Appendix F Water Quality Equipment Calibration Certificate

ALS Technichem (HK) Pty Ltd
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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	BEN TAM	WORK ORDER:	HK1912056
CLIENT:	ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING		
ADDRESS:	RM A 20/F., GOLD KING IND BLDG, NO. 35-41 TAI LIN PAI ROAD, KWAI CHUNG, N.T. HONG KONG	SUB-BATCH:	0
		LABORATORY:	HONG KONG
		DATE RECEIVED:	20-Mar-2019
		DATE OF ISSUE:	26-Mar-2019

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.
The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test:	Conductivity, Dissolved Oxygen, pH Value, Turbidity, Salinity and Temperature
Equipment Type:	Multifunctional Meter
Brand Name:	YSI
Model No.:	Professional DSS
Serial No.:	17B102764/17B100758
Equipment No.:	EQW019
Date of Calibration:	22 March, 2019

NOTES

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

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Ms. Lin Wai Yu
Assistant Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1912056

SUB-BATCH: 0
DATE OF ISSUE: 26-Mar-2019
CLIENT: ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional DSS
Serial No.: 17B102764/17B100758
Equipment No.: EQW019
Date of Calibration: 22 March, 2019 Date of Next Calibration: 22 June, 2019

PARAMETERS:

Conductivity

Method Ref: APHA (21st edition), 2510B

Expected Reading (µS/cm)	Displayed Reading (µS/cm)	Tolerance (%)
146.9	143.1	-2.6
6667	6194	-7.1
12890	12016	-6.8
58670	54263	-7.5
	Tolerance Limit (%)	±10.0

Dissolved Oxygen

Method Ref: APHA (21st edition), 4500-O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
4.81	4.63	-0.18
6.77	6.60	-0.17
8.33	8.28	-0.05
	Tolerance Limit (mg/L)	±0.20

pH Value

Method Ref: APHA (21st edition), 4500H:B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	4.07	+0.07
7.0	7.19	+0.19
10.0	10.04	+0.04
	Tolerance Limit (pH unit)	±0.20

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Ms. Lin Wai Yu
Assistant Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1912056

SUB-BATCH: 0
DATE OF ISSUE: 26-Mar-2019
CLIENT: ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional DSS
Serial No.: 17B102764/17B100758
Equipment No.: EQW019
Date of Calibration: 22 March, 2019 Date of Next Calibration: 22 June, 2019

PARAMETERS:

Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	-0.24	--
4	4.26	+6.5
40	41.30	+3.2
80	75.41	-5.7
400	388.10	-3.0
800	724.34	-9.5
	Tolerance Limit (%)	±10.0

Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	10.01	+0.1
20	19.14	-4.3
30	28.15	-6.2
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

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Assistant Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1912056

SUB-BATCH: 0
DATE OF ISSUE: 26-Mar-2019
CLIENT: ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional DSS
Serial No.: 17B102764/17B100758
Equipment No.: EQW019
Date of Calibration: 22 March, 2019 Date of Next Calibration: 22 June, 2019

PARAMETERS:

Temperature Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (^{o}C)	Displayed Reading (^{o}C)	Tolerance (^{o}C)
8.5	10.0	+1.5
23.0	22.4	-0.6
41.0	39.1	-1.9
	Tolerance Limit (^{o}C)	±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

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Assistant Manager - Inorganic

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR. POLAR CHAN	WORK ORDER:	HK1907349
CLIENT:	ACUITY SUSTAINABILITY CONSULTING LIMITED		
ADDRESS:	1908, IPLACE, NOS. 301-305 CASTLE PEAK ROAD, KWAI CHUNG, NEW TERRITORIES, HONG KONG	SUB-BATCH: LABORATORY: DATE RECEIVED: DATE OF ISSUE:	0 HONG KONG 19-Feb-2019 28-Feb-2019

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test:	Dissolved Oxygen, pH Value, Turbidity, Salinity, Redox Potential and Temperature
Equipment Type:	Multifunctional Meter
Brand Name:	HORIBA
Model No.:	U-5000
Serial No.:	UHB5F2BB
Equipment No.:	--
Date of Calibration:	26 February, 2019

NOTES

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

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1907349

SUB-BATCH: 0
DATE OF ISSUE: 28-Feb-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-5000
Serial No.: UHB5F2BB
Equipment No.: --
Date of Calibration: 26 February, 2019 Date of Next Calibration: 26 May, 2019

PARAMETERS:

Dissolved Oxygen Method Ref: APHA (21st edition), 4500-O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.72	3.90	+0.18
5.61	5.76	+0.15
8.52	8.43	-0.09
	Tolerance Limit (mg/L)	±0.20

pH Value Method Ref: APHA (21st edition), 4500H:B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	4.08	+0.08
7.0	7.00	+0.00
10.0	9.98	-0.02
	Tolerance Limit (pH unit)	±0.20

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1907349

SUB-BATCH: 0
DATE OF ISSUE: 28-Feb-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-5000
Serial No.: UHB5F2BB
Equipment No.: --
Date of Calibration: 26 February, 2019 Date of Next Calibration: 26 May, 2019

PARAMETERS:

Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.00	--
4	4.17	+4.3
40	39.8	-0.5
80	78.4	-2.0
400	398	-0.5
800	784	-2.0
	Tolerance Limit (%)	±10.0

Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.02	--
10	9.37	-6.3
20	18.06	-9.7
30	27.41	-8.6
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1907349

SUB-BATCH: 0
DATE OF ISSUE: 28-Feb-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-5000
Serial No.: UHB5F2BB
Equipment No.: --
Date of Calibration: 26 February, 2019 Date of Next Calibration: 26 May, 2019

PARAMETERS:

Redox Potential

Method Ref: APHA (21st edition), 2580B
Method Ref: Orion Research Instruction Manual and the Laboratory Manual the Environmental of Water, Wastewater and Soil (2nd edition), Rump & Krist (1992)

Expected Reading (mV)	Displayed Reading (mV)	Difference of A and B (mV)
Solution A (~234mV)	228	
Solution B (~300mV)	295	+67.0
	Tolerance Limit (mV)	>66

Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (^{o}C)	Displayed Reading (^{o}C)	Tolerance (^{o}C)
11.0	11.48	+0.5
21.0	21.66	+0.7
38.0	39.07	+1.1
	Tolerance Limit (^{o}C)	±2.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Mr Chan Siu Ming, Vico
Manager - Inorganic