Appendix F Water Quality Equipment Calibration Certificate

ALS Technichem (HK) Pty Ltd
11/F, Chung Shun Knitting Centre
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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR BEN TAM	WORK ORDER:	HK1860886
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:	21-Nov-2018
		DATE OF ISSUE:	27-Dec-2018

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.

The "Next Calibration Date" is recommended according to best practice principle as practised 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.:	15H102620/ 15H103928
Equipment No.:	EQW018
Date of Calibration:	28 November, 2018

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: HK1860886

SUB-BATCH: 0
DATE OF ISSUE: 27-Dec-2018
CLIENT: ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional DSS
Serial No.: 15H102620/ 15H103928
Equipment No.: EQW018
Date of Calibration: 28 November, 2018 Date of Next Calibration: 28 February, 2019

PARAMETERS:

Conductivity

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

Expected Reading (µS/cm)	Displayed Reading (µS/cm)	Tolerance (%)
146.9	159.8	+8.8
6667	6492	-2.6
12890	12526	-2.8
58670	55801	-4.9
	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)
3.17	3.05	-0.12
5.95	5.92	-0.03
8.19	8.29	+0.10
	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	4.10	+0.10
7.0	7.13	+0.13
10.0	9.99	-0.01
	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: HK1860886

SUB-BATCH: 0
DATE OF ISSUE: 27-Dec-2018
CLIENT: ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional DSS
Serial No.: 15H102620/ 15H103928
Equipment No.: EQW018
Date of Calibration: 28 November, 2018 Date of Next Calibration: 28 February, 2019

PARAMETERS:

Salinity

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.01	--
10	10.23	+2.3
20	21.02	+5.1
30	29.83	-0.6
	Tolerance Limit (%)	±10.0

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)
10.0	11.2	+1.2
22.0	21.7	-0.3
41.0	40.8	-0.2
	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

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1860886

SUB-BATCH: 0
DATE OF ISSUE: 27-Dec-2018
CLIENT: ACTION UNITED ENVIRONMENT SERVICES AND CONSULTING

Equipment Type: Multifunctional Meter
Brand Name: YSI
Model No.: Professional DSS
Serial No.: 15H102620/ 15H103928
Equipment No.: EQW018
Date of Calibration: 05 December, 2018 Date of Next Calibration: 05 March, 2019

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.14	--
4	3.60	-10.0
40	41.49	+3.7
80	74.42	-7.0
400	426.8	+6.7
800	803.89	+0.5
	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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Manager - Inorganic

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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR. NELSON TSUI	**WORK ORDER:**	HK1859679
CLIENT:	ACUITY SUSTAINABILITY CONSULTING LIMITED		
ADDRESS:	UNIT 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 15- Nov- 2018 23- Nov- 2018

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.
The "Next Calibration Date" is recommended according to best practice principle as practised 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.:	WJ2DHR9V
Equipment No.:	BGYP9CKD
Date of Calibration:	23 November, 2018

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: HK1859679

SUB-BATCH: 0
DATE OF ISSUE: 23- Nov- 2018
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U- 5000
Serial No.: WJ2DHR9V
Equipment No.: BGYP9CKD
Date of Calibration: 23 November, 2018 Date of Next Calibration: 23 February, 2019

PARAMETERS:

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.34	3.32	- 0.02
6.23	6.13	- 0.10
8.13	7.98	- 0.15
	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	4.20	+ 0.20
7.0	7.02	+ 0.02
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: HK1859679

SUB-BATCH: 0
DATE OF ISSUE: 23- Nov- 2018
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U- 5000
Serial No.: WJ2DHR9V
Equipment No.: BGYP9CKD
Date of Calibration: 23 November, 2018 Date of Next Calibration: 23 February, 2019

PARAMETERS:

Turbidity

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.00	- -
4	0.00	- 100.0
40	34.70	- 13.3
80	79.7	- 0.4
400	448	+ 12.0
800	836	+ 4.5
	Tolerance Limit (%)	± 10.0

Salinity

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	- -
10	9.4	- 6.0
20	20.3	+ 1.5
30	28.0	- 6.7
	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: HK1859679

SUB-BATCH: 0
DATE OF ISSUE: 23- Nov- 2018
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U- 5000
Serial No.: WJ2DHR9V
Equipment No.: BGYP9CKD
Date of Calibration: 23 November, 2018 Date of Next Calibration: 23 February, 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)	98	
Solution B (~300mV)	169	+71.0
	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 (°C)	Displayed Reading (°C)	Tolerance (°C)
11.5	12.26	+0.8
22.0	23.07	+1.1
39.0	38.34	-0.7
	Tolerance Limit (°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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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR. NELSON TSUI	**WORK ORDER:**	HK1863504
CLIENT:	ACUITY SUSTAINABILITY CONSULTING LIMITED		
ADDRESS:	UNIT 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 06- Dec- 2018 10- Dec- 2018

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.
The "Next Calibration Date" is recommended according to best practice principle as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test:	Turbidity
Equipment Type:	Multifunctional Meter
Brand Name:	HORIBA
Model No.:	U- 5000
Serial No.:	- -
Equipment No.:	BGYP9CKD
Date of Calibration:	06 December, 2018

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: HK1863504

SUB-BATCH: 0
DATE OF ISSUE: 10- Dec- 2018
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U- 5000
Serial No.: - -
Equipment No.: BGYP9CKD
Date of Calibration: 06 December, 2018 Date of Next Calibration: 06 March, 2019

PARAMETERS:
Turbidity

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.34	- -
4	4.37	+9.3
40	40.1	+0.3
80	87.5	+9.4
400	430	+7.5
800	863	+7.9
	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

ALS Technichem (HK) Pty Ltd
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N.T., Hong Kong
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REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR. NELSON TSUI	**WORK ORDER:**	HK1866963
CLIENT:	ACUITY SUSTAINABILITY CONSULTING LIMITED		
ADDRESS:	UNIT 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 27- Dec- 2018 15- Jan- 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.
The "Next Calibration Date" is recommended according to best practice principle as practised 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.:	WJ2DHR9V
Equipment No.:	BGYP9CKD
Date of Calibration:	02 January, 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: HK1866963

SUB-BATCH: 0
DATE OF ISSUE: 15-Jan-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-5000
Serial No.: WJ2DHR9V
Equipment No.: BGYP9CKD
Date of Calibration: 02 January, 2019 Date of Next Calibration: 02 April, 2019

PARAMETERS:

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
3.21	3.13	-0.08
6.34	6.26	-0.08
8.02	8.09	+0.07
	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	4.12	+0.12
7.0	7.02	+0.02
10.0	9.82	-0.18
	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: HK1866963

SUB-BATCH: 0
DATE OF ISSUE: 15-Jan-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-5000
Serial No.: WJ2DHR9V
Equipment No.: BGYP9CKD
Date of Calibration: 02 January, 2019 Date of Next Calibration: 02 April, 2019

PARAMETERS:

Salinity

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.30	--
10	10.12	+1.2
20	20.36	+1.8
30	30.73	+2.4
	Tolerance Limit (%)	±10.0

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)	231	
Solution B (~300mV)	303	+72.0
	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 (°C)	Displayed Reading (°C)	Tolerance (°C)
10.0	9.8	-0.2
22.5	21.9	-0.6
37.0	37.26	+0.3
	Tolerance Limit (°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

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

WORK ORDER: HK1866963

SUB-BATCH: 0
DATE OF ISSUE: 15-Jan-2019
CLIENT: ACUITY SUSTAINABILITY CONSULTING LIMITED

Equipment Type: Multifunctional Meter
Brand Name: HORIBA
Model No.: U-5000
Serial No.: WJ2DHR9V
Equipment No.: BGYP9CKD
Date of Calibration: 15 January, 2019 Date of Next Calibration: 02 April, 2019

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.11	- -
4	4.27	+6.7
40	37.8	-5.5
80	81.5	+1.9
400	399	-0.3
800	828	+3.5
	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