :  Date : 8 November 2021

## TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location :	Gold King Industrial Building, Kwai Chung	Date of Calibration: 5-Nov-21
Location ID :	Calibration Room	Next Calibration Date: 5-Feb-22

### CONDITIONS

Sea Level Pressure (hPa)	1012.5	Corrected Pressure (mm Hg)	759.375
Temperature (°C)	25.6	Temperature (K)	299

### CALIBRATION ORIFICE

Make->	TISCH	Qstd Slope ->	2.10574
Model->	5025A	Qstd Intercept ->	-0.00985
Calibration Date->	19-Jan-21	Expiry Date->	18-Jan-22

### CALIBRATION

Plate No.	H2O (L) (in)	H2O (R) (in)	H2O (in)	Qstd (m3/min)	I (chart)	IC corrected	LINEAR REGRESSION
18	6.2	6.2	12.4	1.675	52	51.93	Slope = 24.2092 Intercept = 10.8881 Corr. coeff. = 0.9959
13	5	5	10.0	1.504	48	47.93	
10	3.9	3.9	7.8	1.329	42	41.94	
8	2.5	2.5	5.0	1.065	36	35.95	
5	1.0	1.0	2.0	0.675	28	27.96	

**Calculations :**

$$Qstd = 1/m[\text{Sqrt}(H20(Pa/Pstd)(Tstd/Ta))-b]$$

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

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:**

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

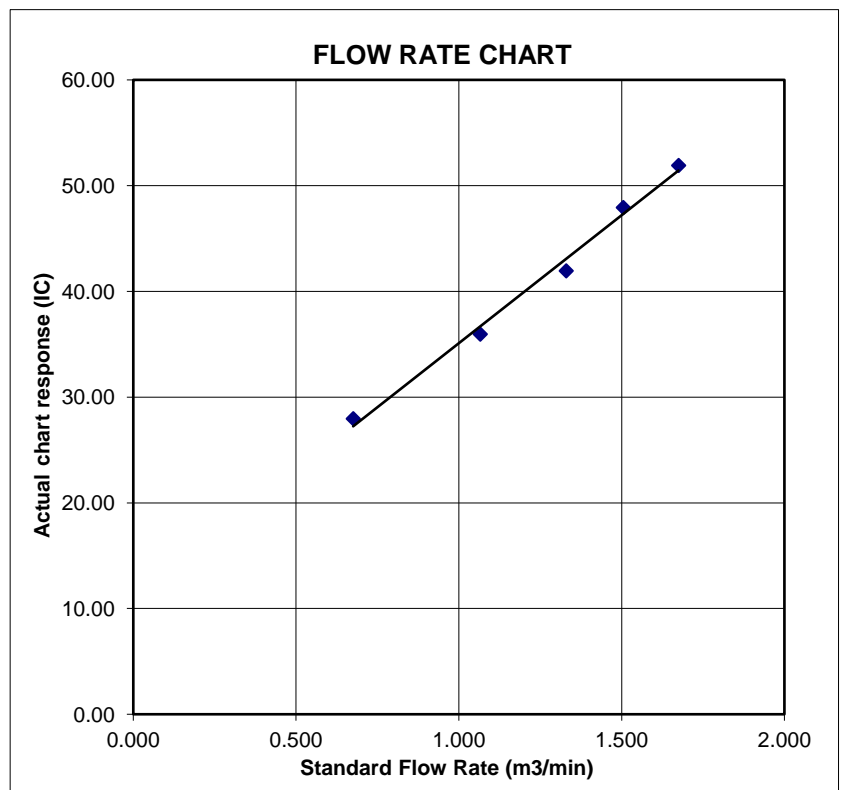
m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure





# Certificate of Calibration

Calibration Certification Information			
Cal. Date: January 19, 2021	Rootsmeter S/N: 438320	Ta: 294	°K
Operator: Jim Tisch		Pa: 755.1	mm Hg
Calibration Model #: TE-5025A	Calibrator S/N: <b>1941</b>		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4830	3.2	2.00
2	3	4	1	1.0420	6.4	4.00
3	5	6	1	0.9290	8.0	5.00
4	7	8	1	0.8840	8.8	5.50
5	9	10	1	0.7340	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)	$\sqrt{\Delta H \left( \frac{Ta}{Pa} \right)}$ (y-axis)
1.0029	0.6762	1.4192	0.9958	0.6715	0.8824
0.9986	0.9583	2.0071	0.9915	0.9516	1.2479
0.9965	1.0726	2.2440	0.9894	1.0650	1.3952
0.9954	1.1260	2.3535	0.9883	1.1180	1.4633
0.9899	1.3487	2.8385	0.9829	1.3391	1.7648
<b>QSTD</b>	<b>m=</b>	<b>2.10574</b>	<b>QA</b>	<b>m=</b>	<b>1.31858</b>
	<b>b=</b>	<b>-0.00985</b>		<b>b=</b>	<b>-0.00612</b>
	<b>r=</b>	<b>0.99992</b>		<b>r=</b>	<b>0.99992</b>

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

Standard Conditions	
Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH: calibrator manometer reading (in H2O)	
ΔP: 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



## ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES

### SUB-CONTRACTING REPORT

CONTACT	: MR K.W. FAN	WORK ORDER	: <b>HK2146425</b>
CLIENT	: <b>ENVIROTECH SERVICES CO.</b>		
ADDRESS	: RM113, 1/F, MY LOFT, 9 HOI WING ROAD, TUEN MUN, N.T. HONG KONG	SUB-BATCH	: 1
		DATE RECEIVED	: 11-NOV-2021
		DATE OF ISSUE	: 22-NOV-2021
PROJECT	: ----	NO. OF SAMPLES	: 1
		CLIENT ORDER	: ----

#### General Comments

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WORK ORDER : HK2146425  
SUB-BATCH : 1  
CLIENT : ENVIROTECH SERVICES CO.  
PROJECT : ----



ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2146425-001	S/N: 6Z7784	Equipments	11-Nov-2021	S/N: 6Z7784

## Equipment Verification Report (TSP)

### Equipment Calibrated:

Type: Laser Dust monitor  
Manufacturer: Sibata LD-3B  
Serial No. 6Z7784  
Equipment Ref: Nil  
Job Order HK2146425

### Standard Equipment:

Standard Equipment: Higher Volume Sampler (TSP)  
Location & Location ID: AUES office (calibration room)  
Equipment Ref: HVS 018  
Last Calibration Date: 5 November 2021

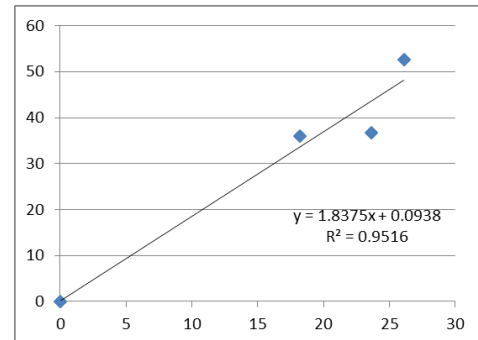
### Equipment Verification Results:

Verification Date: 16 November 2021

Hour	Time	Mean Temp °C	Mean Pressure (hPa)	Concentration in ug/m <sup>3</sup> (Standard Equipment)	Total Count (Calibrated Equipment)	Count/Minute (Total Count/min)
2hr01min	09:17 ~ 11:18	23.2	1017	36.0	2196	18.2
2hr01min	11:22 ~ 13:23	23.2	1017	36.7	2850	23.6
2hr01min	13:27 ~ 15:28	23.2	1017	52.5	3151	26.1

### Linear Regression of Y or X

Slope (K-factor): 1.8375 (µg/m<sup>3</sup>)/CPM  
Correlation Coefficient (R) 0.9755  
Date of Issue 19 November 2021




### Remarks:

1. **Strong** Correlation (R>0.8)
2. Factor 1.8375 (µg/m<sup>3</sup>)/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 : 19 November 2021

QC Reviewer : Ben Tam Signature :  Date : 19 November 2021



## TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location :	Gold King Industrial Building, Kwai Chung	Date of Calibration: 5-Nov-21
Location ID :	Calibration Room	Next Calibration Date: 5-Feb-22

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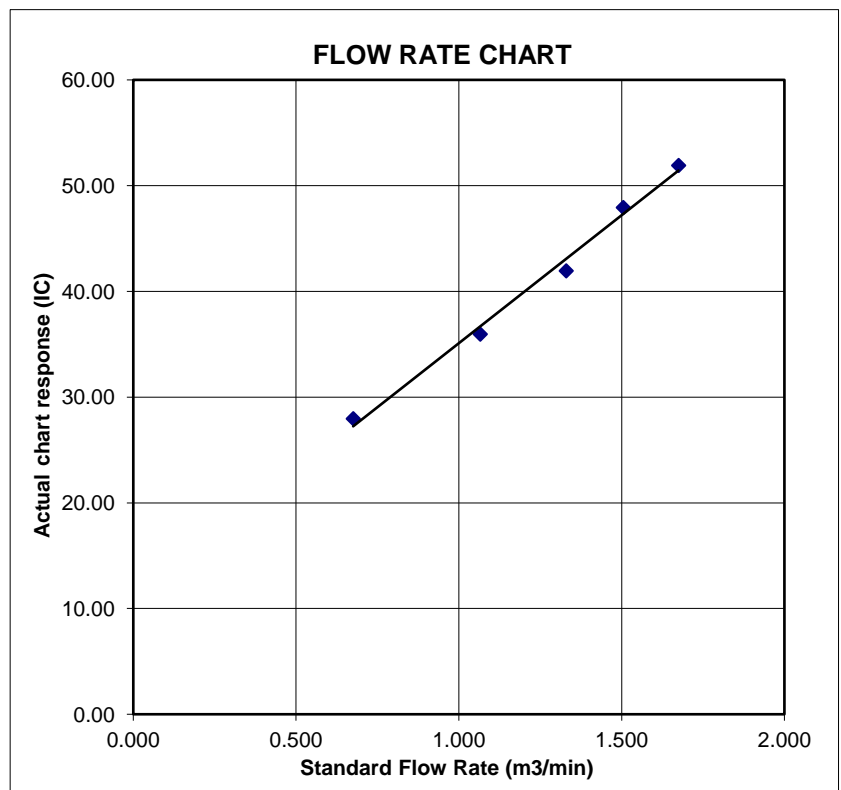
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