Annex E

Air Quality

Annex E1

Calibration Certificates for Air Quality

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

SUB-CONTRACTING REPORT

CONTACT	: MR K.W. FAN	WORK ORDER : **HK2240047**
CLIENT	: ENVIROTECH SERVICES CO.	
ADDRESS	: RM 712, 7/F, MY LOFT 9 HOI WING ROAD, TUEN MUN, N.T., HK	SUB-BATCH : 1 DATE RECEIVED : 11-OCT-2022 DATE OF ISSUE : 20-OCT-2022
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.
- Result(s) of sample(s) is/are reported on as received basis, unless otherwise specified.
- 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	
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
Kwai Tsing Hong Kong

Page 1 of 2

WORK ORDER   : HK2240047
SUB-BATCH   : 1
CLIENT   : ENVIROTECH SERVICES CO.
PROJECT   : ----

ALS Lab ID	Client's Sample ID	Sample Type	Sample Date	External Lab Report No.
HK2240047-001	S/N: 336338	Equipments	11-Oct-2022	S/N: 336338

Equipment Verification Report (TSP)

Equipment Calibrated:

Type: Laser Dust monitor

Manufacturer: Sibata LD – 3B

Serial No. 336338

Equipment Ref: NA

Job Order HK2240047

Standard Equipment:

Standard Equipment: Higher Volume Sampler (TSP)

Location & Location ID: AUES office (calibration room)

Equipment Ref: HVS 018

Last Calibration Date: 13 September 2022

Equipment Verification Results:

Verification Date: 14 October 2022

Hour	Time	Mean Temp °C	Mean Pressure (hPa)	Concentration in ug/m³ (Standard Equipment)	Total Count (Calibrated Equipment)	Count/Minute (Total Count/min)
2hr15mins	09:33 ~ 11:48	26.9	1012.1	44.6	2621	19.5
2hr01mins	11:51 ~ 13:52	26.9	1012.1	45.7	2722	22.6
2hr01mins	13:55 ~ 15:56	26.9	1012.1	56.6	2922	24.1

Linear Regression of Y or X

Slope (K-factor): 2.2211 (µg/m³)/CPM

Correlation Coefficient (R) 0.9920

Date of Issue 17 October 2022

$y - 2.2211x - 0.0341$
$R^2 = 0.9841$

Remarks:

1. **Strong** Correlation (R>0.8)

2. Factor 2.2211 (µg/m³)/CPM should be applied for TSP monitoring

*If R<0.5, repair or re-verification is required for the equipment
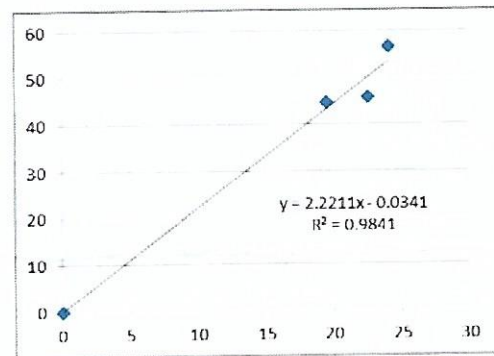
Operator : Fai So   Signature : _____   Date : 17 October 2022

QC Reviewer : Ben Tam   Signature : _____   Date : 17 October 2022

TSP SAMPLER CALIBRATION CALCULATION SPREADSHEET

Location :	Gold King Industrial Building, Kwai Chung	Date of Calibration: 13-Sep-22
Location ID :	Calibration Room	Next Calibration Date: 13-Dec-22

CONDITIONS

Sea Level Pressure (hPa)	1007.3	Corrected Pressure (mm Hg)	755.475
Temperature (°C)	31.7	Temperature (K)	305

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	6	6	12.0	1.714	54	53.24	Slope =	30.1792
13	4.9	4.9	9.8	1.549	48	47.33	Intercept =	1.5486
10	3.7	3.7	7.4	1.347	44	43.38	Corr. coeff. =	0.9961
8	2.5	2.5	5.0	1.108	36	35.50		
5	1.6	1.6	3.2	0.887	28	27.61		

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

FLOW RATE CHART

TISCH
Environmental
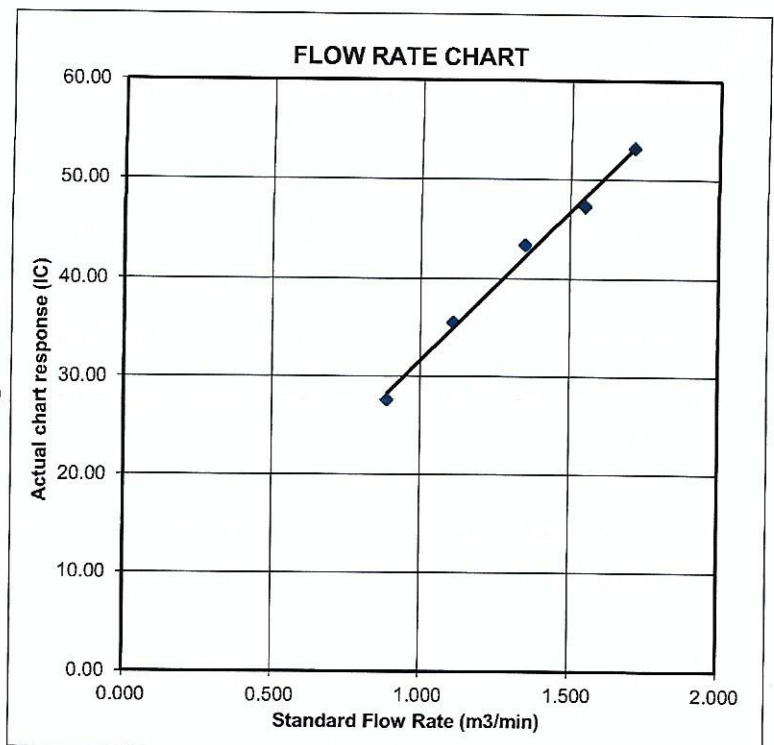
Certificate of Calibration

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			QA		
	m=	1.99838		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

Annex E2

Monitoring Schedule for Air Quality

Tung Chung New Town Extension (East)
Air Quality Monitoring Schedule (June 2023)

| Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1-Jun	2-Jun	3-Jun
4-Jun	5-Jun	6-Jun **Air Quality Monitoring**	7-Jun	8-Jun	9-Jun	10-Jun
11-Jun	12-Jun **Air Quality Monitoring**	13-Jun	14-Jun	15-Jun	16-Jun	17-Jun **Air Quality Monitoring**
18-Jun	19-Jun	20-Jun	21-Jun	22-Jun	23-Jun **Air Quality Monitoring**	24-Jun
25-Jun	26-Jun	27-Jun	28-Jun	29-Jun **Air Quality Monitoring**	30-Jun	

Annex E3

Monitoring Results for Air Quality

Table E3   *Data for 1-hr TSP Monitoring at Station DM-1*

Date	Start Time	Finish Time	Weather	1-hour TSP (μg/m³)
6/6/2023	13:13	14:13	Cloudy	24
6/6/2023	14:13	15:13	Cloudy	28
6/6/2023	15:13	16:13	Cloudy	27
12/6/2023	9:04	10:04	Sunny	28
12/6/2023	10:04	11:04	Sunny	29
12/6/2023	11:04	12:04	Sunny	26
17/6/2023	9:03	10:03	Cloudy	24
17/6/2023	10:03	11:03	Cloudy	27
17/6/2023	11:03	12:03	Cloudy	28
23/6/2023	9:01	10:01	Sunny	45
23/6/2023	10:01	11:01	Sunny	43
23/6/2023	11:01	12:01	Sunny	47
29/6/2023	13:05	14:05	Sunny	29
29/6/2023	14:05	15:05	Sunny	26
29/6/2023	15:05	16:05	Sunny	30

Figure E3   *Graphical Presentation for 1-hr TSP Monitoring at Station DM-1*
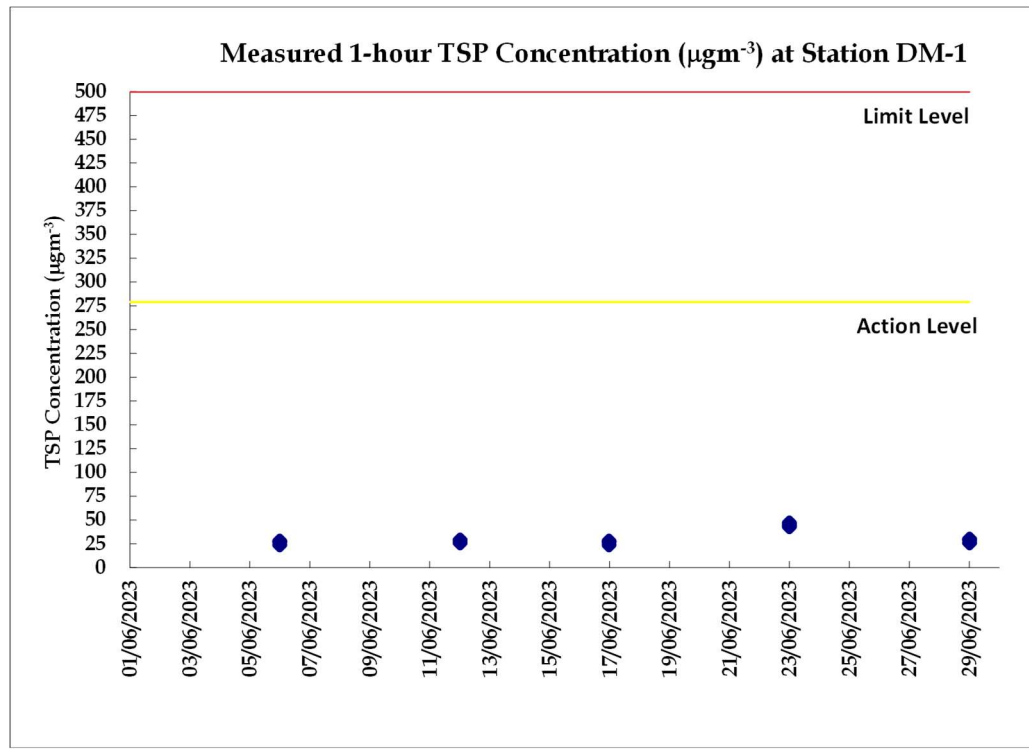
Annex E4

Event and Action Plan for Air Quality

Annex E4   Event and Action Plan for Air Quality

Event	Action			
	ET	**IEC**	**ER**	**Contractor**
Action level exceedance for one sample	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform IEC and ER; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method.	1. Notify Contractor.	1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
Action level exceedance for two or more consecutive samples	1. Identify source; 2. Inform IEC and ER; 3. Advise the ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with IEC and ER; 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ET on the effectiveness of the proposed remedial measures; 5. Supervise Implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Submit proposals for remedial to ER within 3 working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.

Event	Action			
	ET	IEC	ER	Contractor
Limit level exceedance for one sample	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform ER, Contractor and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
Limit level exceedance for two or more consecutive samples	1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; 8. If exceedance stops, cease additional monitoring.	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.