

ภาคผนวก ค

ใบรับรองผลการตรวจวิเคราะห์ผลกระทบสิ่งแวดล้อม

คุณภาพอากาศในบรรยากาศ



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2314699

Date Received : Feb 22, 2023

Date Reported : Mar 04, 2023

Report Number: 2562305-1C9

Page 1 of 1

Sample Description Air Quality

Location กรุงเทพมหานคร (GPS 47P 0724381, 1402551)

Parameter Nitrogen dioxide (ppm)

Measurement Date Feb 14, 2023 - Feb 21, 2023

Measurement by Sitpawit Suwannarat

Time	2314699-1 Feb 14, 2023	2314699-2 Feb 15, 2023	2314699-3 Feb 16, 2023	2314699-4 Feb 17, 2023	2314699-5 Feb 18, 2023	2314699-6 Feb 19, 2023	2314699-7 Feb 20, 2023
10:00 AM - 11:00 AM	<0.001	<0.001	0.005	0.012	<0.001	<0.001	<0.001
11:00 AM - 12:00 PM	<0.001	<0.001	0.002	0.010	0.001	<0.001	<0.001
12:00 PM - 01:00 PM	<0.001	<0.001	0.002	0.004	<0.001	<0.001	<0.001
01:00 PM - 02:00 PM	<0.001	<0.001	0.002	0.006	0.003	<0.001	<0.001
02:00 PM - 03:00 PM	<0.001	<0.001	<0.001	0.007	0.006	<0.001	<0.001
03:00 PM - 04:00 PM	<0.001	<0.001	0.009	0.005	0.004	<0.001	<0.001
04:00 PM - 05:00 PM	<0.001	<0.001	0.006	0.008	0.005	<0.001	<0.001
05:00 PM - 06:00 PM	<0.001	<0.001	0.013	0.012	<0.001	<0.001	<0.001
06:00 PM - 07:00 PM	<0.001	<0.001	0.024	0.007	0.004	<0.001	<0.001
07:00 PM - 08:00 PM	<0.001	<0.001	0.013	0.001	0.011	<0.001	<0.001
08:00 PM - 09:00 PM	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001
09:00 PM - 10:00 PM	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001
10:00 PM - 11:00 PM	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	0.006
11:00 PM - 12:00 AM	<0.001	<0.001	0.005	0.002	<0.001	<0.001	0.002
12:00 AM - 01:00 AM	<0.001	<0.001	0.007	0.006	<0.001	<0.001	0.003
01:00 AM - 02:00 AM	<0.001	<0.001	0.012	0.006	<0.001	<0.001	<0.001
02:00 AM - 03:00 AM	<0.001	<0.001	0.010	0.007	<0.001	<0.001	0.005
03:00 AM - 04:00 AM	<0.001	<0.001	0.008	0.012	<0.001	<0.001	0.007
04:00 AM - 05:00 AM	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.003
05:00 AM - 06:00 AM	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003
06:00 AM - 07:00 AM	<0.001	<0.001	0.004	<0.001	<0.001	<0.001	0.003
07:00 AM - 08:00 AM	<0.001	<0.001	0.010	<0.001	<0.001	<0.001	0.004
08:00 AM - 09:00 AM	<0.001	0.004	0.006	0.003	<0.001	<0.001	0.006
09:00 AM - 10:00 AM	<0.001	0.007	0.007	<0.001	<0.001	<0.001	0.002
Average	<0.001	0.001	0.006	0.005	0.002	<0.001	0.002
1hr - Maximum	<0.001	0.007	0.024	0.012	0.011	<0.001	0.007
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170

Standard : Notification of the National Environment Board No. 33, 2009 (B.E. 2552).

Reference Method : US EPA Method Part 50 App. F (Chemiluminescence)

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Approved by

Orawan R.

Orawan Rakyong
Scientist (3)

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7267-211 EMAIL



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant



TESTING

No.0042

Lot ID: 2314715

Date Received : Feb 21, 2023

Date Reported : Feb 25, 2023

Report Number: 2562358-1

Page 1 of 1

Sample Description Air Quality

Location กรุงเทพมหานคร (GPS 47P 0724381, 1402551)

Date Analysis Commenced Feb 22, 2023

Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag

Sample Number	Sampled Date	Total Suspended Particulate (mg/m3)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
2314715-1	Feb 14 - Feb 15, 2023	0.033	758	32
2314715-2	Feb 15 - Feb 16, 2023	0.050	758	29
2314715-3	Feb 16 - Feb 17, 2023	0.071	758	29
2314715-4	Feb 17 - Feb 18, 2023	0.086	758	30
2314715-5	Feb 18 - Feb 19, 2023	0.090	758	30
2314715-6	Feb 19 - Feb 20, 2023	0.073	758	32
2314715-7	Feb 20 - Feb 21, 2023	0.077	758	31
Guideline		0.33	-	-

Reference Method

Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B

Guideline : Notification of the National Environment Board. No.24, 2004 (B.E.2547) dated September 22, 2004

Sampled By : Sitpawit Suwannarat

Remark :

- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Thanita K.

Thanita Kulsuriwong
Scientist (4)

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8525-209 / EMAIL

S:\Reports_Air Ambient\7Days_1.rpt (10:24AM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPPO-TPO Plant

Lot ID : 2314713

Date Received : Feb 22, 2023

Date Reported : Feb 28, 2023

Report Number : 2562351-1

Page 1 of 2

Sample Number : 2314713-1 to 7
Parameter : Wind Speed / Wind Direction
Location : ๔๗๗๗๗๗๗๗ (GPS 47P 0724381, 1402551)
Sampling Date : Feb 14 - Feb 21, 2023
Sampling by : Sitpawit Suwannarat

Time	Feb 14 - Feb 15, 2023			Feb 15 - Feb 16, 2023			Feb 16 - Feb 17, 2023			Feb 17 - Feb 18, 2023			Feb 18 - Feb 19, 2023			Feb 19 - Feb 20, 2023			Feb 20 - Feb 21, 2023		
	WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)	
10:00 AM - 11:00 AM	1.0	245.4	WSW	1.1	239.1	WSW	1.2	148.5	SSE	2.0	89.3	E	2.0	57.2	ENE	1.5	56.2	NE	2.2	96.5	E
11:00 AM - 12:00 PM	1.1	239.5	WSW	1.2	126.5	SE	1.8	117.8	ESE	1.6	122.7	ESE	1.9	65.8	ENE	1.8	106.6	ESE	2.0	93.1	F
12:00 PM - 01:00 PM	1.1	239.2	WSW	1.8	186.0	S	1.9	97.9	E	1.5	178.2	S	2.1	52.9	NE	1.4	115.8	ESE	1.0	183.9	S
01:00 PM - 02:00 PM	1.2	240.7	WSW	2.3	177.1	S	2.0	81.2	E	1.1	198.0	SSW	2.1	75.6	ENE	1.4	239.9	WSW	1.3	239.4	WSW
02:00 PM - 03:00 PM	1.3	237.4	WSW	2.0	154.5	SSE	1.8	72.2	ENE	1.1	211.9	SSW	1.3	22.0	NNE	1.5	253.1	WSW	1.5	248.4	WSW
03:00 PM - 04:00 PM	1.4	240.0	WSW	1.8	25.3	NNE	0.7	63.4	ENE	0.9	219.9	SW	1.2	235.6	SW	1.2	240.2	WSW	1.4	249.8	WSW
04:00 PM - 05:00 PM	1.3	237.8	WSW	1.8	7.5	N	0.5	262.8	W	0.9	244.4	WSW	1.1	231.2	SW	1.3	260.8	W	1.3	237.4	WSW
05:00 PM - 06:00 PM	1.3	252.7	WSW	4.2	19.0	NNE	0.6	266.9	W	1.0	264.5	W	0.8	286.6	WNW	1.5	262.4	W	1.3	248.3	WSW
06:00 PM - 07:00 PM	1.2	266.6	W	3.2	339.3	NNW	0.5	300.8	NNW	1.2	309.0	NW	0.4	10.1	N	1.0	268.6	W	1.3	260.8	W
07:00 PM - 08:00 PM	2.7	269.7	W	3.6	2.5	N	0.4	95.4	E	0.7	329.6	NNW	0.5	152.5	SSE	0.7	268.0	W	1.0	265.1	W
08:00 PM - 09:00 PM	0.6	274.3	W	3.3	12.5	NNE	3.3	56.9	ENE	0.3	320.9	NW	0.6	151.5	SSE	4.5	302.5	WNW	0.6	271.3	W
09:00 PM - 10:00 PM	0.7	293.1	WNW	1.4	37.1	NE	0.4	78.3	ENE	0.9	346.7	NNW	2.1	124.0	SE	0.4	302.3	WNW	0.7	278.5	W
10:00 PM - 11:00 PM	0.9	266.5	W	1.6	31.1	NNE	0.5	82.4	E	1.4	41.2	NE	3.2	76.8	ENE	1.8	322.0	NW	0.4	278.5	W
11:00 PM - 12:00 AM	1.2	266.4	W	2.1	45.2	NE	0.3	74.0	ENE	1.3	41.8	NE	2.7	71.1	ENE	0.8	127.9	SE	3.1	278.5	W
12:00 AM - 01:00 AM	0.3	256.5	WSW	2.6	61.3	ENE	1.1	65.4	ENE	1.3	63.2	ENE	2.3	69.0	ENE	1.3	114.5	ESE	2.2	298.0	WNW
01:00 AM - 02:00 AM	0.3	253.2	WSW	1.3	49.1	NE	1.3	61.4	ENE	0.6	62.6	ENE	0.9	62.8	ENE	1.8	98.0	E	2.1	94.4	E
02:00 AM - 03:00 AM	0.3	262.2	W	2.4	60.9	ENE	3.7	66.3	ENE	0.7	48.6	NE	1.6	62.2	ENE	3.6	118.2	ESE	1.2	99.0	E
03:00 AM - 04:00 AM	0.6	266.7	W	2.6	63.4	ENE	5.2	64.0	ENE	0.6	54.0	NE	0.6	49.0	NE	0.6	182.5	S	1.0	98.1	E
04:00 AM - 05:00 AM	2.1	258.2	WSW	3.0	87.5	E	2.9	62.6	ENE	0.9	85.5	E	0.8	49.4	NE	2.3	212.5	SSW	0.8	70.2	ENE
05:00 AM - 06:00 AM	1.3	264.2	W	2.7	93.7	E	2.9	63.4	ENE	0.6	53.2	NE	1.6	64.1	ENE	1.7	194.1	SSW	2.0	69.3	ENE
06:00 AM - 07:00 AM	0.3	253.6	WSW	1.3	109.6	ESE	1.8	92.7	E	0.7	46.6	NE	0.6	34.2	NE	1.9	96.7	E	2.1	69.3	ENE
07:00 AM - 08:00 AM	0.1	-	-	0.8	111.5	ESE	1.3	96.5	E	0.9	46.7	NE	1.5	30.0	NNE	3.0	91.0	E	2.9	76.4	ENE
08:00 AM - 09:00 AM	0.0	-	-	0.8	83.2	E	1.9	99.1	E	0.9	41.5	NE	1.2	33.3	NNE	2.6	80.7	E	2.3	93.5	E
09:00 AM - 10:00 AM	0.3	-	-	3.2	124.7	SE	2.0	96.7	E	1.4	40.7	NE	1.0	49.7	NE	2.0	88.1	E	2.5	100.9	E

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPPO-TPO Plant

Lot ID : 2314713

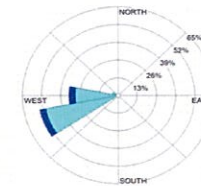
Date Received : Feb 22, 2023

Date Reported : Feb 28, 2023

Report Number : 2562351-1

Page 2 of 2

Wind Rose



Date : Feb 14-15, 2023



Date : Feb 15-16, 2023



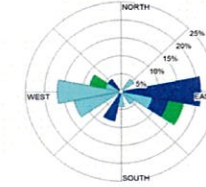
Date : Feb 16-17, 2023



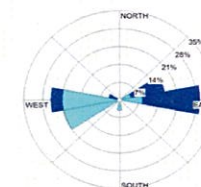
Date : Feb 17-18, 2023



Date : Feb 18-19, 2023



Date : Feb 19-20, 2023



Date : Feb 20-21, 2023



Date : Feb 14-21, 2023

WS(m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	4.76
1.7-3.3	30.95
0.3-1.7	63.10
Calms	1.19

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2314700

Date Received : Feb 22, 2023

Date Reported : Mar 04, 2023

Report Number: 2562309-1C9

Page 1 of 1

Sample Description	Air Quality						
Location	พิกัดพิกัด (GPS 47P 0730823, 1407374)						
Parameter	Nitrogen dioxide (ppm)						
Measurement Date	Feb 14, 2023 - Feb 21, 2023						
Measurement by	Sitpawit Suwannarat						
Time	2314700-1 Feb 14, 2023	2314700-2 Feb 15, 2023	2314700-3 Feb 16, 2023	2314700-4 Feb 17, 2023	2314700-5 Feb 18, 2023	2314700-6 Feb 19, 2023	2314700-7 Feb 20, 2023
09:00 AM - 10:00 AM	<0.001	<0.001	<0.001	<0.001	0.004	0.001	0.003
10:00 AM - 11:00 AM	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
11:00 AM - 12:00 PM	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	0.003
12:00 PM - 01:00 PM	0.004	<0.001	<0.001	<0.001	0.004	0.002	0.006
01:00 PM - 02:00 PM	0.004	<0.001	<0.001	<0.001	0.004	0.002	0.003
02:00 PM - 03:00 PM	0.001	<0.001	<0.001	<0.001	0.003	<0.001	0.004
03:00 PM - 04:00 PM	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.007
04:00 PM - 05:00 PM	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.009
05:00 PM - 06:00 PM	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.007
06:00 PM - 07:00 PM	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.006
07:00 PM - 08:00 PM	<0.001	<0.001	<0.001	<0.001	0.004	<0.001	0.004
08:00 PM - 09:00 PM	<0.001	<0.001	<0.001	<0.001	0.001	0.004	0.003
09:00 PM - 10:00 PM	<0.001	<0.001	<0.001	<0.001	<0.001	0.008	0.005
10:00 PM - 11:00 PM	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.006
11:00 PM - 12:00 AM	<0.001	<0.001	<0.001	<0.001	0.001	0.002	0.006
12:00 AM - 01:00 AM	<0.001	<0.001	<0.001	<0.001	<0.001	0.004	0.003
01:00 AM - 02:00 AM	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.006
02:00 AM - 03:00 AM	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.007
03:00 AM - 04:00 AM	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001
04:00 AM - 05:00 AM	<0.001	<0.001	<0.001	0.003	0.004	0.002	<0.001
05:00 AM - 06:00 AM	<0.001	<0.001	<0.001	0.002	0.001	0.006	<0.001
06:00 AM - 07:00 AM	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
07:00 AM - 08:00 AM	<0.001	<0.001	<0.001	<0.001	0.007	<0.001	0.003
08:00 AM - 09:00 AM	<0.001	<0.001	<0.001	<0.001	0.006	<0.001	0.004
Average	0.001	<0.001	<0.001	<0.001	0.002	0.002	0.004
1hr - Maximum	0.004	<0.001	<0.001	0.003	0.007	0.008	0.009
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170

Standard : Notification of the National Environment Board No. 33, 2009 (B.E. 2552).

Reference Method : US EPA Method Part 50 App. F (Chemiluminescence)

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Approved by

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Orawan Rakyong
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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant



TESTING

No.0042

Lot ID: 2314718

Date Received : Feb 21, 2023

Date Reported : Feb 25, 2023

Report Number: 2562375-1

Page 1 of 1

Sample Description	Air Quality			
Location	พิกัดพิกัด (GPS 47P 20730823, 1407374)			
Date Analysis Commenced	Feb 22, 2023			
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag			
Sample Number	Sampled Date	Total Suspended Particulate (mg/m3)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
2314718-1	Feb 14 - Feb 15, 2023	0.079	758	32
2314718-2	Feb 15 - Feb 16, 2023	0.080	758	29
2314718-3	Feb 16 - Feb 17, 2023	0.074	758	29
2314718-4	Feb 17 - Feb 18, 2023	0.117	758	30
2314718-5	Feb 18 - Feb 19, 2023	0.086	758	30
2314718-6	Feb 19 - Feb 20, 2023	0.142	758	32
2314718-7	Feb 20 - Feb 21, 2023	0.121	758	31
Guideline	0.33			

Reference Method

Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B

Guideline : Notification of the National Environmental Board. No.24, 2004 (B.E.2547) dated September 22, 2004

Sampled By : Sitpawit Suwannarat

Remark :

- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Thanita K.
Thanita Kulsuriwong
Scientist (4)

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S:\Reports_Air Ambient\Days_1.rpt (10:27AM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 2314702

Date Received : Feb 22, 2023

Date Reported : Feb 28, 2023

Report Number : 2562313-1 C9

Page 1 of 2

Sample Number : 2314702-1 to 7
Parameter : Wind Speed / Wind Direction
Location : อู่เก็บน้ำจืด (GPS 47P 0730823, 1407374)
Sampling Date : Feb 14 - Feb 21, 2023
Sampling by : Sitpawit Suwannarat

Time	Feb 14 - Feb 15, 2023			Feb 15 - Feb 16, 2023			Feb 16 - Feb 17, 2023			Feb 17 - Feb 18, 2023			Feb 18 - Feb 19, 2023			Feb 19 - Feb 20, 2023			Feb 20 - Feb 21, 2023		
	WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)	
09:00 AM - 10:00 AM	0.6	342.0	NNW	0.8	210.0	SSW	0.9	64.0	ENE	0.6	58.0	ENE	0.7	69.0	ENE	0.6	80.0	E	0.4	170.0	S
10:00 AM - 11:00 AM	0.0	-	-	0.6	210.0	SSW	1.5	63.0	ENE	1.5	61.0	ENE	1.3	64.0	ENE	0.7	73.0	ENE	0.3	85.0	E
11:00 AM - 12:00 PM	0.6	230.0	SW	0.3	222.0	SW	0.8	63.0	ENE	1.3	61.0	ENE	0.9	54.0	NE	0.3	65.0	ENE	1.3	85.0	E
12:00 PM - 01:00 PM	0.3	300.0	WNW	0.3	276.0	W	1.2	62.0	ENE	0.9	60.0	ENE	0.7	66.0	ENE	0.3	67.0	ENE	0.3	90.0	E
01:00 PM - 02:00 PM	0.3	247.0	WSW	0.4	322.0	NW	1.1	78.0	ENE	0.3	60.0	ENE	0.8	61.0	ENE	0.3	67.0	ENE	1.6	74.0	ENE
02:00 PM - 03:00 PM	0.3	317.0	NW	0.3	111.0	ESE	1.1	65.0	ENE	1.1	76.0	ENE	1.3	53.0	NE	0.5	67.0	ENE	1.2	75.0	ENE
03:00 PM - 04:00 PM	0.0	-	-	1.0	191.0	S	0.6	73.0	ENE	1.3	75.0	ENE	1.4	55.0	NE	0.0	-	-	0.5	76.0	ENE
04:00 PM - 05:00 PM	0.7	245.0	WSW	0.3	188.0	S	0.5	39.0	NE	1.2	39.0	NE	1.9	57.0	ENE	2.3	55.0	NE	0.0	-	-
05:00 PM - 06:00 PM	0.6	203.0	SSW	1.2	156.0	SSE	0.8	60.0	ENE	1.4	46.0	NE	1.4	72.0	ENE	1.7	60.0	ENE	0.3	50.0	NE
06:00 PM - 07:00 PM	0.3	221.0	SW	1.1	50.0	NE	1.5	57.0	ENE	1.0	71.0	ENE	2.4	49.0	NE	1.8	59.0	ENE	0.7	42.0	NE
07:00 PM - 08:00 PM	1.5	184.0	S	0.0	-	-	1.9	65.0	ENE	1.4	172.0	S	1.7	88.0	E	2.0	45.0	NE	1.3	40.0	NE
08:00 PM - 09:00 PM	1.1	181.0	S	0.7	164.0	SSE	1.4	95.0	E	1.1	108.0	ESE	0.8	90.0	E	1.9	50.0	NE	0.3	45.0	NE
09:00 PM - 10:00 PM	1.8	152.0	SSE	0.3	254.0	WSW	1.2	54.0	NE	1.0	69.0	ENE	1.9	44.0	NE	0.9	214.0	SW	0.3	210.0	SSW
10:00 PM - 11:00 PM	1.7	236.0	SW	0.0	-	-	0.4	88.0	E	0.1	-	-	0.5	54.0	NE	1.4	223.0	SW	0.0	-	-
11:00 PM - 12:00 AM	1.4	286.0	WNW	0.4	312.0	NW	0.6	58.0	ENE	1.1	334.0	NNW	1.9	62.0	ENE	0.9	129.0	SE	0.4	130.0	SE
12:00 AM - 01:00 AM	0.9	205.0	SSW	0.3	66.0	ENE	0.6	69.0	ENE	0.6	306.0	NW	0.5	88.0	E	0.3	190.0	S	0.3	200.0	SSW
01:00 AM - 02:00 AM	0.4	198.0	SSW	0.3	359.0	N	2.8	58.0	ENE	0.3	278.0	W	0.1	-	-	0.3	271.0	W	0.0	-	-
02:00 AM - 03:00 AM	0.9	219.0	SW	0.6	0.0	N	0.6	71.0	ENE	0.3	282.0	WNW	0.4	160.0	SSE	0.3	280.0	W	0.0	-	-
03:00 AM - 04:00 AM	0.9	312.0	NW	0.3	0.0	N	0.0	-	-	0.6	287.0	WNW	0.3	192.0	SSW	0.9	265.0	W	0.7	265.0	W
04:00 AM - 05:00 AM	0.4	356.0	N	0.3	0.0	N	0.4	55.0	NE	0.0	-	-	0.4	178.0	S	0.3	260.0	W	0.9	250.0	WSW
05:00 AM - 06:00 AM	0.3	319.0	NW	0.5	32.0	NNE	0.4	59.0	ENE	1.5	59.0	ENE	0.3	178.0	S	0.4	235.0	SW	0.3	180.0	S
06:00 AM - 07:00 AM	0.6	322.0	NW	0.9	30.0	NNE	0.6	54.0	NE	0.7	79.0	E	0.9	178.0	S	0.6	175.0	S	0.0	-	-
07:00 AM - 08:00 AM	0.3	322.0	NW	0.4	30.0	NNE	0.0	-	-	1.0	47.0	NE	1.2	178.0	S	1.0	176.0	S	0.0	-	-
08:00 AM - 09:00 AM	0.4	322.0	NW	0.8	30.0	NNE	0.4	56.0	NE	0.8	59.0	ENE	1.0	178.0	S	0.6	153.0	SSE	0.3	178.0	S

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuth Jittrantont
Assistant General Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

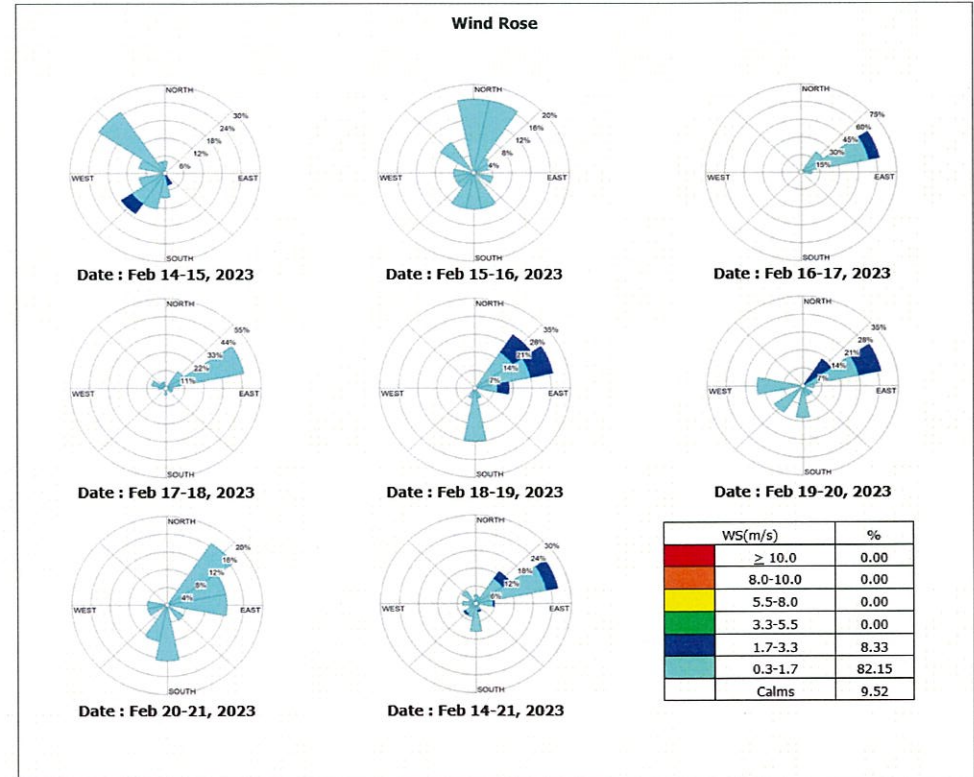
Lot ID : 2314702

Date Received : Feb 22, 2023

Date Reported : Feb 28, 2023

Report Number : 2562313-1 C9

Page 2 of 2



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Sarayuth Jittrantont
Assistant General Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2314720

Date Received : Feb 22, 2023

Date Reported : Feb 28, 2023

Report Number: 2562393-1

Page 1 of 1

Sample Description	Air Quality						
Location	กรุงเทพมหานคร (GPS 47P 0730051, 1409677)						
Parameter	Nitrogen dioxide (ppm)						
Measurement Date	Feb 14, 2023 - Feb 21, 2023						
Measurement by	Sitpawit Suwannarat						
	2314720-1	2314720-2	2314720-3	2314720-4	2314720-5	2314720-6	2314720-7
Time	Feb 14, 2023	Feb 15, 2023	Feb 16, 2023	Feb 17, 2023	Feb 18, 2023	Feb 19, 2023	Feb 20, 2023
11:00 AM - 12:00 PM	0.001	0.015	0.007	0.008	0.010	0.009	0.010
12:00 PM - 01:00 PM	0.006	0.020	0.007	0.008	0.010	0.008	0.008
01:00 PM - 02:00 PM	0.009	0.015	0.008	0.008	0.009	0.014	0.008
02:00 PM - 03:00 PM	0.010	0.013	0.009	0.014	0.009	0.018	0.009
03:00 PM - 04:00 PM	0.009	0.016	0.010	0.020	0.009	0.015	0.015
04:00 PM - 05:00 PM	0.009	0.017	0.010	0.018	0.009	0.015	0.015
05:00 PM - 06:00 PM	0.011	0.016	0.009	0.022	0.022	0.020	0.019
06:00 PM - 07:00 PM	0.012	0.016	0.012	0.027	0.020	0.026	0.026
07:00 PM - 08:00 PM	0.014	0.017	0.016	0.021	0.014	0.032	0.030
08:00 PM - 09:00 PM	0.012	0.012	0.014	0.018	0.018	0.031	0.039
09:00 PM - 10:00 PM	0.011	0.012	0.012	0.015	0.021	0.024	0.028
10:00 PM - 11:00 PM	0.008	0.011	0.012	0.015	0.017	0.022	0.019
11:00 PM - 12:00 AM	0.008	0.011	0.010	0.016	0.017	0.020	0.016
12:00 AM - 01:00 AM	0.008	0.009	0.010	0.019	0.014	0.016	0.014
01:00 AM - 02:00 AM	0.007	0.011	0.010	0.018	0.015	0.014	0.013
02:00 AM - 03:00 AM	0.006	0.012	0.010	0.014	0.019	0.013	0.013
03:00 AM - 04:00 AM	0.005	0.008	0.011	0.013	0.020	0.012	0.013
04:00 AM - 05:00 AM	0.008	0.008	0.011	0.013	0.022	0.012	0.013
05:00 AM - 06:00 AM	0.009	0.006	0.012	0.012	0.017	0.012	0.012
06:00 AM - 07:00 AM	0.009	0.007	0.016	0.014	0.012	0.013	0.019
07:00 AM - 08:00 AM	0.012	0.011	0.016	0.016	0.015	0.018	0.024
08:00 AM - 09:00 AM	0.012	0.010	0.014	0.014	0.018	0.015	0.018
09:00 AM - 10:00 AM	0.009	0.011	0.010	0.014	0.015	0.014	0.012
10:00 AM - 11:00 AM	0.010	0.009	0.010	0.012	0.011	0.012	0.009
Average	0.009	0.012	0.011	0.015	0.015	0.017	0.017
1hr - Maximum	0.014	0.020	0.016	0.027	0.022	0.032	0.039
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170

Standard : Notification of the National Environment Board No. 33, 2009 (B.E. 2552).

Reference Method : US EPAMethod Part 50 App. F (Chemiluminescence)

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Approved by

Orawan R.

Orawan Rak Yong
Scientist (3)

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8525-209 / EMAIL

S:\Reports_Air SOxNOx.rpt (4:30PM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant



TESTING

No.0042

Lot ID: 2314722

Date Received : Feb 21, 2023

Date Reported : Feb 25, 2023

Report Number: 2562436-1

Page 1 of 1

Sample Description	Air Quality			
Location	กรุงเทพมหานคร (GPS 47P 0730051, 1409677)			
Date Analysis Commenced	Feb 22, 2023			
Condition of Sample	Drawn into one glass filter paper (8x10 inch) placed in plastic bag			
Sample Number	Sampled Date	Total Suspended Particulate (mg/m3)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
2314722-1	Feb 14 - Feb 15, 2023	0.100	758	32
2314722-2	Feb 15 - Feb 16, 2023	0.072	758	29
2314722-3	Feb 16 - Feb 17, 2023	0.067	758	29
2314722-4	Feb 17 - Feb 18, 2023	0.107	758	30
2314722-5	Feb 18 - Feb 19, 2023	0.104	758	30
2314722-6	Feb 19 - Feb 20, 2023	0.142	758	32
2314722-7	Feb 20 - Feb 21, 2023	0.149	758	31
Guideline		0.33	-	-

Reference Method

Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B

Guideline : Notification of the National Environmental Board. No.24, 2004 (B.E.2547) dated September 22, 2004

Sampled By : Sitpawit Suwannarat

Remark :

- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Thanita K.

Thanita Kulsuriwong
Scientist (4)

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S:\Reports_Air Ambient7Days_1.rpt (10:28AM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 2314721

Date Received : Feb 22, 2023

Date Reported : Feb 28, 2023

Report Number : 2562400-1

Page 1 of 2

Sample Number : 2314721-1 to 7
Parameter : Wind Speed / Wind Direction
Location : ภูมิวนาลูกพลู (GPS 47P 0730051, 1409677)
Sampling Date : Feb 14 - Feb 21, 2023
Sampling by : Sitpawit Suwannarat

Time	Feb 14 - Feb 15, 2023			Feb 15 - Feb 16, 2023			Feb 16 - Feb 17, 2023			Feb 17 - Feb 18, 2023			Feb 18 - Feb 19, 2023			Feb 19 - Feb 20, 2023			Feb 20 - Feb 21, 2023		
	WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)	
11:00 AM - 12:00 PM	0.3	209.0	SSW	0.3	302.0	WNW	0.5	19.0	NNE	0.3	92.0	E	0.9	23.0	NNE	0.5	24.0	NNE	0.3	11.0	N
12:00 PM - 01:00 PM	0.9	92.0	E	0.6	118.0	ESE	1.5	359.0	N	0.4	52.0	NE	0.5	48.0	NE	0.2	-	-	0.4	2.0	N
01:00 PM - 02:00 PM	1.5	144.0	SE	0.4	336.0	NNW	0.2	-	-	2.2	329.0	NNW	0.5	337.0	NNW	1.9	301.0	WNW	0.9	343.0	NNW
02:00 PM - 03:00 PM	0.6	258.0	WSW	0.3	305.0	NW	0.3	48.0	NE	1.3	335.0	NNW	1.2	22.0	NNE	0.5	194.0	SSW	0.1	-	-
03:00 PM - 04:00 PM	0.5	181.0	S	0.8	301.0	WNW	0.8	46.0	NE	0.9	109.0	ESE	0.7	5.0	N	0.4	188.0	S	0.5	184.0	S
04:00 PM - 05:00 PM	0.3	191.0	S	0.0	-	-	0.6	0.0	N	0.4	190.0	S	0.3	321.0	NW	0.6	178.0	S	0.5	186.0	S
05:00 PM - 06:00 PM	0.5	215.0	SW	0.4	321.0	NW	1.0	29.0	NNE	0.1	-	-	0.5	146.0	SE	0.4	148.0	SSE	0.5	155.0	SSE
06:00 PM - 07:00 PM	0.5	252.0	WSW	0.0	-	-	0.3	334.0	NNW	0.7	243.0	WSW	0.6	139.0	SE	0.0	-	-	0.3	166.0	SSE
07:00 PM - 08:00 PM	0.0	-	-	0.0	-	-	0.4	333.0	NNW	0.3	281.0	W	0.6	109.0	ESE	0.3	212.0	SSW	0.8	217.0	SW
08:00 PM - 09:00 PM	0.2	-	-	0.3	321.0	NW	0.6	333.0	NNW	0.1	-	-	0.3	87.0	E	0.3	212.0	SSW	0.3	217.0	SW
09:00 PM - 10:00 PM	0.5	203.0	SSW	0.3	321.0	NW	0.3	331.0	NNW	0.4	355.0	N	0.3	43.0	NE	0.8	212.0	SSW	0.3	217.0	SW
10:00 PM - 11:00 PM	0.6	293.0	WNW	0.9	321.0	NW	0.3	305.0	NW	0.5	17.0	NNE	0.5	43.0	NE	0.7	117.0	ESE	0.4	217.0	SW
11:00 PM - 12:00 AM	0.3	293.0	WNW	1.0	321.0	NW	0.3	1.0	N	0.3	12.0	NNE	0.6	43.0	NE	0.3	106.0	ESE	0.5	317.0	NW
12:00 AM - 01:00 AM	0.3	293.0	WNW	0.3	321.0	NW	0.3	0.0	N	0.5	321.0	NW	0.5	43.0	NE	0.9	63.0	ENE	0.3	317.0	NW
01:00 AM - 02:00 AM	0.3	293.0	WNW	0.6	358.0	N	0.4	0.0	N	0.8	23.0	NNE	0.3	43.0	NE	1.0	63.0	ENE	1.0	30.0	NNE
02:00 AM - 03:00 AM	0.3	293.0	WNW	0.4	36.0	NE	0.6	68.0	ENE	0.3	37.0	NE	0.4	2.0	N	0.5	63.0	ENE	0.6	30.0	NNE
03:00 AM - 04:00 AM	0.3	161.0	SSE	0.6	339.0	NNW	0.3	40.0	NE	0.4	0.0	N	0.3	3.0	N	1.3	35.0	NE	1.2	342.0	NNW
04:00 AM - 05:00 AM	0.5	149.0	SSE	0.6	59.0	ENE	0.3	335.0	NNW	0.2	-	-	0.3	0.0	N	0.6	35.0	NE	0.5	342.0	NNW
05:00 AM - 06:00 AM	0.5	149.0	SSE	0.3	12.0	NNE	0.2	-	-	0.4	359.0	N	0.9	0.0	N	0.3	35.0	NE	0.8	342.0	NNW
06:00 AM - 07:00 AM	0.6	149.0	SSE	0.3	14.0	NNE	0.3	5.0	N	0.3	350.0	N	0.3	0.0	N	0.5	355.0	N	0.3	342.0	NNW
07:00 AM - 08:00 AM	0.5	143.0	SE	0.3	31.0	NNE	0.3	17.0	NNE	0.4	290.0	WNW	0.8	19.0	NNE	0.0	-	-	0.4	342.0	NNW
08:00 AM - 09:00 AM	1.2	143.0	SE	0.5	26.0	NNE	0.3	33.0	NNE	0.8	337.0	NNW	0.4	31.0	NNE	0.7	37.0	NE	0.4	41.0	NE
09:00 AM - 10:00 AM	2.9	315.0	NW	0.8	46.0	NE	1.0	315.0	NW	0.3	358.0	N	0.7	342.0	NNW	0.3	345.0	NNW	0.3	359.0	N
10:00 AM - 11:00 AM	0.3	275.0	W	0.3	33.0	NNE	1.3	344.0	NNW	1.1	0.0	N	0.9	350.0	N	0.6	86.0	E	1.5	68.0	ENE

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuth Jittrantont
Assistant General Manager



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

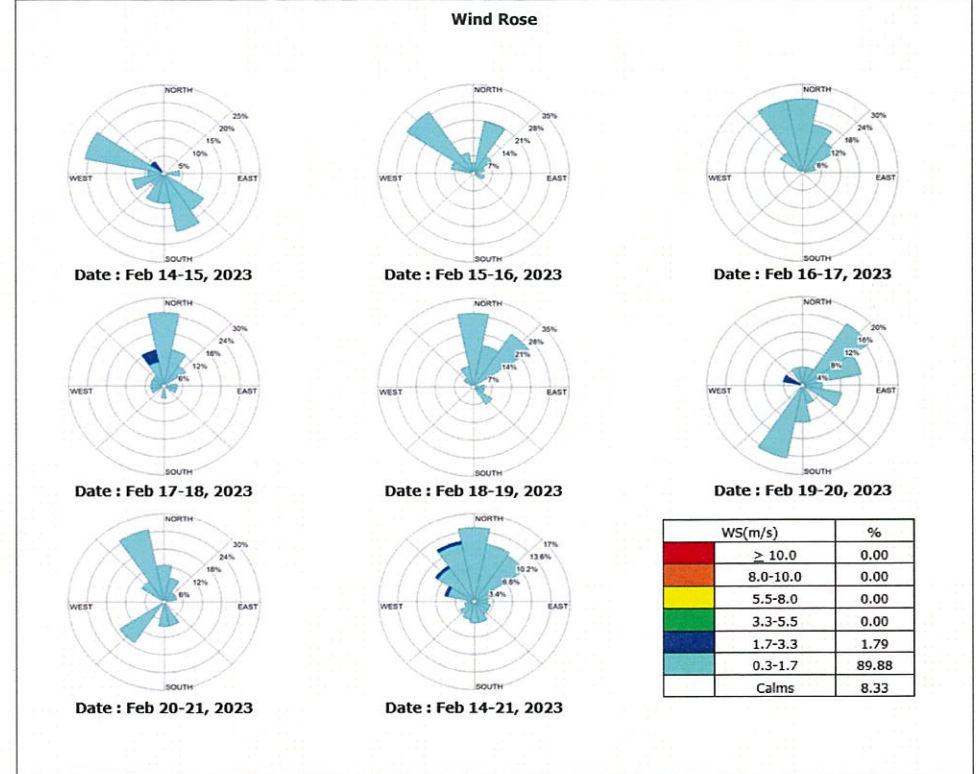
Lot ID : 2314721

Date Received : Feb 22, 2023

Date Reported : Feb 28, 2023

Report Number : 2562400-1

Page 2 of 2



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Sarayuth Jittrantont
Assistant General Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 22154309

Date Received : Jan 04, 2023

Date Reported : Jan 11, 2023

Report Number : 2530916-1C9

Page 1 of 1

Sample Number 22154309-1
Sampled Date Jan 03, 2023
Sample Description Air Quality
Location หมู่บ้านประมงมิตรภาพ (GPS 47P 0726292, 1407282)
Date Analysis Commenced Jan 05, 2023
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure 759 mmHg
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	03/01/23 - 04/01/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	03/01/23 - 04/01/23	ug/m3	0.05	0.18	2.53	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	03/01/23 - 04/01/23	ug/m3	0.05	0.16	1.53	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	03/01/23 - 04/01/23	ug/m3	0.60	1.76	3.60	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	03/01/23 - 04/01/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	03/01/23 - 04/01/23	ug/m3	0.30	0.86	1.27	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	03/01/23 - 04/01/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	03/01/23 - 04/01/23	ug/m3	0.60	1.88	2.41	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Prachum Mit Bamrung Community station has moderate traffic, Clear sky, Normal activity, Nearby temple and Community

Sampled By : Nantawat Sarin

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Sararat Mongkonjirawut
Supervisor

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7267-21/ EMAIL



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 22154315

Date Received : Jan 04, 2023

Date Reported : Jan 11, 2023

Report Number : 2530926-1C9

Page 1 of 1

Sample Number 22154315-1
Sampled Date Jan 03, 2023
Sample Description Air Quality
Location หมู่บ้านประมงมิตร (GPS 47P 0730826, 1407366)
Date Analysis Commenced Jan 05, 2023
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure 759 mmHg
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	03/01/23 - 04/01/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	03/01/23 - 04/01/23	ug/m3	0.05	0.18	1.52	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	03/01/23 - 04/01/23	ug/m3	0.05	0.16	1.28	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	03/01/23 - 04/01/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	03/01/23 - 04/01/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	03/01/23 - 04/01/23	ug/m3	0.30	0.86	1.31	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	03/01/23 - 04/01/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	03/01/23 - 04/01/23	ug/m3	0.60	1.88	2.71	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Map Cha Lood Community station has moderate traffic, Clear sky, Normal activity, Nearby temple and Community

Sampled By : Nantawat Sarin

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Sararat Mongkonjirawut
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 22154314
Date Received : Jan 04, 2023
Date Reported : Jan 11, 2023
Report Number : 2530922-1C9

Page 1 of 1

Sample Number 22154314-1
Sampled Date Jan 03, 2023
Sample Description Air Quality
Location กรุงเทพมหานคร (GPS 47P 0724377, 1402458)
Date Analysis Commenced Jan 05, 2023
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure 759 mmHg
Atmospheric Temperature 30.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	03/01/23 - 04/01/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	03/01/23 - 04/01/23	ug/m3	0.05	0.18	1.44	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	03/01/23 - 04/01/23	ug/m3	0.05	0.16	1.34	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	03/01/23 - 04/01/23	ug/m3	0.60	1.76	<1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	03/01/23 - 04/01/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	03/01/23 - 04/01/23	ug/m3	0.30	0.86	1.31	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	03/01/23 - 04/01/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	03/01/23 - 04/01/23	ug/m3	0.60	1.88	<1.88	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Pa Yoon Community station has moderate traffic, Clear sky, Normal activity, Nearby temple and Community

Sampled By : Nantawat Sarin

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Sararat Mongkonjirawut
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

Lot ID : 22154334
Date Received : Jan 04, 2023
Date Reported : Jan 07, 2023
Report Number : 2530937-1

P/O :

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Page 1 of 2

Sample Number 22154334-1
Parameter Wind Speed / Wind Direction
Location กรุงเทพมหานคร (GPS 47P 0730826, 1407366)
Sampling Date Jan 03 - Jan 04, 2023
Sampling by Natthawut Duangpang

Time	Jan 03 - Jan 04, 2023		-		-		-		-		-		-		-	
	WS (m/s)	WD (deg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	0.5	195.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.8	326.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.3	194.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	1.7	242.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	1.0	299.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	1.4	312.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.5	317.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	1.1	313.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	1.6	289.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.6	312.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	1.0	301.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	1.0	333.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	1.7	304.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.9	299.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	1.1	291.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	1.0	308.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	1.8	310.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	1.4	334.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.7	329.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	1.4	310.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.9	324.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	1.1	312.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	0.8	322.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	1.2	334.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuth Jittrantong
Assistant General Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O :

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 22154334

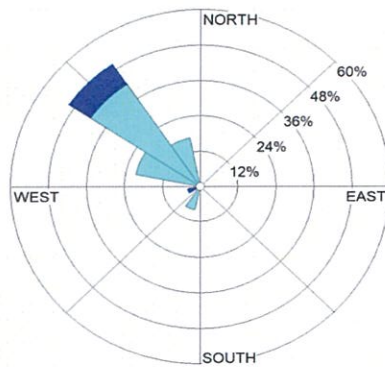
Date Received : Jan 04, 2023

Date Reported : Jan 07, 2023

Report Number : 2530937-1

Page 2 of 2

Wind Rose



Date : Jan 03-04, 2023

WS(m/s)	%
> 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.00
1.7-3.3	12.50
0.3-1.7	87.50
Calms	0.00

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Approved by

Sarayuth Jitranont
Assistant General Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 231659

Date Received : Feb 02, 2023

Date Reported : Feb 09, 2023

Report Number : 2535753-1C9

Page 1 of 3

Sample Number : 231659-1
Sampled Date : Feb 01, 2023
Sample Description : Air Quality
Location : กรุงเทพมหานคร (GPS 47P 0726292, 1407282)
Date Analysis Commenced : Feb 03, 2023
Condition of Sample : Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure : 756 mmHg
Atmospheric Temperature : 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/02/23 - 02/02/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/02/23 - 02/02/23	ug/m3	0.05	0.18	3.39	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/02/23 - 02/02/23	ug/m3	0.05	0.16	1.47	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/02/23 - 02/02/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/02/23 - 02/02/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	01/02/23 - 02/02/23	ug/m3	0.30	0.86	4.92	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/02/23 - 02/02/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/02/23 - 02/02/23	ug/m3	0.60	1.88	4.22	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Prachum Mit Bamrung Community station has moderate traffic, Clear sky, Normal activity, Nearby temple and Community

Sampled By : Sawai Tonpho

Remark :

- LOD : Limit of Detection

- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by

Sarat Mongkonjirawut
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 231659

Date Received : Feb 02, 2023

Date Reported : Feb 09, 2023

Report Number : 2535753-1C9

Page 3 of 3

Sample Number 231659-3
Sampled Date Feb 01, 2023
Sample Description Air Quality
Location กรุงเทพมหานคร (GPS 47P 0730826, 1407366)
Date Analysis Commenced Feb 03, 2023
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/02/23 - 02/02/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/02/23 - 02/02/23	ug/m3	0.05	0.18	4.44	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/02/23 - 02/02/23	ug/m3	0.05	0.16	1.66	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/02/23 - 02/02/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/02/23 - 02/02/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	01/02/23 - 02/02/23	ug/m3	0.30	0.86	4.89	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/02/23 - 02/02/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/02/23 - 02/02/23	ug/m3	0.60	1.88	6.93	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Map Cha Lood Community station has moderate traffic, Clear sky, Normal activity, Nearby temple and Community

Sampled By : Sawai Tonpho

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Sararat Mongkonjirawut
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 231659

Date Received : Feb 02, 2023

Date Reported : Feb 09, 2023

Report Number : 2535753-1C9

Page 2 of 3

Sample Number 231659-2
Sampled Date Feb 01, 2023
Sample Description Air Quality
Location กรุงเทพมหานคร (GPS 47P 0724377, 1402458)
Date Analysis Commenced Feb 03, 2023
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/02/23 - 02/02/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/02/23 - 02/02/23	ug/m3	0.05	0.18	4.04	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/02/23 - 02/02/23	ug/m3	0.05	0.16	1.41	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/02/23 - 02/02/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/02/23 - 02/02/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	01/02/23 - 02/02/23	ug/m3	0.30	0.86	4.06	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/02/23 - 02/02/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/02/23 - 02/02/23	ug/m3	0.60	1.88	3.92	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Pa Yoon Community station has moderate traffic, Clear sky, Normal activity, Nearby temple and Community

Sampled By : Sawai Tonpho

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Sararat Mongkonjirawut
Supervisor

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7267-21/ EMAIL



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O :
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID : 231669
Date Received : Feb 02, 2023
Date Reported : Feb 09, 2023
Report Number : 2535759-1

Page 1 of 2

Sample Number : 231669-1
Parameter : Wind Speed / Wind Direction
Location : กรุงเทพมหานคร (GPS 47P 0730826, 1407366)
Sampling Date : Feb 01 - Feb 02, 2023
Sampling by : Sawai Tonpho

Time	Feb 01 - Feb 02, 2023															
	WS (m/s)	WD (deg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	0.6	99.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	0.8	90.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	1.2	142.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.9	144.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	1.7	99.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	1.0	123.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.8	61.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	1.0	138.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.8	199.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.3	163.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.3	178.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.4	301.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	0.3	302.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuth Jitranont
Assistant General Manager

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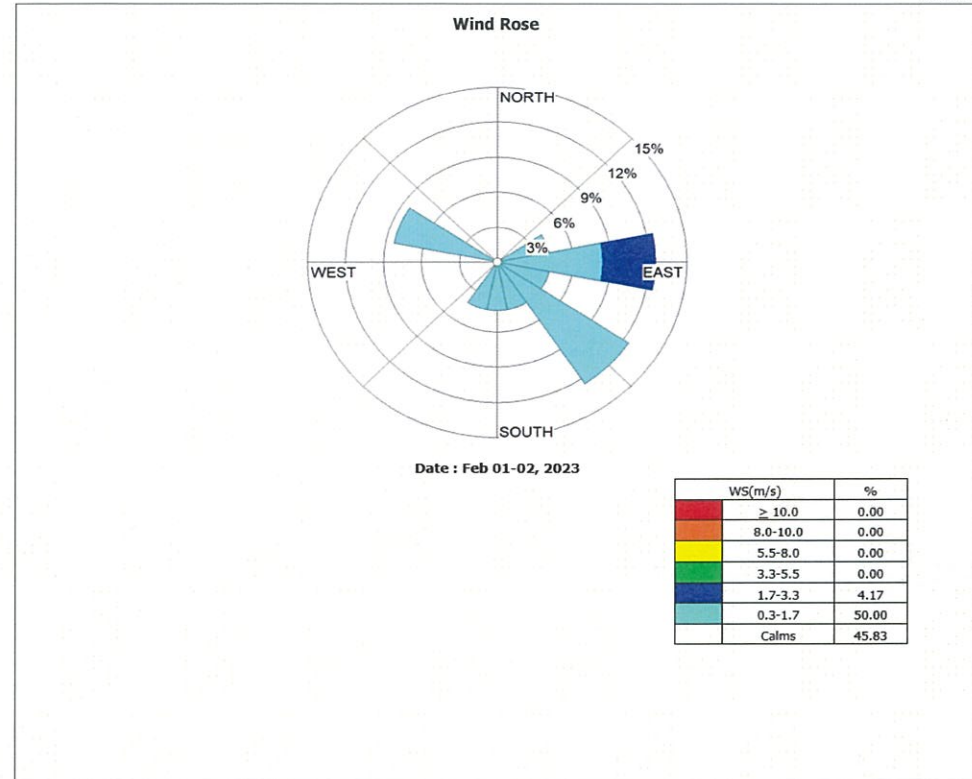
Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O :
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID : 231669
Date Received : Feb 02, 2023
Date Reported : Feb 09, 2023
Report Number : 2535759-1

Page 2 of 2



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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2320914

Date Received : Mar 03, 2023

Date Reported : Mar 17, 2023

Report Number : 2596120-1C9

Page 1 of 3

Sample Number 2320914-1
Sampled Date Mar 01, 2023
Sample Description Air Quality
Location กรุงเทพมหานคร (GPS 47P 0726292, 1407282)
Date Analysis Commenced Mar 03, 2023
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure 760 mmHg
Atmospheric Temperature 34.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/03/23 - 02/03/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/03/23 - 02/03/23	ug/m3	0.05	0.18	5.23	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/03/23 - 02/03/23	ug/m3	0.05	0.16	2.17	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/03/23 - 02/03/23	ug/m3	0.60	1.76	<1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/03/23 - 02/03/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	01/03/23 - 02/03/23	ug/m3	0.30	0.86	3.06	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/03/23 - 02/03/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/03/23 - 02/03/23	ug/m3	0.60	1.88	3.69	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Prachum Mit Bamrung Community station has moderate traffic, Cloudy, Normal activity, Nearby temple, school and Community

Sampled By : Saknarin Jaraskay

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

D. Changchon

Dej Changchon
Senior Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2320914

Date Received : Mar 03, 2023

Date Reported : Mar 17, 2023

Report Number : 2596120-1C9

Page 3 of 3

Sample Number 2320914-3
Sampled Date Mar 01, 2023
Sample Description Air Quality
Location กรุงเทพมหานคร (GPS 47P 0730826, 1407366)
Date Analysis Commenced Mar 03, 2023
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure 760 mmHg
Atmospheric Temperature 34.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/03/23 - 02/03/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/03/23 - 02/03/23	ug/m3	0.05	0.18	4.69	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/03/23 - 02/03/23	ug/m3	0.05	0.16	1.60	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/03/23 - 02/03/23	ug/m3	0.60	1.76	<1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/03/23 - 02/03/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	01/03/23 - 02/03/23	ug/m3	0.30	0.86	1.65	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/03/23 - 02/03/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/03/23 - 02/03/23	ug/m3	0.60	1.88	5.35	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Map Cha Lood Community station has moderate traffic, Cloudy, Normal activity, Nearby temple, school and Community

Sampled By : Saknarin Jaraskay

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

D. Changchon

Dej Changchon
Senior Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2320914
Date Received : Mar 03, 2023
Date Reported : Mar 17, 2023
Report Number : 2596120-1C9

Sample Number : 2320914-2
Sampled Date : Mar 01, 2023
Sample Description : Air Quality
Location : กรุงเทพมหานคร (GPS 47P 0724377, 1402458)
Date Analysis Commenced : Mar 03, 2023
Condition of Sample : Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure : 760 mmHg
Atmospheric Temperature : 34.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/03/23 - 02/03/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/03/23 - 02/03/23	ug/m3	0.05	0.18	3.61	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/03/23 - 02/03/23	ug/m3	0.05	0.16	1.98	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/03/23 - 02/03/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/03/23 - 02/03/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	01/03/23 - 02/03/23	ug/m3	0.30	0.86	1.96	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/03/23 - 02/03/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/03/23 - 02/03/23	ug/m3	0.60	1.88	2.86	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :
NEB : Notification of National Environment Board, B.E. 2560 (2017)
PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)
Note : - Pa Yoon Community station has moderate traffic, Cloudy, Normal activity, Nearby temple, school and Community
Sampled By : Saknarin Jaraskay

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Dej Changchon

Dej Changchon
Senior Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130
P/O : 4514156966
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID : 2320924
Date Received : Mar 03, 2023
Date Reported : Mar 09, 2023
Report Number : 2576782-1

Sample Number : 2320924-1
Parameter : Wind Speed / Wind Direction
Location : กรุงเทพมหานคร (GPS 47P 0730826, 1407366)
Sampling Date : Mar 01 - Mar 02, 2023
Sampling by : Saknarin Jaraskay

Time	Mar 01 - Mar 02, 2023		-		-		-		-		-		-		-	
	WS (m/s)	WD (deg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	2.1	20.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	2.9	27.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	1.5	241.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.5	314.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	1.2	299.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.5	249.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.3	166.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	1.2	263.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.6	273.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.8	275.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	1.3	56.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.9	34.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	0.6	16.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	1.2	16.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.3	27.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.5	27.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.7	27.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.3	27.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	0.7	27.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	1.0	319.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	0.6	31.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	0.6	45.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.5	23.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Sarayuth Jitranont

Sarayuth Jitranont
Assistant General Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 2320924

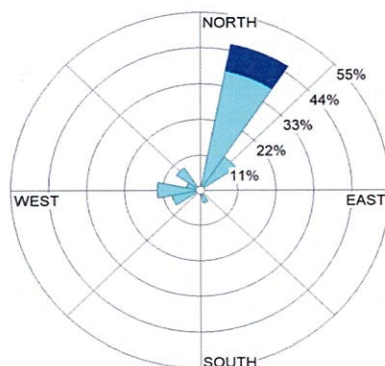
Date Received : Mar 03, 2023

Date Reported : Mar 09, 2023

Report Number : 2576782-1

Page 2 of 2

Wind Rose



Date : Mar 01-02, 2023

WS(m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.00
1.7-3.3	8.33
0.3-1.7	87.50
Calms	4.17

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2336706

Date Received : Apr 04, 2023

Date Reported : Apr 11, 2023

Report Number : 2610615-1C9

Page 1 of 3

Sample Number : 2336706-1
Sampled Date : Apr 03, 2023
Sample Description : Air Quality
Location : ชุมชนบ้านประทุมมิตรบางจ (GPS 47P 0726292, 1407282)
Date Analysis Commenced : Apr 05, 2023
Condition of Sample : Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure : 756 mmHg
Atmospheric Temperature : 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	03/04/23 - 04/04/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	03/04/23 - 04/04/23	ug/m3	0.05	0.18	1.41	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	03/04/23 - 04/04/23	ug/m3	0.05	0.16	0.38	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	03/04/23 - 04/04/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	03/04/23 - 04/04/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	03/04/23 - 04/04/23	ug/m3	0.30	0.86	1.27	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	03/04/23 - 04/04/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	03/04/23 - 04/04/23	ug/m3	0.60	1.88	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Prachum Mit Bamrung Community station has moderate traffic clear sky, Normal activit, Nearby temple and Community

Sampled By : Wichan Choonharat

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by

Tanyatorm Mongkonjirawut
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2336706
Date Received : Apr 04, 2023
Date Reported : Apr 11, 2023
Report Number : 2610615-1C9

Page 3 of 3

Sample Number 2336706-3
Sampled Date Apr 03, 2023
Sample Description Air Quality
Location กรุงเทพมหานคร (GPS 47P 0730826, 1407366)
Date Analysis Commenced Apr 05, 2023
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	03/04/23 - 04/04/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	03/04/23 - 04/04/23	ug/m3	0.05	0.18	1.33	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	03/04/23 - 04/04/23	ug/m3	0.05	0.16	0.45	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	03/04/23 - 04/04/23	ug/m3	0.60	1.76	<1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	03/04/23 - 04/04/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	03/04/23 - 04/04/23	ug/m3	0.30	0.86	2.51	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	03/04/23 - 04/04/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	03/04/23 - 04/04/23	ug/m3	0.60	1.88	2.34	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)
PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)
Note : - Map Cha Lood Community station has moderate traffic, Clear sky, Normal activity, Nearby temple, school and Community

Sampled By : Wichan Choonharat

Remark :

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Approved by

Tanyatorn Mongkonjirawat
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2336706
Date Received : Apr 04, 2023
Date Reported : Apr 11, 2023
Report Number : 2610615-1C9

Page 2 of 3

Sample Number 2336706-2
Sampled Date Apr 03, 2023
Sample Description Air Quality
Location กรุงเทพมหานคร (GPS 47P 0724377, 1402458)
Date Analysis Commenced Apr 05, 2023
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure 756 mmHg
Atmospheric Temperature 32.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	03/04/23 - 04/04/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	03/04/23 - 04/04/23	ug/m3	0.05	0.18	1.30	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	03/04/23 - 04/04/23	ug/m3	0.05	0.16	0.19	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	03/04/23 - 04/04/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	03/04/23 - 04/04/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	03/04/23 - 04/04/23	ug/m3	0.30	0.86	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	03/04/23 - 04/04/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	03/04/23 - 04/04/23	ug/m3	0.60	1.88	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)
PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)
Note : - Pa Yoon Community station has moderate traffic, Clear sky, Normal activity, Nearby temple, school and Community

Sampled By : Wichan Choonharat

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Tanyatorn Mongkonjirawat
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 2336708

Date Received : Apr 04, 2023

Date Reported : Apr 07, 2023

Report Number : 2610622-1

Page 1 of 2

Sample Number : 2336708-1
Parameter : Wind Speed / Wind Direction
Location : วิทยาสถาณ (GPS 47P 0730826, 1407366)
Sampling Date : Apr 03 - Apr 04, 2023
Sampling by : Wichan Choonharat

Time	Apr 03 - Apr 04, 2023															
	WS (m/s)	WD (deg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	1.8	154.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	1.0	153.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.4	120.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	1.0	66.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.4	180.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.7	165.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.6	142.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.4	136.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	2.2	108.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	2.1	150.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	1.3	97.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.6	163.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	1.4	63.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	1.0	183.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	2.8	183.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	1.0	168.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	1.1	177.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	1.1	114.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	0.3	188.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	1.7	90.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	1.0	123.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.3	148.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	0.4	154.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuth Jitranont
Assistant General Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 2336708

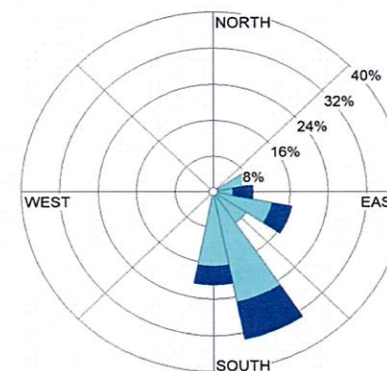
Date Received : Apr 04, 2023

Date Reported : Apr 07, 2023

Report Number : 2610622-1

Page 2 of 2

Wind Rose



Date : Apr 03-04, 2023

WS(m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.00
1.7-3.3	20.83
0.3-1.7	75.00
Calms	4.17

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2347997
Date Received : May 06, 2023
Date Reported : May 17, 2023
Report Number : 2635864-1C9

Page 1 of 3

Sample Number 2347997-1
Sampled Date May 05, 2023
Sample Description Air Quality
Location กรุงเทพมหานคร (GPS 47P 0726292, 1407282)
Date Analysis Commenced May 09, 2023
Condition of Sample Drawn into one 6-L Canister, one sorbent tube and one amber plastic bottle, refrigerated
Barometric Pressure 756 mmHg
Atmospheric Temperature 34.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	05/05/23 - 06/05/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	05/05/23 - 06/05/23	ug/m3	0.05	0.18	4.62	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	05/05/23 - 06/05/23	ug/m3	0.05	0.16	0.26	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	05/05/23 - 06/05/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	05/05/23 - 06/05/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	05/05/23 - 06/05/23	ug/m3	0.30	0.86	<0.86	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	05/05/23 - 06/05/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	05/05/23 - 06/05/23	ug/m3	0.60	1.88	<1.88	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)
PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)
Note : - Prachum Mit Bamrung Community station has moderate traffic clear sky, Normal activit, Nearby temple and Community

Sampled By : Chatchai Sukpia

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Tanyatorn Mongkonjirawut
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2347997
Date Received : May 06, 2023
Date Reported : May 17, 2023
Report Number : 2635864-1C9

Page 3 of 3

Sample Number 2347997-3
Sampled Date May 05, 2023
Sample Description Air Quality
Location กรุงเทพมหานคร (GPS 47P 0730826, 1407366)
Date Analysis Commenced May 09, 2023
Condition of Sample Drawn into one 6-L Canister, one sorbent tube and one amber plastic bottle, refrigerated
Barometric Pressure 756 mmHg
Atmospheric Temperature 34.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	05/05/23 - 06/05/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	05/05/23 - 06/05/23	ug/m3	0.05	0.18	7.07	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	05/05/23 - 06/05/23	ug/m3	0.05	0.16	0.38	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	05/05/23 - 06/05/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	05/05/23 - 06/05/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	05/05/23 - 06/05/23	ug/m3	0.30	0.86	<0.86	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	05/05/23 - 06/05/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	05/05/23 - 06/05/23	ug/m3	0.60	1.88	<1.88	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)
PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)
Note : - Map Cha Lood Community station has moderate traffic, Clear sky, Normal activity, Nearby temple, school and Community

Sampled By : Chatchai Sukpia

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Tanyatorn Mongkonjirawut
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2347997
Date Received : May 06, 2023
Date Reported : May 17, 2023
Report Number : 2635864-1C9

Page 2 of 3

Sample Number 2347997-2
Sampled Date May 05, 2023
Sample Description Air Quality
Location ร่มถนนพหลโยธิน (GPS 47P 0724377, 1402458)
Date Analysis Commenced May 09, 2023
Condition of Sample Drawn into one 6-L Canister, one sorbent tube and one amber plastic bottle, refrigerated
Barometric Pressure 756 mmHg
Atmospheric Temperature 34.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	05/05/23 - 06/05/23	ug/m3	0.20	0.60	0.72	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	05/05/23 - 06/05/23	ug/m3	0.05	0.18	5.19	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	05/05/23 - 06/05/23	ug/m3	0.05	0.16	0.45	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	05/05/23 - 06/05/23	ug/m3	0.60	1.76	1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	05/05/23 - 06/05/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	05/05/23 - 06/05/23	ug/m3	0.30	0.86	<0.86	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	05/05/23 - 06/05/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	05/05/23 - 06/05/23	ug/m3	0.60	1.88	<1.88	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

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PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Pa Yoon Community station has moderate traffic, Clear sky, Normal activity, Nearby temple, school and Community

Sampled By : Chatchai Sukpia

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Tanyatarn Mongkonjirawut
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 2348009

Date Received : May 08, 2023

Date Reported : May 16, 2023

Report Number : 2635871-1

Page 1 of 2

Sample Number 2348009-1
Parameter Wind Speed / Wind Direction
Location ร่มถนนพหลโยธิน (GPS 47P 0730826, 1407366)
Sampling Date May 05 - May 06, 2023
Sampling by Chatchai Sukpia

Time	May 05 - May 06, 2023		-		-		-		-		-		-		-	
	WS (m/s)	WD (deg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	0.4	201.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	1.5	251.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.7	210.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	1.1	237.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	0.6	220.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	0.8	231.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.5	143.0	SE	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.3	158.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	1.0	200.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	2.2	193.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.7	243.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	1.0	246.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.5	211.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	2.4	249.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.4	108.0	ESE	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	1.1	271.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.7	260.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	2.1	227.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.8	287.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.9	286.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	1.6	225.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.8	269.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	2.0	210.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	1.5	251.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

Sarayuth Jitranont
Assistant General Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 2348009

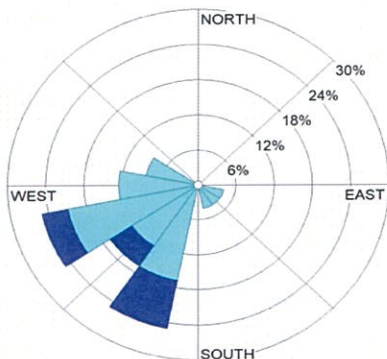
Date Received : May 08, 2023

Date Reported : May 16, 2023

Report Number : 2635871-1

Page 2 of 2

Wind Rose



Date : May 05-06, 2023

WS(m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.00
1.7-3.3	16.67
0.3-1.7	83.33
Calms	0.00

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2362372

Date Received : Jun 07, 2023

Date Reported : Jun 19, 2023

Report Number : 2667125-1C9

Page 1 of 3

Sample Number 2362372-1
Sampled Date Jun 06, 2023
Sample Description Air Quality
Location กรุงเทพมหานคร (GPS 47P 0726292, 1407282)
Date Analysis Commenced Jun 08, 2023
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure 756 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	06/06/23 - 07/06/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	06/06/23 - 07/06/23	ug/m3	0.05	0.18	3.14	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	06/06/23 - 07/06/23	ug/m3	0.05	0.16	<0.16	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	06/06/23 - 07/06/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	06/06/23 - 07/06/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	06/06/23 - 07/06/23	ug/m3	0.30	0.86	<0.86	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	06/06/23 - 07/06/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	06/06/23 - 07/06/23	ug/m3	0.60	1.88	<1.88	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Prachum Mit Bamrung Community station has moderate traffic Cloudy with light to moderate rain, Normal activit, Nearby temple and Community

Sampled By : Suphachai Wongsurichai

Remark :

- LOD : Limit of Detection

- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by

Tanyatorn Mongkonjirawut
Supervisor

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7267-21/ EMAIL



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2362372

Date Received : Jun 07, 2023

Date Reported : Jun 19, 2023

Report Number : 2667125-1C9

Page 3 of 3

Sample Number	2362372-3
Sampled Date	Jun 06, 2023
Sample Description	Air Quality
Location	ถนนพหลโยธิน (GPS 47P 0730826, 1407366)
Date Analysis Commenced	Jun 08, 2023
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure	756 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	06/06/23 - 07/06/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	06/06/23 - 07/06/23	ug/m3	0.05	0.18	3.39	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	06/06/23 - 07/06/23	ug/m3	0.05	0.16	<0.16	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	06/06/23 - 07/06/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	06/06/23 - 07/06/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	06/06/23 - 07/06/23	ug/m3	0.30	0.86	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	06/06/23 - 07/06/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	06/06/23 - 07/06/23	ug/m3	0.60	1.88	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Map Cha Lood Community station has moderate traffic, Cloudy with light to moderate rain, Normal activity, Nearby temple, school and Community

Sampled By : Suphachai Wongsurichai

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Tanyatorn Mongkonjirawut
Supervisor

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7267-21/ EMAIL



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4510824480

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2362372

Date Received : Jun 07, 2023

Date Reported : Jun 19, 2023

Report Number : 2667125-1C9

Page 2 of 3

Sample Number	2362372-2
Sampled Date	Jun 06, 2023
Sample Description	Air Quality
Location	ถนนพหลโยธิน (GPS 47P 0724377, 1402458)
Date Analysis Commenced	Jun 08, 2023
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure	756 mmHg
Atmospheric Temperature	31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	06/06/23 - 07/06/23	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	06/06/23 - 07/06/23	ug/m3	0.05	0.18	2.31	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	06/06/23 - 07/06/23	ug/m3	0.05	0.16	<0.16	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	06/06/23 - 07/06/23	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	06/06/23 - 07/06/23	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	06/06/23 - 07/06/23	ug/m3	0.30	0.86	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	06/06/23 - 07/06/23	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	06/06/23 - 07/06/23	ug/m3	0.60	1.88	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong

Guideline :

NEB : Notification of National Environment Board, B.E. 2560 (2017)

PCD : Notification of the Pollution Control Department, which was published in the Royal Government Gazette Vol. 126 Special Part 13 D dated January 27, B.E. 2552 (2009)

Note : - Pa Yoon Community station has moderate traffic, Cloudy with light to moderate rain, Normal activity, Nearby temple, school and Community

Sampled By : Suphachai Wongsurichai

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Tanyatorn Mongkonjirawut
Supervisor

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7267-21/ EMAIL



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 2362473

Date Received : Jun 07, 2023

Date Reported : Jun 15, 2023

Report Number : 2667207-1

Page 1 of 2

Sample Number : 2362473-1
Parameter : Wind Speed / Wind Direction
Location : ทุ่งนาบงกช (GPS 47P 0730826, 1407366)
Sampling Date : Jun 06 - Jun 07, 2023
Sampling by : Saknarin Jaraskay

Time	Jun 06 - Jun 07, 2023															
	WS (m/s)	WD (deg)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	0.6	235.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.5	210.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	2.8	285.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	0.6	208.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	3.0	262.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	1.1	225.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.8	233.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	1.6	240.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.7	257.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	1.3	265.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.6	259.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	1.7	304.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.5	267.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	1.7	242.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	1.0	268.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	1.4	226.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	1.0	229.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.8	294.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	0.6	196.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	2.6	290.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	2.2	310.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	1.3	300.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	2.0	280.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang,
Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID : 2362473

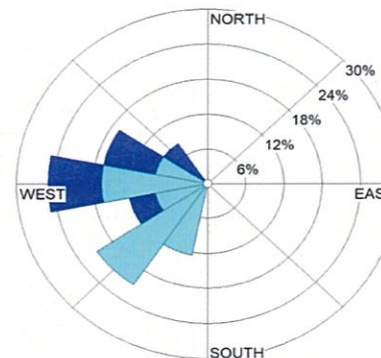
Date Received : Jun 07, 2023

Date Reported : Jun 15, 2023

Report Number : 2667207-1

Page 2 of 2

Wind Rose



Date : Jun 06-07, 2023

WS(m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.00
1.7-3.3	29.17
0.3-1.7	66.66
Calms	4.17

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4514156966
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant



TESTING
No.0042

Lot ID: 2314737
Date Received : Feb 16, 2023
Date Reported : Feb 23, 2023
Report Number: 2562497-1

Page 1 of 2

Sample Number 2314737-1
Sampled Date Feb 16, 2023
Sample Description Emission from Stationary Source
Location TOX1 (ERU Stack) (GPS 47P 0726915, 1405346)
Date Analysis Commenced Feb 17, 2023
Condition of Sample Extracted into three 2-L collection flasks, one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	759	mmHg	Diameter	3.00	m	Oxygen	9.5	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	6.5	%
Type of Process	Combustion		Stack Temperature	210	°C	Gas Velocity	5.1	m/s
Type of Fuel	Natural Gas		Moisture	13.75	%	Flow Rate (Actual O2)	68579	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 %O ₂	Result at 9.5 % O ₂	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing										
Oxides of Nitrogen *	11:00 AM - 11:15 AM	ppm	-	1.06	17.2	14.11	200	72	United States Environmental Protection Agency, EPA Method 7	Rayong
Total Suspended Particulate	10:50 AM - 11:38 AM	mg/m3	-	0.5	<0.5	<0.5	320	35	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline :

Guideline
1). Notification of the Ministry of Industry 2006 (B.E. 2549) Published in the Royal Government Gazette, Vol.123 Special Part 125 D, dated December 4, 2006 (B.E. 2549)
2). Emission Air Standard according to EIA study of HPPO Plant, Approval Letter No. Tor Sor 1009.8/7196 dated June 09, 2017 (B.E. 2560)

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)
โทรศัพท์ ๖-323-๙-9447

Approved by

D. Chanchon

Dej Chanchon
Senior Manager
โทรศัพท์ ๖-323-๙-9442

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S:\Report_Air Stack_O2_2GL.rpt (4:14PM)

8525-209/ EMAIL



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4514156966
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant



TESTING
No.0042

Lot ID: 2314737
Date Received : Feb 16, 2023
Date Reported : Feb 23, 2023
Report Number: 2562497-1

Page 2 of 2

Sample Number 2314737-1
Sampled Date Feb 16, 2023
Sample Description Emission from Stationary Source
Location TOX1 (ERU Stack) (GPS 47P 0726915, 1405346)
Date Analysis Commenced Feb 17, 2023
Condition of Sample Extracted into three 2-L collection flasks, one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	759	mmHg	Diameter	3.00	m	Oxygen	9.5	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	6.5	%
Type of Process	Combustion		Stack Temperature	210	°C	Gas Velocity	5.1	m/s
Type of Fuel	Natural Gas		Moisture	13.75	%	Flow Rate (Actual O2)	68579	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Oxides of Nitrogen *	11:00 AM - 11:15 AM	g/s	-	-	0.507	-	2.0	Calculated	Rayong
Total Suspended Particulate *	10:50 AM - 11:38 AM	g/s	-	-	<0.01	-	0.52	Calculated	Rayong

Guideline :

Guideline
1). Notification of the Ministry of Industry 2006 (B.E. 2549) Published in the Royal Government Gazette, Vol.123 Special Part 125 D, dated December 4, 2006 (B.E. 2549)
2). Emission Air Standard according to EIA study of HPPO Plant, Approval Letter No. Tor Sor 1009.8/7196 dated June 09, 2017 (B.E. 2560)

Sampled By : Anurak Tongkhajonsakda

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)
โทรศัพท์ ๖-323-๙-9447

Approved by

D. Chanchon

Dej Chanchon
Senior Manager
โทรศัพท์ ๖-323-๙-9442

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Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2314739

Date Received : Feb 16, 2023

Date Reported : Feb 23, 2023

Report Number: 2562504-1

Page 1 of 2

Sample Number 2314739-1
Sampled Date Feb 16, 2023
Sample Description Emission from Stationary Source
Location TOX2 (ERU Stack)
Date Analysis Commenced Feb 17, 2023
Condition of Sample Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	759	mmHg	Diameter	3.00	m	Oxygen	9.5	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	6.5	%
Type of Process	Combustion		Stack Temperature	196	°C	Gas Velocity	4.4	m/s
Type of Fuel	Natural Gas		Moisture	19.20	%	Flow Rate (Actual O2)	57781	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 % O ₂ at 9.5 % O ₂	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Oxides of Nitrogen *	11:05 AM - 11:20 AM	ppm	-	1.06	10.7 8.78	200	72	United States Environmental Protection Agency, EPA Method 7	Rayong
Total Suspended Particulate	11:02 AM - 12:02 PM	mg/m3	-	0.5	<0.5 <0.5	320	35	United States Environmental Protection Agency, EPA Method 5	Rayong

Guideline :

Guideline

- 1).Notification of the Ministry of Industry 2006 (B.E. 2549) Published in the Royal Government Gazette, Vol.123 Special Part 125 D, dated December 4, 2006 (B.E. 2549)
- 2).Emission Air Standard according to EIA study of HPPO Plant, Approval Letter No. Tor Sor 1009.8/7196 dated June 09, 2017 (B.E. 2560)

Technical Management

Thanitak

Thanita Kulsuriwong
Scientist (4)
หมายเลขโทรศัพท์ 3-323-9-9447

Approved by

D. Chongchon

Dej Changchon
Senior Manager
หมายเลขโทรศัพท์ 3-323-9-9442

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Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2314739

Date Received : Feb 16, 2023

Date Reported : Feb 23, 2023

Report Number: 2562504-1

Page 2 of 2

Sample Number 2314739-1
Sampled Date Feb 16, 2023
Sample Description Emission from Stationary Source
Location TOX2 (ERU Stack)
Date Analysis Commenced Feb 17, 2023
Condition of Sample Extracted into two 2-L collection flasks, one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	759	mmHg	Diameter	3.00	m	Oxygen	9.5	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	6.5	%
Type of Process	Combustion		Stack Temperature	196	°C	Gas Velocity	4.4	m/s
Type of Fuel	Natural Gas		Moisture	19.20	%	Flow Rate (Actual O2)	57781	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Oxides of Nitrogen *	11:05 AM - 11:20 AM	g/s	-	-	0.266	-	2.8	Calculated	Rayong
Total Suspended Particulate *	11:02 AM - 12:02 PM	g/s	-	-	<0.008	-	0.52	Calculated	Rayong

Guideline :

Guideline

- 1).Notification of the Ministry of Industry 2006 (B.E. 2549) Published in the Royal Government Gazette, Vol.123 Special Part 125 D, dated December 4, 2006 (B.E. 2549)
- 2).Emission Air Standard according to EIA study of HPPO Plant, Approval Letter No. Tor Sor 1009.8/7196 dated June 09, 2017 (B.E. 2560)

Sampled By : Kantaphon Maneesampan

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.

Technical Management

Thanitak

Thanita Kulsuriwong
Scientist (4)
หมายเลขโทรศัพท์ 3-323-9-9447

Approved by

D. Chongchon

Dej Changchon
Senior Manager
หมายเลขโทรศัพท์ 3-323-9-9442

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การตรวจสอบประสิทธิภาพระบบ CEMs



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4512888163
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 22129789
Date Received : Dec 15, 2022
Date Reported : Dec 20, 2022
Report Number : 2472125-1

Sample Number	22129789-1
Sampled Date	Dec 14, 2022
Sample Description	Emission from Stationary Source
Location	TOX1 (ERU Stack)
Parameter	NOx

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual O2		Corrected Value at 7% O2		Difference
		Start	Stop	CEMs (ppm)	RM (ppm)	CEMs (ppm)	RM (ppm)	
1*	14 Dec 22	11:25	11:45	5.58	8.92	8.10	12.52	4.42
2*	14 Dec 22	11:46	12:06	5.28	8.60	7.56	11.92	4.36
3	14 Dec 22	12:07	12:27	5.35	8.66	7.64	11.96	4.32
4	14 Dec 22	12:28	12:48	5.18	8.49	7.40	11.74	4.33
5*	14 Dec 22	12:49	13:09	5.05	8.38	7.29	11.67	4.38
6	14 Dec 22	13:10	13:30	5.21	8.47	7.47	11.74	4.27
7	14 Dec 22	13:31	13:51	5.44	8.60	7.79	11.92	4.13
8	14 Dec 22	13:52	14:12	5.44	8.66	7.81	12.05	4.24
9	14 Dec 22	14:13	14:33	5.35	8.62	7.70	12.02	4.32
10	14 Dec 22	14:34	14:54	5.50	8.68	7.83	11.98	4.15
11	14 Dec 22	14:55	15:15	5.57	8.78	7.93	12.12	4.19
12	14 Dec 22	15:16	15:36	5.20	8.48	7.48	11.81	4.33
Average						7.67	11.93	4.25
Confidence Coefficient (CC)								0.06
Relative Accuracy (Compared with Emission Standard : 72 ppm) (%)								5.99
Relative Accuracy Criteria ^{1/} (Compared with Emission Standard)								≤ 10%

Reference Method : US EPA Method 7E

Remark: * Sample with * is a rejected data

^{1/} Relative Accuracy Criteria of NOx is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 2 (PS-2) compared with Emission Standard 72 ppm at 7%O2
RA Result is within Criteria

Technical Management

Wichan Choonharat
Manager
โทรศัพท์ ๖-204-๖-6113

Approved by

Sarayuth Jitranont
Assistant General Manager
โทรศัพท์ ๖-204-๖-4702



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4512888163
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 22129789
Date Received : Dec 15, 2022
Date Reported : Dec 20, 2022
Report Number : 2472125-1

Sample Number	22129789-1
Sampled Date	Dec 14, 2022
Sample Description	Emission from Stationary Source
Location	TOX1 (ERU Stack)
Parameter	CO

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual O2		Corrected Value at 7% O2		Difference
		Start	Stop	CEMs (ppm)	RM (ppm)	CEMs (ppm)	RM (ppm)	
1	14 Dec 22	11:25	11:45	0.54	0.21	0.78	0.29	-0.49
2	14 Dec 22	11:46	12:06	0.50	0.34	0.72	0.47	-0.25
3	14 Dec 22	12:07	12:27	0.50	0.24	0.72	0.33	-0.39
4	14 Dec 22	12:28	12:48	0.48	0.27	0.68	0.38	-0.30
5	14 Dec 22	12:49	13:09	0.50	0.31	0.73	0.43	-0.30
6	14 Dec 22	13:10	13:30	0.48	0.14	0.68	0.19	-0.49
7*	14 Dec 22	13:31	13:51	0.52	0.15	0.74	0.21	-0.53
8*	14 Dec 22	13:52	14:12	0.60	0.09	0.85	0.12	-0.73
9*	14 Dec 22	14:13	14:33	0.52	0.12	0.75	0.16	-0.58
10	14 Dec 22	14:34	14:54	0.48	0.19	0.68	0.26	-0.41
11	14 Dec 22	14:55	15:15	0.45	0.26	0.64	0.36	-0.28
12	14 Dec 22	15:16	15:36	0.52	0.32	0.75	0.44	-0.31
Average						0.71	0.35	-0.36
Confidence Coefficient (CC)								0.07
Relative Accuracy (Compared with Emission Standard : 690 ppm) (%)								0.06
Relative Accuracy Criteria ^{1/} (Compared with Emission Standard)								≤ 5%

Reference Method : US EPA Method 10

Remark: * Sample with * is a rejected data

^{1/} Relative Accuracy Criteria of CO is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 4 (PS-4) compared with Emission Standard 690 ppm at 7%O2
RA Result is within Criteria

Technical Management

Wichan Choonharat
Manager
โทรศัพท์ ๖-204-๖-6113

Approved by

Sarayuth Jitranont
Assistant General Manager
โทรศัพท์ ๖-204-๖-4702

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4512888163
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPP0-TPO Plant

Lot ID: 22129789
Date Received : Dec 15, 2022
Date Reported : Dec 20, 2022
Report Number : 2472125-1

Sample Number 22129789-1
Sampled Date Dec 14, 2022
Sample Description Emission from Stationary Source
Location TOX1 (ERU Stack)
Parameter O2

Page 3 of 3

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual		Difference
		Start	Stop	CEMs (%)	RM (%)	
1	14 Dec 22	11:25	11:45	11.32	11.00	-0.33
2*	14 Dec 22	11:46	12:06	11.20	10.87	-0.33
3	14 Dec 22	12:07	12:27	11.17	10.83	-0.33
4*	14 Dec 22	12:28	12:48	11.18	10.85	-0.34
5*	14 Dec 22	12:49	13:09	11.25	10.92	-0.34
6	14 Dec 22	13:10	13:30	11.20	10.88	-0.32
7	14 Dec 22	13:31	13:51	11.19	10.87	-0.32
8	14 Dec 22	13:52	14:12	11.22	10.91	-0.32
9	14 Dec 22	14:13	14:33	11.24	10.93	-0.31
10	14 Dec 22	14:34	14:54	11.14	10.84	-0.31
11	14 Dec 22	14:55	15:15	11.14	10.83	-0.31
12	14 Dec 22	15:16	15:36	11.23	10.92	-0.31
Average				11.21	10.89	-0.32
Confidence Coefficient (CC)						-
Relative Accuracy (Compared in Actual) (%)						0.32
Relative Accuracy Criteria (%)						≤ 1%

Reference Method : US EPA Method 3A

Remark: * Sample with * is a rejected data

^{1/} Relative Accuracy Criteria of O2 is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 3 (PS-3)

RA Result is within Criteria

Sampled By : Saksit Phaisanphisut โทร 02-04-5427

Technical Management

Wichan Choonharat
Manager
โทร 02-04-6113

Approved by

Sarayuth Jitranont
Assistant General Manager
โทร 02-04-4702

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4513914623
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPP0-TPO Plant

Lot ID: 22129790
Date Received : Dec 15, 2022
Date Reported : Dec 27, 2022
Report Number : 2472146-2

Sample Number 22129790-1
Sampled Date Dec 14, 2022
Sample Description Emission from Stationary Source
Location TOX1 (ERU Stack)
Parameter Flowrate

Page 1 of 1

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual		Difference
		Start	Stop	CEMs (Nm3/Hr)	RM (Nm3/Hr)	
1	14 Dec 22	11:25	11:45	79,400	78756	-644
2	14 Dec 22	11:46	12:06	78,991	78744	-247
3	14 Dec 22	12:07	12:27	78,612	78761	149
4	14 Dec 22	12:28	12:48	79,644	78761	-883
5	14 Dec 22	12:49	13:09	79,421	78756	-665
6	14 Dec 22	13:10	13:30	79,156	78756	-400
7	14 Dec 22	13:31	13:51	79,737	78627	-1110
8*	14 Dec 22	13:52	14:12	80,194	78632	-1562
9	14 Dec 22	14:13	14:33	79,804	78632	-1172
10	14 Dec 22	14:34	14:54	79,721	78627	-1094
11*	14 Dec 22	14:55	15:15	80,039	78632	-1407
12*	14 Dec 22	15:16	15:36	80,434	78632	-1802
Average				79,387	78,713	-674
Confidence Coefficient (CC)						343
Relative Accuracy ^{1/} (Compared with RM) (%)						1.29
Relative Accuracy Criteria (Compared with RM)						≤ 20 %

Reference Method : US EPA Method 2

Remark: * Sample with * is a rejected data

^{1/} Relative Accuracy Criteria of Flowrate is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 6 (PS-6)

RA Result is within Criteria

Sampled By : Tinnakorn Kulchart

Technical Management

Wichan Choonharat
Manager
โทร 02-04-6113

Approved by

Sarayuth Jitranont
Assistant General Manager
โทร 02-04-4702

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4512888163

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 22117137

Date Received : Sep 28, 2022

Date Reported : Oct 18, 2022

Report Number : 2442293-1

Sample Number 22117137-1
Sampled Date Sep 27, 2022
Sample Description Emission from Stationary Source
Location TOX2 (ERU Stack) (GPS 47P 0726941 1405348)
Parameter NOx

Page 1 of 3

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual O2		Corrected Value at 7% O2		Difference
		Start	Stop	CEMs (ppm)	RM (ppm)	CEMs (ppm)	RM (ppm)	
1*	27 Sep 22	12:00	12:20	10.86	12.66	11.66	13.72	2.07
2	27 Sep 22	12:21	12:41	10.99	12.71	11.80	13.78	1.97
3	27 Sep 22	12:42	13:02	10.92	12.67	11.83	13.81	1.98
4	27 Sep 22	13:03	13:23	11.10	12.77	11.99	13.84	1.85
5	27 Sep 22	13:24	13:44	11.13	12.81	12.08	13.97	1.89
6	27 Sep 22	13:45	14:05	11.11	12.86	12.14	14.10	1.96
7	27 Sep 22	14:06	14:26	11.18	12.93	12.15	14.11	1.95
8	27 Sep 22	14:27	14:47	11.22	12.98	12.15	14.11	1.97
9	27 Sep 22	14:48	15:08	10.90	12.72	11.95	14.00	2.05
10*	27 Sep 22	15:09	15:29	10.98	12.81	11.93	13.98	2.06
11*	27 Sep 22	15:30	15:50	10.76	12.63	11.82	13.94	2.12
12	27 Sep 22	15:51	16:11	10.95	12.75	11.94	13.97	2.03
Average						12.00	13.97	1.96
Confidence Coefficient (CC)								0.05
Relative Accuracy (Compared with Emission Standard : 72 ppm) (%)								2.79
Relative Accuracy Criteria ^{1/} (Compared with Emission Standard)								≤ 10%

Reference Method : US EPA Method 7E

Remark: * Sample with * is a rejected data

^{1/} Relative Accuracy Criteria of NOx is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 2 (PS-2) compared with

Emission Standard 72 ppm at 7%O2

RA Result is within Criteria

Technical Management

Wichan Choonharat
Manager
ทะเบียนเลขที่ ๖-204-๖-6113

Approved by

Sarayuth Jitranont
Assistant General Manager
ทะเบียนเลขที่ ๖-204-๖-4702

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4512888163

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 22117137

Date Received : Sep 28, 2022

Date Reported : Oct 18, 2022

Report Number : 2442293-1

Sample Number 22117137-1
Sampled Date Sep 27, 2022
Sample Description Emission from Stationary Source
Location TOX2 (ERU Stack) (GPS 47P 0726941 1405348)
Parameter CO

Page 2 of 3

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual O2		Corrected Value at 7% O2		Difference
		Start	Stop	CEMs (ppm)	RM (ppm)	CEMs (ppm)	RM (ppm)	
1*	27 Sep 22	12:00	12:20	2.93	17.55	3.14	19.03	15.89
2*	27 Sep 22	12:21	12:41	3.13	12.07	3.37	13.08	9.72
3*	27 Sep 22	12:42	13:02	3.15	9.59	3.41	10.46	7.04
4	27 Sep 22	13:03	13:23	2.81	6.99	3.03	7.58	4.54
5	27 Sep 22	13:24	13:44	2.44	5.12	2.65	5.58	2.93
6	27 Sep 22	13:45	14:05	2.19	3.99	2.39	4.38	1.99
7	27 Sep 22	14:06	14:26	2.48	3.31	2.69	3.61	0.92
8	27 Sep 22	14:27	14:47	2.05	2.75	2.22	2.99	0.77
9	27 Sep 22	14:48	15:08	1.83	2.31	2.01	2.54	0.53
10	27 Sep 22	15:09	15:29	1.60	1.92	1.74	2.09	0.35
11	27 Sep 22	15:30	15:50	1.45	1.50	1.60	1.66	0.06
12	27 Sep 22	15:51	16:11	1.97	1.21	2.15	1.33	-0.82
Average						2.28	3.53	1.25
Confidence Coefficient (CC)								1.26
Relative Accuracy (Compared with Emission Standard : 690 ppm) (%)								0.36
Relative Accuracy Criteria ^{1/} (Compared with Emission Standard)								≤ 5%

Reference Method : US EPA Method 10

Remark: * Sample with * is a rejected data

^{1/} Relative Accuracy Criteria of CO is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 4 (PS-4) compared with

Emission Standard 690 ppm at 7%O2

RA Result is within Criteria

Technical Management

Wichan Choonharat
Manager
ทะเบียนเลขที่ ๖-204-๖-6113

Approved by

Sarayuth Jitranont
Assistant General Manager
ทะเบียนเลขที่ ๖-204-๖-4702

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 451288163

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 22117137

Date Received : Sep 28, 2022

Date Reported : Oct 18, 2022

Report Number : 2442293-1

Sample Number 22117137-1
Sampled Date Sep 27, 2022
Sample Description Emission from Stationary Source
Location TOX2 (ERU Stack) (GPS 47P 0726941 1405348)
Parameter O2

Page 3 of 3

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual		Difference
		Start	Stop	CEMs (%)	RM (%)	
1*	27 Sep 22	12:00	12:20	7.96	8.08	0.13
2*	27 Sep 22	12:21	12:41	7.96	8.08	0.11
3*	27 Sep 22	12:42	13:02	8.07	8.15	0.08
4	27 Sep 22	13:03	13:23	8.03	8.07	0.05
5	27 Sep 22	13:24	13:44	8.10	8.15	0.05
6	27 Sep 22	13:45	14:05	8.17	8.22	0.05
7	27 Sep 22	14:06	14:26	8.12	8.16	0.04
8	27 Sep 22	14:27	14:47	8.06	8.12	0.06
9	27 Sep 22	14:48	15:08	8.23	8.27	0.05
10	27 Sep 22	15:09	15:29	8.10	8.16	0.06
11	27 Sep 22	15:30	15:50	8.25	8.30	0.06
12	27 Sep 22	15:51	16:11	8.15	8.21	0.06
Average				8.13	8.19	0.05
Confidence Coefficient (CC)				-		-
Relative Accuracy (Compared in Actual) (%)				0.05		0.05
Relative Accuracy Criteria (%)				≤ 1%		≤ 1%

Reference Method : US EPA Method 3A

Remark: * Sample with * is a rejected data

^{1/} Relative Accuracy Criteria of O2 is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 3 (PS-3)

RA Result is within Criteria

Sampled By : Saksit Phaisanphisit

Technical Management

Wichan Choonharat
Manager
ทะเบียนเลขที่ 7-204-ก-6113

Approved by

Sarayuht Jitranont
Assistant General Manager
ทะเบียนเลขที่ 7-204-ก-4702

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 451288163

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 22117143

Date Received : Sep 28, 2022

Date Reported : Oct 18, 2022

Report Number : 2442423-2

Sample Number 22117143-1
Sampled Date Sep 27, 2022
Sample Description Emission from Stationary Source
Location TOX2 (ERU Stack)
Parameter Flowrate

Page 1 of 1

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual		Difference
		Start	Stop	CEMs (Nm3/Hr)	RM (Nm3/Hr)	
1	27 Sep 22	12:00	12:19	67,730	64,205	-3524
2	27 Sep 22	12:20	12:39	67,904	69,196	1292
3	27 Sep 22	12:40	12:59	67,840	64,205	-3635
4*	27 Sep 22	13:00	13:19	67,758	58,644	-9114
5	27 Sep 22	13:20	13:39	67,791	64,150	-3641
6	27 Sep 22	13:40	13:59	67,494	64,149	-3344
7	27 Sep 22	14:00	14:19	67,314	69,290	1976
8*	27 Sep 22	14:20	14:39	66,926	58,434	-8492
9	27 Sep 22	14:40	14:59	67,198	63,951	-3247
10	27 Sep 22	15:00	15:19	66,770	63,876	-2894
11*	27 Sep 22	15:20	15:39	67,165	58,313	-8852
12	27 Sep 22	15:40	15:59	67,339	68,904	1565
Average				67,487	65,769	-1717
Confidence Coefficient (CC)				1931		1931
Relative Accuracy ^{1/} (Compared with RM) (%)				5.55		5.55
Relative Accuracy Criteria (Compared with RM)				≤ 20 %		≤ 20 %

Reference Method : US EPA Method 2

Remark: * Sample with * is a rejected data

^{1/} Relative Accuracy Criteria of Flowrate is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 6 (PS-6)

RA Result is within Criteria

Sampled By : Saksit Phaisanphisit

Technical Management

Wichan Choonharat
Manager
ทะเบียนเลขที่ 7-204-ก-6113

Approved by

Sarayuht Jitranont
Assistant General Manager
ทะเบียนเลขที่ 7-204-ก-4702

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คุณภาพอากาศในสถานประกอบการ



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4514156966
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 232059
Date Received : Feb 08, 2023
Date Reported : Feb 16, 2023
Report Number : 2536562-1

Page 1 of 2

Sample Number 232059-1
Sampled Date Feb 06, 2023
Sample Description Air Quality
Location โรงงานหน่วยผลิตสาร PO
Date Analysis Commenced Feb 09, 2023
Condition of Sample Drawn into one 10-L air sampling bag and one sorbent tube, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Methane as Propane	09:30 AM - 11:30 AM	ppm	-	0.33	1.05	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Non Methane Hydrocarbon as Propane	09:30 AM - 11:30 AM	ppm	-	0.33	0.61	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Propylene Oxide	09:30 AM - 11:30 AM	ppm	-	0.10	<0.10	100	NIOSH (1994), 1612	MOL	Bangkok
Total Hydrocarbon as Propane	09:30 AM - 11:30 AM	ppm	-	0.33	1.66	No Standard	Total Hydrocarbon Analyzer	-	Rayong

Guideline :

MOL : Announcement of the Department of Labour Protection and Welfare on Threshold Limit Values of Hazardous Chemical Substances Dated August 3, B.E. 2560 (2017)

Sampled By : Natthapon Jiengwareewong

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Thanita K.

Thanita Kulsuriwong
Scientist (4)

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4514156966
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 232059
Date Received : Feb 08, 2023
Date Reported : Feb 16, 2023
Report Number : 2536562-1

Page 2 of 2

Sample Number 232059-2
Sampled Date Feb 06, 2023
Sample Description Air Quality
Location โรงงานหน่วยผลิตสาร PO
Date Analysis Commenced Feb 09, 2023
Condition of Sample Drawn into one 10-L air sampling bag and one sorbent tube, refrigerated
Barometric Pressure 757 mmHg
Atmospheric Temperature 31.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Methane as Propane	10:00 AM - 12:00 PM	ppm	-	0.33	1.11	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Non Methane Hydrocarbon as Propane	10:00 AM - 12:00 PM	ppm	-	0.33	0.63	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Propylene Oxide	10:00 AM - 12:00 PM	ppm	-	0.10	<0.10	100	NIOSH (1994), 1612	MOL	Bangkok
Total Hydrocarbon as Propane	10:00 AM - 12:00 PM	ppm	-	0.33	1.73	No Standard	Total Hydrocarbon Analyzer	-	Rayong

Guideline :

MOL : Announcement of the Department of Labour Protection and Welfare on Threshold Limit Values of Hazardous Chemical Substances Dated August 3, B.E. 2560 (2017)

Sampled By : Natthapon Jiengwareewong

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Thanita K.

Thanita Kulsuriwong
Scientist (4)

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2348239

Date Received : May 08, 2023

Date Reported : May 16, 2023

Report Number : 2636476-1

Page 1 of 2

Sample Number 2348239-1
Sampled Date May 08, 2023
Sample Description Air Quality
Location บริเวณหน่วยผลิตสาร PO
Date Analysis Commenced May 09, 2023
Condition of Sample Drawn into one 10-L air sampling bag and one sorbent tube, refrigerated
Barometric Pressure 755 mmHg
Atmospheric Temperature 34.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Methane as Propane	09:15 AM - 11:15 AM	ppm	-	0.33	1.03	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Non Methane Hydrocarbon as Propane	09:15 AM - 11:15 AM	ppm	-	0.33	<0.33	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Propylene Oxide	09:15 AM - 11:15 AM	ppm	-	0.10	<0.10	100	NIOSH (1994), 1612	MOL	Bangkok
Total Hydrocarbon as Propane	09:15 AM - 11:15 AM	ppm	-	0.33	1.03	No Standard	Total Hydrocarbon Analyzer	-	Rayong

Guideline :

MOL : Announcement of the Department of Labour Protection and Welfare on Threshold Limit Values of Hazardous Chemical Substances Dated August 3, B.E. 2560 (2017)

Sampled By : Norranon Tathongkham

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Saranya C.

Saranya Chalermtamrong
Scientist (4)

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2348239

Date Received : May 08, 2023

Date Reported : May 16, 2023

Report Number : 2636476-1

Page 2 of 2

Sample Number 2348239-2
Sampled Date May 08, 2023
Sample Description Air Quality
Location บริเวณหน่วยผลิตสาร PO
Date Analysis Commenced May 09, 2023
Condition of Sample Drawn into one 10-L air sampling bag and one sorbent tube, refrigerated
Barometric Pressure 755 mmHg
Atmospheric Temperature 34.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Methane as Propane	09:00 AM - 11:00 AM	ppm	-	0.33	1.03	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Non Methane Hydrocarbon as Propane	09:00 AM - 11:00 AM	ppm	-	0.33	0.46	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Propylene Oxide	09:10 AM - 11:10 AM	ppm	-	0.10	<0.10	100	NIOSH (1994), 1612	MOL	Bangkok
Total Hydrocarbon as Propane	09:00 AM - 11:00 AM	ppm	-	0.33	1.49	No Standard	Total Hydrocarbon Analyzer	-	Rayong

Guideline :

MOL : Announcement of the Department of Labour Protection and Welfare on Threshold Limit Values of Hazardous Chemical Substances Dated August 3, B.E. 2560 (2017)

Sampled By : Norranon Tathongkham

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Saranya C.

Saranya Chalermtamrong
Scientist (4)

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ระดับเสียงทั่วไป (Leq 24 hrs) บริเวณโรงงาน



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 231821

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577042-1

Page 1 of 1

Sample Number 231821-1
Parameter Noise (Leq 24 hrs.)
Location บริเวณรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date Feb 14 - Feb 15, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 1222724

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	60.6	77.7	58.8
10:00 AM - 11:00 AM	68.4	93.8	58.7
11:00 AM - 12:00 PM	60.7	78.1	58.7
12:00 PM - 01:00 PM	60.4	80.4	58.4
01:00 PM - 02:00 PM	60.7	81.0	58.8
02:00 PM - 03:00 PM	59.9	74.5	58.6
03:00 PM - 04:00 PM	60.3	77.8	58.6
04:00 PM - 05:00 PM	61.3	79.4	59.0
05:00 PM - 06:00 PM	62.3	80.3	59.4
06:00 PM - 07:00 PM	62.8	88.7	60.2
07:00 PM - 08:00 PM	61.6	75.2	60.5
08:00 PM - 09:00 PM	62.2	72.3	61.2
09:00 PM - 10:00 PM	61.6	69.1	60.8
10:00 PM - 11:00 PM	61.6	72.4	60.8
11:00 PM - 12:00 AM	60.9	69.9	60.2
12:00 AM - 01:00 AM	61.5	74.3	60.3
01:00 AM - 02:00 AM	60.9	67.3	60.3
02:00 AM - 03:00 AM	61.1	66.0	60.3
03:00 AM - 04:00 AM	60.9	66.3	60.1
04:00 AM - 05:00 AM	60.7	67.5	60.0
05:00 AM - 06:00 AM	62.2	83.9	59.9
06:00 AM - 07:00 AM	64.3	92.4	60.8
07:00 AM - 08:00 AM	62.6	77.9	59.8
08:00 AM - 09:00 AM	61.0	73.5	59.4

Leq Average 24 hrs. (dB(A))

62.2

Lmax (dB(A))

93.8

L90 (dB(A))

59.9

Ldn (dB(A))

68.2

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports\Air Noise.rpt (2.38PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 231821

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577043-1

Page 1 of 1

Sample Number 231821-2
Parameter Noise (Leq 24 hrs.)
Location บริเวณรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date Feb 15 - Feb 16, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 1222724

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	60.7	74.3	59.1
10:00 AM - 11:00 AM	60.6	80.2	58.5
11:00 AM - 12:00 PM	61.3	83.8	58.5
12:00 PM - 01:00 PM	60.7	80.9	58.6
01:00 PM - 02:00 PM	59.6	70.6	58.4
02:00 PM - 03:00 PM	59.9	81.6	58.5
03:00 PM - 04:00 PM	60.7	82.9	58.7
04:00 PM - 05:00 PM	61.3	75.2	58.9
05:00 PM - 06:00 PM	62.2	73.0	59.4
06:00 PM - 07:00 PM	61.5	82.8	59.7
07:00 PM - 08:00 PM	60.3	71.5	59.4
08:00 PM - 09:00 PM	60.2	71.1	59.4
09:00 PM - 10:00 PM	60.3	67.0	59.6
10:00 PM - 11:00 PM	60.6	72.9	60.0
11:00 PM - 12:00 AM	61.6	70.1	60.7
12:00 AM - 01:00 AM	60.8	72.0	60.2
01:00 AM - 02:00 AM	60.7	65.7	60.2
02:00 AM - 03:00 AM	61.9	69.3	60.0
03:00 AM - 04:00 AM	60.5	66.9	59.9
04:00 AM - 05:00 AM	60.7	66.9	60.2
05:00 AM - 06:00 AM	62.7	78.4	60.2
06:00 AM - 07:00 AM	63.4	86.1	60.3
07:00 AM - 08:00 AM	62.7	84.0	59.5
08:00 AM - 09:00 AM	61.4	79.0	59.1

Leq Average 24 hrs. (dB(A))

61.2

Lmax (dB(A))

86.1

L90 (dB(A))

59.4

Ldn (dB(A))

67.9

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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8525-209/ EMAIL

S:\Reports\Air Noise.rpt (2.38PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4514156966
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 231821
Date Received : Feb 21, 2023
Date Reported : Feb 24, 2023
Report Number: 2577044-1

Page 1 of 1

Sample Number 231821-3
Parameter Noise (Leq 24 hrs.)
Location บริเวณรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date Feb 16 - Feb 17, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 1222724

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	67.7	80.8	62.3
10:00 AM - 11:00 AM	64.1	82.2	61.8
11:00 AM - 12:00 PM	63.1	87.4	60.6
12:00 PM - 01:00 PM	63.4	83.1	60.6
01:00 PM - 02:00 PM	60.8	74.0	59.2
02:00 PM - 03:00 PM	60.3	71.5	58.9
03:00 PM - 04:00 PM	60.6	74.6	58.6
04:00 PM - 05:00 PM	61.5	78.4	58.8
05:00 PM - 06:00 PM	61.7	72.9	59.2
06:00 PM - 07:00 PM	60.6	71.3	59.6
07:00 PM - 08:00 PM	60.0	81.0	59.2
08:00 PM - 09:00 PM	60.5	69.5	59.5
09:00 PM - 10:00 PM	60.9	70.9	60.2
10:00 PM - 11:00 PM	61.3	70.2	60.4
11:00 PM - 12:00 AM	61.6	69.6	60.5
12:00 AM - 01:00 AM	61.5	70.2	60.4
01:00 AM - 02:00 AM	61.2	75.5	60.5
02:00 AM - 03:00 AM	62.0	66.0	61.2
03:00 AM - 04:00 AM	62.4	67.1	61.6
04:00 AM - 05:00 AM	62.3	68.0	61.5
05:00 AM - 06:00 AM	62.6	74.6	61.0
06:00 AM - 07:00 AM	64.1	82.7	61.3
07:00 AM - 08:00 AM	63.2	75.6	61.2
08:00 AM - 09:00 AM	62.0	73.9	60.8

Leq Average 24 hrs. (dB(A)) 62.4
Lmax (dB(A)) 87.4
L90 (dB(A)) 60.5
Ldn (dB(A)) 68.7
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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8525-209/ EMAIL

S:\Reports_Air Noise.rpt (2:38PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4514156966
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 231821
Date Received : Feb 21, 2023
Date Reported : Feb 24, 2023
Report Number: 2577045-1

Page 1 of 1

Sample Number 231821-4
Parameter Noise (Leq 24 hrs.)
Location บริเวณรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date Feb 17 - Feb 18, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 1222724

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	61.5	72.8	59.9
10:00 AM - 11:00 AM	61.1	73.8	59.1
11:00 AM - 12:00 PM	61.1	81.8	59.0
12:00 PM - 01:00 PM	60.8	71.9	58.5
01:00 PM - 02:00 PM	60.4	80.7	58.3
02:00 PM - 03:00 PM	61.2	78.8	59.6
03:00 PM - 04:00 PM	60.7	78.4	59.0
04:00 PM - 05:00 PM	61.8	78.2	59.7
05:00 PM - 06:00 PM	63.5	89.9	60.8
06:00 PM - 07:00 PM	62.2	86.3	60.7
07:00 PM - 08:00 PM	62.1	69.8	61.3
08:00 PM - 09:00 PM	62.7	82.6	61.5
09:00 PM - 10:00 PM	62.7	70.9	61.8
10:00 PM - 11:00 PM	62.9	74.0	62.0
11:00 PM - 12:00 AM	62.7	68.3	61.9
12:00 AM - 01:00 AM	62.4	67.9	61.7
01:00 AM - 02:00 AM	62.1	70.6	61.3
02:00 AM - 03:00 AM	61.4	63.6	60.7
03:00 AM - 04:00 AM	61.2	66.7	60.6
04:00 AM - 05:00 AM	61.2	72.6	60.4
05:00 AM - 06:00 AM	62.8	82.5	60.7
06:00 AM - 07:00 AM	64.8	91.0	61.0
07:00 AM - 08:00 AM	61.8	76.6	60.3
08:00 AM - 09:00 AM	61.4	75.7	60.0

Leq Average 24 hrs. (dB(A)) 62.1
Lmax (dB(A)) 91.0
L90 (dB(A)) 60.6
Ldn (dB(A)) 68.8
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (2:40PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 231821

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577046-1

Page 1 of 1

Sample Number	231821-5
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณพื้นที่ของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date	Feb 18 - Feb 19, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 1222724

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	61.8	72.0	60.3
10:00 AM - 11:00 AM	62.0	75.3	60.2
11:00 AM - 12:00 PM	62.2	83.1	59.9
12:00 PM - 01:00 PM	61.3	80.2	59.1
01:00 PM - 02:00 PM	60.1	74.9	58.7
02:00 PM - 03:00 PM	60.3	79.7	58.8
03:00 PM - 04:00 PM	60.3	77.1	58.3
04:00 PM - 05:00 PM	60.1	74.8	57.5
05:00 PM - 06:00 PM	62.3	89.0	58.4
06:00 PM - 07:00 PM	60.3	81.9	58.5
07:00 PM - 08:00 PM	59.3	67.6	58.5
08:00 PM - 09:00 PM	60.0	71.5	58.4
09:00 PM - 10:00 PM	59.6	68.1	58.8
10:00 PM - 11:00 PM	60.5	72.2	59.4
11:00 PM - 12:00 AM	60.6	72.4	59.4
12:00 AM - 01:00 AM	60.4	63.6	59.5
01:00 AM - 02:00 AM	61.3	66.9	60.4
02:00 AM - 03:00 AM	61.7	65.1	60.4
03:00 AM - 04:00 AM	60.3	65.5	59.5
04:00 AM - 05:00 AM	60.1	75.1	58.6
05:00 AM - 06:00 AM	62.2	81.6	58.8
06:00 AM - 07:00 AM	62.6	86.1	59.4
07:00 AM - 08:00 AM	60.1	77.5	58.1
08:00 AM - 09:00 AM	59.7	73.6	58.4

Leq Average 24 hrs. (dB(A))	60.9		
Lmax (dB(A))		89.0	
L90 (dB(A))			58.8
Ldn (dB(A))	67.5		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (2.40PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 231821

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577047-1

Page 1 of 1

Sample Number	231821-6
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณพื้นที่ของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date	Feb 19 - Feb 20, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 1222724

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	59.8	71.2	58.5
10:00 AM - 11:00 AM	61.1	79.5	58.8
11:00 AM - 12:00 PM	62.8	79.8	57.6
12:00 PM - 01:00 PM	60.2	76.0	56.9
01:00 PM - 02:00 PM	59.8	74.0	58.2
02:00 PM - 03:00 PM	60.3	73.3	58.8
03:00 PM - 04:00 PM	61.6	90.7	58.8
04:00 PM - 05:00 PM	61.8	75.7	60.1
05:00 PM - 06:00 PM	63.8	90.7	60.4
06:00 PM - 07:00 PM	61.3	71.8	59.8
07:00 PM - 08:00 PM	60.4	75.0	59.7
08:00 PM - 09:00 PM	60.8	68.9	60.1
09:00 PM - 10:00 PM	60.5	70.9	60.0
10:00 PM - 11:00 PM	60.5	69.5	60.1
11:00 PM - 12:00 AM	60.1	69.0	59.7
12:00 AM - 01:00 AM	60.5	68.1	59.6
01:00 AM - 02:00 AM	61.3	73.0	60.4
02:00 AM - 03:00 AM	61.5	67.1	60.6
03:00 AM - 04:00 AM	61.3	63.6	60.4
04:00 AM - 05:00 AM	61.2	70.4	60.3
05:00 AM - 06:00 AM	64.2	93.3	60.7
06:00 AM - 07:00 AM	61.5	81.7	59.3
07:00 AM - 08:00 AM	59.6	72.8	58.3
08:00 AM - 09:00 AM	60.0	71.5	58.3

Leq Average 24 hrs. (dB(A))	61.2		
Lmax (dB(A))		93.3	
L90 (dB(A))			59.7
Ldn (dB(A))	67.9		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (2.40PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 231821

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577048-1

Page 1 of 1

Sample Number	231821-7
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางผ่านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date	Feb 20 - Feb 21, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 1222724

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	61.3	71.5	59.1
10:00 AM - 11:00 AM	60.1	72.6	58.2
11:00 AM - 12:00 PM	59.9	78.7	58.3
12:00 PM - 01:00 PM	59.2	73.8	57.9
01:00 PM - 02:00 PM	59.5	77.1	58.2
02:00 PM - 03:00 PM	59.4	76.9	58.2
03:00 PM - 04:00 PM	59.8	75.2	58.4
04:00 PM - 05:00 PM	60.1	72.3	58.7
05:00 PM - 06:00 PM	62.9	85.7	59.4
06:00 PM - 07:00 PM	61.5	84.8	59.7
07:00 PM - 08:00 PM	60.5	73.8	59.4
08:00 PM - 09:00 PM	59.8	70.3	59.1
09:00 PM - 10:00 PM	61.1	71.9	60.1
10:00 PM - 11:00 PM	61.1	68.7	60.4
11:00 PM - 12:00 AM	61.9	72.6	60.7
12:00 AM - 01:00 AM	62.1	74.8	60.9
01:00 AM - 02:00 AM	61.6	64.5	60.9
02:00 AM - 03:00 AM	61.1	64.4	60.3
03:00 AM - 04:00 AM	61.0	65.4	60.3
04:00 AM - 05:00 AM	61.1	72.3	60.3
05:00 AM - 06:00 AM	62.6	81.6	60.3
06:00 AM - 07:00 AM	63.3	83.1	60.1
07:00 AM - 08:00 AM	61.5	81.8	59.5
08:00 AM - 09:00 AM	60.9	76.2	59.7

Leq Average 24 hrs. (dB(A))	61.1	
Lmax (dB(A))		85.7
L90 (dB(A))		59.5
Ldn (dB(A))	68.1	
Standard (dB(A))	70	115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salameh
Section Head

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S: Reports_Air Noise rpt (2:40PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232054

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577049-1

Page 1 of 1

Sample Number	232054-1
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางผ่านทิศใต้ของพื้นที่ HPPO (ทางเชื่อม บล็อก บลค 45) (GPS 47P 0727136, 1404550)
Measurement Date	Feb 14 - Feb 15, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 597169

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	52.5	76.4	45.8
11:00 AM - 12:00 PM	50.0	71.0	44.8
12:00 PM - 01:00 PM	51.5	74.8	45.1
01:00 PM - 02:00 PM	51.4	76.8	44.7
02:00 PM - 03:00 PM	55.0	79.9	44.9
03:00 PM - 04:00 PM	52.4	72.8	45.7
04:00 PM - 05:00 PM	60.9	83.5	47.6
05:00 PM - 06:00 PM	53.2	72.3	47.2
06:00 PM - 07:00 PM	54.8	87.2	46.9
07:00 PM - 08:00 PM	51.2	76.5	46.8
08:00 PM - 09:00 PM	48.0	58.0	46.9
09:00 PM - 10:00 PM	47.4	66.6	46.1
10:00 PM - 11:00 PM	50.7	72.4	45.5
11:00 PM - 12:00 AM	46.5	67.3	45.3
12:00 AM - 01:00 AM	45.8	60.1	44.9
01:00 AM - 02:00 AM	47.6	76.3	44.7
02:00 AM - 03:00 AM	50.3	77.2	44.9
03:00 AM - 04:00 AM	51.9	74.8	44.9
04:00 AM - 05:00 AM	47.0	63.6	45.4
05:00 AM - 06:00 AM	53.0	71.4	46.9
06:00 AM - 07:00 AM	54.9	77.4	50.2
07:00 AM - 08:00 AM	53.1	76.5	46.8
08:00 AM - 09:00 AM	51.9	76.2	45.9
09:00 AM - 10:00 AM	50.3	71.8	45.7

Leq Average 24 hrs. (dB(A))	52.8	
Lmax (dB(A))		87.2
L90 (dB(A))		45.7
Ldn (dB(A))	57.7	
Standard (dB(A))	70	115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salameh
Section Head

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8525-209/ EMAIL

S: Reports_Air Noise rpt (2:57PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232054

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577050-1

Page 1 of 1

Sample Number	232054-2
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ข้างปั๊ม รถบัส ล็อค 45) (GPS 47P 0727136, 1404550)
Measurement Date	Feb 15 - Feb 16, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 597169

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	54.1	84.9	45.1
11:00 AM - 12:00 PM	48.5	65.9	44.8
12:00 PM - 01:00 PM	54.5	79.2	45.1
01:00 PM - 02:00 PM	50.4	73.0	45.9
02:00 PM - 03:00 PM	51.5	71.7	45.9
03:00 PM - 04:00 PM	51.7	74.8	46.0
04:00 PM - 05:00 PM	52.9	86.3	46.4
05:00 PM - 06:00 PM	53.0	79.8	46.8
06:00 PM - 07:00 PM	56.0	80.2	47.0
07:00 PM - 08:00 PM	55.9	89.4	46.4
08:00 PM - 09:00 PM	50.4	70.8	47.1
09:00 PM - 10:00 PM	48.3	58.8	47.2
10:00 PM - 11:00 PM	47.3	59.1	46.4
11:00 PM - 12:00 AM	47.5	65.9	46.1
12:00 AM - 01:00 AM	46.5	58.0	45.8
01:00 AM - 02:00 AM	45.8	57.0	45.1
02:00 AM - 03:00 AM	47.0	72.0	44.9
03:00 AM - 04:00 AM	55.1	79.7	45.8
04:00 AM - 05:00 AM	49.2	68.4	45.6
05:00 AM - 06:00 AM	51.6	69.8	46.0
06:00 AM - 07:00 AM	56.9	76.7	49.6
07:00 AM - 08:00 AM	53.0	79.7	46.8
08:00 AM - 09:00 AM	60.3	75.1	46.0
09:00 AM - 10:00 AM	67.8	81.9	53.9

Leq Average 24 hrs. (dB(A))

56.6

Lmax (dB(A))

89.4

L90 (dB(A))

46.0

Ldn (dB(A))

59.7

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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8525-209/ EMAIL

S:\Reports_Air Noise.rpt (2.57PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232054

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577051-1

Page 1 of 1

Sample Number	232054-3
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ข้างปั๊ม รถบัส ล็อค 45) (GPS 47P 0727136, 1404550)
Measurement Date	Feb 16 - Feb 17, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 597169

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	59.5	82.9	53.5
11:00 AM - 12:00 PM	53.8	65.2	50.8
12:00 PM - 01:00 PM	57.2	84.0	51.0
01:00 PM - 02:00 PM	52.5	70.6	50.4
02:00 PM - 03:00 PM	56.9	69.7	50.5
03:00 PM - 04:00 PM	59.3	87.5	51.3
04:00 PM - 05:00 PM	53.6	70.5	50.4
05:00 PM - 06:00 PM	59.4	80.3	52.4
06:00 PM - 07:00 PM	55.5	68.3	52.4
07:00 PM - 08:00 PM	56.7	73.4	52.6
08:00 PM - 09:00 PM	59.1	70.5	53.1
09:00 PM - 10:00 PM	58.9	78.6	53.4
10:00 PM - 11:00 PM	56.1	71.3	52.9
11:00 PM - 12:00 AM	57.5	65.3	53.6
12:00 AM - 01:00 AM	57.7	63.4	54.9
01:00 AM - 02:00 AM	58.9	63.7	55.7
02:00 AM - 03:00 AM	59.3	64.3	56.7
03:00 AM - 04:00 AM	57.4	63.9	53.4
04:00 AM - 05:00 AM	58.2	79.4	53.5
05:00 AM - 06:00 AM	56.9	71.1	53.8
06:00 AM - 07:00 AM	56.8	71.7	54.1
07:00 AM - 08:00 AM	56.9	75.8	53.5
08:00 AM - 09:00 AM	68.3	88.0	52.5
09:00 AM - 10:00 AM	69.2	88.4	50.4

Leq Average 24 hrs. (dB(A))

60.6

Lmax (dB(A))

88.4

L90 (dB(A))

52.9

Ldn (dB(A))

65.0

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (2.57PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232054

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577052-1

Page 1 of 1

Sample Number 232054-4
Parameter Noise (Leq 24 hrs.)
Location บริเวณรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ข้างปั๊มน รถ บดอัด 45) (GPS 47P 0727136, 1404550)
Measurement Date Feb 17 - Feb 18, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 597169

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	54.0	69.8	50.7
11:00 AM - 12:00 PM	55.6	70.3	51.2
12:00 PM - 01:00 PM	52.6	79.0	49.7
01:00 PM - 02:00 PM	52.9	71.5	48.4
02:00 PM - 03:00 PM	52.2	71.0	46.8
03:00 PM - 04:00 PM	52.8	76.7	47.7
04:00 PM - 05:00 PM	54.3	79.6	49.8
05:00 PM - 06:00 PM	55.8	73.1	51.9
06:00 PM - 07:00 PM	54.6	70.2	52.6
07:00 PM - 08:00 PM	55.1	71.1	52.7
08:00 PM - 09:00 PM	54.5	64.6	52.0
09:00 PM - 10:00 PM	54.4	73.8	51.2
10:00 PM - 11:00 PM	52.7	56.7	51.7
11:00 PM - 12:00 AM	52.9	60.0	51.8
12:00 AM - 01:00 AM	52.5	61.4	51.6
01:00 AM - 02:00 AM	53.4	62.6	52.3
02:00 AM - 03:00 AM	54.3	70.8	52.5
03:00 AM - 04:00 AM	53.9	69.9	52.5
04:00 AM - 05:00 AM	56.6	80.0	51.9
05:00 AM - 06:00 AM	57.7	85.9	53.5
06:00 AM - 07:00 AM	57.3	77.4	53.1
07:00 AM - 08:00 AM	54.6	76.8	51.5
08:00 AM - 09:00 AM	56.0	78.6	50.6
09:00 AM - 10:00 AM	53.0	71.3	50.4

Leq Average 24 hrs. (dB(A)) 54.6
Lmax (dB(A)) 85.9
L90 (dB(A)) 51.6
Ldn (dB(A)) 61.4
Standard (dB(A)) 70
Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsunwang
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (2:57PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232054

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577053-1

Page 1 of 1

Sample Number 232054-5
Parameter Noise (Leq 24 hrs.)
Location บริเวณรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ข้างปั๊มน รถ บดอัด 45) (GPS 47P 0727136, 1404550)
Measurement Date Feb 18 - Feb 19, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 597169

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	53.1	83.0	49.6
11:00 AM - 12:00 PM	52.1	72.6	47.9
12:00 PM - 01:00 PM	51.4	81.8	46.0
01:00 PM - 02:00 PM	48.1	62.6	45.7
02:00 PM - 03:00 PM	55.5	78.4	46.3
03:00 PM - 04:00 PM	51.2	71.6	47.0
04:00 PM - 05:00 PM	55.7	78.3	47.4
05:00 PM - 06:00 PM	52.6	69.5	47.9
06:00 PM - 07:00 PM	49.3	70.7	46.7
07:00 PM - 08:00 PM	54.1	67.4	49.1
08:00 PM - 09:00 PM	53.5	70.2	50.9
09:00 PM - 10:00 PM	52.3	58.9	50.9
10:00 PM - 11:00 PM	53.6	78.6	51.4
11:00 PM - 12:00 AM	54.4	73.4	52.4
12:00 AM - 01:00 AM	54.0	60.2	52.8
01:00 AM - 02:00 AM	53.8	61.2	52.3
02:00 AM - 03:00 AM	54.3	68.5	52.2
03:00 AM - 04:00 AM	56.7	79.8	51.7
04:00 AM - 05:00 AM	53.4	66.2	51.8
05:00 AM - 06:00 AM	56.6	77.0	53.4
06:00 AM - 07:00 AM	56.0	71.8	52.8
07:00 AM - 08:00 AM	55.6	77.5	52.1
08:00 AM - 09:00 AM	54.3	79.6	51.1
09:00 AM - 10:00 AM	52.3	66.8	50.6

Leq Average 24 hrs. (dB(A)) 53.9
Lmax (dB(A)) 83.0
L90 (dB(A)) 50.9
Ldn (dB(A)) 61.1
Standard (dB(A)) 70
Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsunwang
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (2:58PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232054

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577054-1

Page 1 of 1

Sample Number : 232054-6
Parameter : Noise (Leq 24 hrs.)
Location : บริเวณรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ข้างปั๊มน รถ บล็อก 45) (GPS 47P 0727136, 1404550)
Measurement Date : Feb 19 - Feb 20, 2023
Measurement by : Sitpawit Suwannarat
Sound Level meter : Serial No. 597169

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	52.5	67.4	50.3
11:00 AM - 12:00 PM	51.7	66.9	49.5
12:00 PM - 01:00 PM	50.6	75.8	45.7
01:00 PM - 02:00 PM	55.5	80.1	44.9
02:00 PM - 03:00 PM	50.6	76.7	45.7
03:00 PM - 04:00 PM	56.3	80.6	47.1
04:00 PM - 05:00 PM	52.5	72.8	48.0
05:00 PM - 06:00 PM	53.8	69.4	49.4
06:00 PM - 07:00 PM	50.5	69.7	48.6
07:00 PM - 08:00 PM	51.5	71.4	49.5
08:00 PM - 09:00 PM	53.2	69.6	50.7
09:00 PM - 10:00 PM	53.0	58.9	51.5
10:00 PM - 11:00 PM	53.6	69.3	52.3
11:00 PM - 12:00 AM	54.0	64.3	53.0
12:00 AM - 01:00 AM	52.8	59.0	51.2
01:00 AM - 02:00 AM	52.3	59.2	50.7
02:00 AM - 03:00 AM	51.8	57.1	50.3
03:00 AM - 04:00 AM	54.1	60.4	52.5
04:00 AM - 05:00 AM	55.5	63.3	53.5
05:00 AM - 06:00 AM	56.9	78.1	54.8
06:00 AM - 07:00 AM	59.1	85.1	52.0
07:00 AM - 08:00 AM	51.7	65.3	49.5
08:00 AM - 09:00 AM	58.1	80.2	50.1
09:00 AM - 10:00 AM	51.1	63.3	49.5

Leq Average 24 hrs. (dB(A)) : 54.2
Lmax (dB(A)) : 85.1
L90 (dB(A)) : 50.1
Ldn (dB(A)) : 61.3
Standard (dB(A)) : 70
Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanitak.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteah
Section Head

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8525-209/ EMAIL



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232054

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577055-1

Page 1 of 1

Sample Number : 232054-7
Parameter : Noise (Leq 24 hrs.)
Location : บริเวณรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ข้างปั๊มน รถ บล็อก 45) (GPS 47P 0727136, 1404550)
Measurement Date : Feb 20 - Feb 21, 2023
Measurement by : Sitpawit Suwannarat
Sound Level meter : Serial No. 597169

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	49.8	61.8	46.0
11:00 AM - 12:00 PM	47.0	61.7	44.9
12:00 PM - 01:00 PM	47.9	66.5	45.6
01:00 PM - 02:00 PM	56.6	82.2	45.4
02:00 PM - 03:00 PM	48.1	64.0	45.4
03:00 PM - 04:00 PM	59.5	90.6	46.0
04:00 PM - 05:00 PM	53.0	73.9	47.4
05:00 PM - 06:00 PM	53.0	73.8	47.5
06:00 PM - 07:00 PM	49.4	63.1	47.8
07:00 PM - 08:00 PM	49.5	64.0	48.2
08:00 PM - 09:00 PM	54.4	88.5	48.5
09:00 PM - 10:00 PM	50.2	57.3	49.4
10:00 PM - 11:00 PM	50.6	57.0	49.7
11:00 PM - 12:00 AM	48.8	55.6	47.8
12:00 AM - 01:00 AM	49.5	56.0	47.7
01:00 AM - 02:00 AM	51.6	67.9	47.9
02:00 AM - 03:00 AM	50.7	65.8	49.0
03:00 AM - 04:00 AM	52.2	67.9	49.8
04:00 AM - 05:00 AM	53.0	65.8	50.7
05:00 AM - 06:00 AM	58.9	90.5	53.8
06:00 AM - 07:00 AM	58.2	80.2	53.0
07:00 AM - 08:00 AM	54.2	70.7	52.3
08:00 AM - 09:00 AM	53.5	68.7	50.8
09:00 AM - 10:00 AM	51.7	63.6	49.5

Leq Average 24 hrs. (dB(A)) : 53.6
Lmax (dB(A)) : 90.6
L90 (dB(A)) : 47.9
Ldn (dB(A)) : 60.5
Standard (dB(A)) : 70
Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanitak.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteah
Section Head

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S:\Reports_Air Noise rpt (2.58PM)

ระดับเสียงทั่วไป (Leq 24 hrs) บริเวณชุมชน



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232055

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577056-1

Page 1 of 1

Sample Number 232055-1
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านในชุมชนประจักษ์ศิลปาคม (บ้านคุณบุญผดุง) (GPS 47P 0726292, 1407282)
Measurement Date Feb 14 - Feb 15, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 597168

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	54.0	77.0	46.7
12:00 PM - 01:00 PM	52.4	75.2	45.6
01:00 PM - 02:00 PM	53.0	80.3	44.7
02:00 PM - 03:00 PM	50.5	77.4	45.3
03:00 PM - 04:00 PM	51.8	82.2	45.4
04:00 PM - 05:00 PM	55.0	82.4	46.3
05:00 PM - 06:00 PM	53.3	73.5	46.2
06:00 PM - 07:00 PM	52.5	74.6	47.5
07:00 PM - 08:00 PM	52.8	74.3	48.0
08:00 PM - 09:00 PM	50.9	74.0	48.0
09:00 PM - 10:00 PM	49.8	65.2	48.1
10:00 PM - 11:00 PM	48.3	62.0	47.3
11:00 PM - 12:00 AM	47.7	63.9	46.8
12:00 AM - 01:00 AM	47.4	70.6	45.9
01:00 AM - 02:00 AM	46.3	71.0	45.1
02:00 AM - 03:00 AM	46.4	65.6	45.2
03:00 AM - 04:00 AM	46.1	61.4	45.0
04:00 AM - 05:00 AM	47.5	67.0	45.6
05:00 AM - 06:00 AM	51.9	77.4	45.9
06:00 AM - 07:00 AM	59.1	87.1	50.8
07:00 AM - 08:00 AM	58.2	84.1	48.6
08:00 AM - 09:00 AM	53.0	76.6	46.9
09:00 AM - 10:00 AM	57.6	85.6	45.6
10:00 AM - 11:00 AM	50.8	69.5	44.9

Leq Average 24 hrs. (dB(A))

53.1

Lmax (dB(A))

87.1

L90 (dB(A))

45.9

Ldn (dB(A))

58.5

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (3.02PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232055

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577057-1

Page 1 of 1

Sample Number 232055-2
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านในชุมชนประจักษ์ศิลปาคม (บ้านคุณบุญผดุง) (GPS 47P 0726292, 1407282)
Measurement Date Feb 15 - Feb 16, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 597168

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	51.4	73.7	44.0
12:00 PM - 01:00 PM	52.1	78.5	44.4
01:00 PM - 02:00 PM	50.3	74.3	45.1
02:00 PM - 03:00 PM	50.4	73.3	46.2
03:00 PM - 04:00 PM	51.2	78.7	46.7
04:00 PM - 05:00 PM	57.6	82.8	46.3
05:00 PM - 06:00 PM	55.0	79.6	45.7
06:00 PM - 07:00 PM	54.1	76.0	46.5
07:00 PM - 08:00 PM	50.6	67.5	48.3
08:00 PM - 09:00 PM	48.9	75.9	45.5
09:00 PM - 10:00 PM	52.9	74.6	42.8
10:00 PM - 11:00 PM	47.9	74.5	44.3
11:00 PM - 12:00 AM	48.3	67.4	47.3
12:00 AM - 01:00 AM	48.5	66.4	47.4
01:00 AM - 02:00 AM	47.3	64.1	46.1
02:00 AM - 03:00 AM	46.0	62.3	44.9
03:00 AM - 04:00 AM	45.9	57.2	44.3
04:00 AM - 05:00 AM	47.9	66.9	45.5
05:00 AM - 06:00 AM	51.0	68.4	46.6
06:00 AM - 07:00 AM	56.0	76.4	49.1
07:00 AM - 08:00 AM	57.0	81.0	47.6
08:00 AM - 09:00 AM	54.8	87.3	45.0
09:00 AM - 10:00 AM	54.5	76.0	47.9
10:00 AM - 11:00 AM	60.1	85.4	54.0

Leq Average 24 hrs. (dB(A))

53.4

Lmax (dB(A))

87.3

L90 (dB(A))

46.1

Ldn (dB(A))

57.5

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (3.02PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232055

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577058-1

Page 1 of 1

Sample Number 232055-3
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านในชุมชนประทุมมิตรบำรุง (บ้านคุณบุญยัง) (GPS 47P 0726292, 1407282)
Measurement Date Feb 16 - Feb 17, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 597168

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	58.3	76.7	54.5
12:00 PM - 01:00 PM	56.8	80.9	50.5
01:00 PM - 02:00 PM	55.0	76.4	48.6
02:00 PM - 03:00 PM	51.3	70.5	45.8
03:00 PM - 04:00 PM	52.6	76.3	45.4
04:00 PM - 05:00 PM	53.7	80.4	45.3
05:00 PM - 06:00 PM	56.2	88.4	45.8
06:00 PM - 07:00 PM	51.6	76.7	43.4
07:00 PM - 08:00 PM	51.7	73.3	42.9
08:00 PM - 09:00 PM	54.7	83.8	46.5
09:00 PM - 10:00 PM	53.3	74.8	46.2
10:00 PM - 11:00 PM	54.1	71.3	48.0
11:00 PM - 12:00 AM	58.5	87.1	49.6
12:00 AM - 01:00 AM	52.9	69.0	50.6
01:00 AM - 02:00 AM	52.3	67.2	50.6
02:00 AM - 03:00 AM	52.4	71.4	50.5
03:00 AM - 04:00 AM	53.8	75.4	50.2
04:00 AM - 05:00 AM	51.6	66.0	50.5
05:00 AM - 06:00 AM	51.6	63.6	50.5
06:00 AM - 07:00 AM	51.3	64.8	49.5
07:00 AM - 08:00 AM	50.3	62.8	49.0
08:00 AM - 09:00 AM	49.8	65.0	49.0
09:00 AM - 10:00 AM	50.0	66.5	49.3
10:00 AM - 11:00 AM	54.4	91.9	49.4
Leq Average 24 hrs. (dB(A))	54.0		
Lmax (dB(A))		91.9	
L90 (dB(A))			49.0
Ldn (dB(A))	60.3		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanitak.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteah
Section Head

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S:\Report\Air Noise rpt (3.02PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232055

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577059-1

Page 1 of 1

Sample Number 232055-4
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านในชุมชนประทุมมิตรบำรุง (บ้านคุณบุญยัง) (GPS 47P 0726292, 1407282)
Measurement Date Feb 17 - Feb 18, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 597168

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	57.9	82.6	51.0
12:00 PM - 01:00 PM	58.9	83.3	51.5
01:00 PM - 02:00 PM	54.7	71.1	49.2
02:00 PM - 03:00 PM	52.5	82.9	47.0
03:00 PM - 04:00 PM	51.5	72.2	47.5
04:00 PM - 05:00 PM	52.8	71.9	48.3
05:00 PM - 06:00 PM	54.5	78.6	47.6
06:00 PM - 07:00 PM	54.2	75.7	47.1
07:00 PM - 08:00 PM	52.3	74.4	45.2
08:00 PM - 09:00 PM	52.8	73.9	45.1
09:00 PM - 10:00 PM	54.2	75.3	45.6
10:00 PM - 11:00 PM	54.2	77.7	47.1
11:00 PM - 12:00 AM	60.0	93.8	46.1
12:00 AM - 01:00 AM	52.0	72.7	46.9
01:00 AM - 02:00 AM	48.7	69.9	45.5
02:00 AM - 03:00 AM	47.6	64.0	44.4
03:00 AM - 04:00 AM	51.0	72.4	44.4
04:00 AM - 05:00 AM	49.5	76.5	44.2
05:00 AM - 06:00 AM	47.8	69.8	44.2
06:00 AM - 07:00 AM	47.5	70.6	45.6
07:00 AM - 08:00 AM	48.8	71.4	46.6
08:00 AM - 09:00 AM	49.0	56.6	48.1
09:00 AM - 10:00 AM	49.6	69.5	45.6
10:00 AM - 11:00 AM	51.2	68.1	46.0
Leq Average 24 hrs. (dB(A))	53.7		
Lmax (dB(A))		93.8	
L90 (dB(A))			46.1
Ldn (dB(A))	59.7		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanitak.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteah
Section Head

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S:\Report\Air Noise rpt (3.02PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232055

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577060-1

Page 1 of 1

Sample Number 232055-5
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านในชุมชนประมงมิตรบำรุง (บ้านคุณบุญผดุง) (GPS 47P 0726292, 1407282)
Measurement Date Feb 18 - Feb 19, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 597168

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	56.9	81.7	48.9
12:00 PM - 01:00 PM	57.7	79.6	50.4
01:00 PM - 02:00 PM	55.3	82.6	45.8
02:00 PM - 03:00 PM	51.1	70.8	43.6
03:00 PM - 04:00 PM	49.5	68.8	44.3
04:00 PM - 05:00 PM	51.8	78.4	44.3
05:00 PM - 06:00 PM	49.3	69.6	41.6
06:00 PM - 07:00 PM	48.9	68.3	41.2
07:00 PM - 08:00 PM	48.7	70.9	42.5
08:00 PM - 09:00 PM	55.4	81.3	45.4
09:00 PM - 10:00 PM	53.3	79.1	44.4
10:00 PM - 11:00 PM	52.9	76.3	46.7
11:00 PM - 12:00 AM	59.2	84.6	49.1
12:00 AM - 01:00 AM	58.3	81.8	48.5
01:00 AM - 02:00 AM	50.9	76.3	47.9
02:00 AM - 03:00 AM	49.9	62.5	48.1
03:00 AM - 04:00 AM	48.9	63.6	47.4
04:00 AM - 05:00 AM	51.8	75.8	45.4
05:00 AM - 06:00 AM	48.1	71.4	43.6
06:00 AM - 07:00 AM	46.3	64.2	43.3
07:00 AM - 08:00 AM	48.4	66.9	44.6
08:00 AM - 09:00 AM	49.8	67.2	47.1
09:00 AM - 10:00 AM	48.3	61.3	45.5
10:00 AM - 11:00 AM	52.1	66.9	49.7

Leq Average 24 hrs. (dB(A))

53.4

Lmax (dB(A))

84.6

L90 (dB(A))

45.4

Ldn (dB(A))

60.3

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports\Air Noise rpt (3 03PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232055

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577061-1

Page 1 of 1

Sample Number 232055-6
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านในชุมชนประมงมิตรบำรุง (บ้านคุณบุญผดุง) (GPS 47P 0726292, 1407282)
Measurement Date Feb 19 - Feb 20, 2023
Measurement by Sitpawit Suwannarat
Sound Level meter Serial No. 597168

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	56.5	85.3	51.2
12:00 PM - 01:00 PM	56.2	76.0	49.8
01:00 PM - 02:00 PM	51.1	71.7	44.1
02:00 PM - 03:00 PM	50.0	68.9	44.2
03:00 PM - 04:00 PM	49.8	68.1	44.5
04:00 PM - 05:00 PM	52.5	76.7	44.1
05:00 PM - 06:00 PM	53.0	71.5	45.6
06:00 PM - 07:00 PM	50.2	65.8	45.9
07:00 PM - 08:00 PM	51.0	74.5	46.4
08:00 PM - 09:00 PM	58.7	74.8	49.2
09:00 PM - 10:00 PM	51.7	73.2	44.8
10:00 PM - 11:00 PM	52.2	75.8	44.3
11:00 PM - 12:00 AM	56.1	83.5	46.6
12:00 AM - 01:00 AM	50.8	72.5	47.0
01:00 AM - 02:00 AM	47.8	63.8	45.7
02:00 AM - 03:00 AM	48.6	75.0	43.6
03:00 AM - 04:00 AM	52.0	70.9	47.5
04:00 AM - 05:00 AM	49.8	62.7	48.3
05:00 AM - 06:00 AM	49.9	74.9	48.3
06:00 AM - 07:00 AM	49.4	58.8	48.4
07:00 AM - 08:00 AM	48.8	59.8	48.0
08:00 AM - 09:00 AM	48.9	66.3	47.7
09:00 AM - 10:00 AM	50.9	69.8	48.5
10:00 AM - 11:00 AM	52.0	69.3	48.9

Leq Average 24 hrs. (dB(A))

52.6

Lmax (dB(A))

85.3

L90 (dB(A))

46.6

Ldn (dB(A))

58.2

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports\Air Noise rpt (3 04PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232055

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577062-1

Page 1 of 1

Sample Number	232055-7
Parameter	Noise (Leq 24 hrs.)
Location	กลุ่มบ้านในชุมชนประจวบคีรีขันธ์ (บ้านคลองขุด) (GPS 47P 0726292, 1407282)
Measurement Date	Feb 20 - Feb 21, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 597168

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	56.2	76.1	50.1
12:00 PM - 01:00 PM	57.9	79.1	50.1
01:00 PM - 02:00 PM	53.2	69.9	47.7
02:00 PM - 03:00 PM	53.8	71.4	47.1
03:00 PM - 04:00 PM	50.8	69.2	43.1
04:00 PM - 05:00 PM	53.2	82.8	43.4
05:00 PM - 06:00 PM	53.0	76.4	44.2
06:00 PM - 07:00 PM	53.3	75.7	44.1
07:00 PM - 08:00 PM	54.2	74.0	46.0
08:00 PM - 09:00 PM	55.8	78.1	48.0
09:00 PM - 10:00 PM	54.2	75.7	47.8
10:00 PM - 11:00 PM	54.5	76.2	47.0
11:00 PM - 12:00 AM	56.2	81.3	48.1
12:00 AM - 01:00 AM	52.0	71.8	48.9
01:00 AM - 02:00 AM	55.9	84.7	47.5
02:00 AM - 03:00 AM	50.8	74.1	47.3
03:00 AM - 04:00 AM	49.5	71.8	46.7
04:00 AM - 05:00 AM	52.0	75.0	46.5
05:00 AM - 06:00 AM	49.5	70.0	47.3
06:00 AM - 07:00 AM	49.5	60.2	48.3
07:00 AM - 08:00 AM	50.6	59.7	49.7
08:00 AM - 09:00 AM	51.3	66.3	48.4
09:00 AM - 10:00 AM	52.8	70.1	51.2
10:00 AM - 11:00 AM	53.4	68.6	51.4

Leq Average 24 hrs. (dB(A))	53.7	
Lmax (dB(A))		84.7
L90 (dB(A))		47.5
Ldn (dB(A))	59.6	
Standard (dB(A))	70	115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise rpt (3.04PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232056

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577063-1

Page 1 of 1

Sample Number	232056-1
Parameter	Noise (Leq 24 hrs.)
Location	กลุ่มบ้านในชุมชนประจวบคีรีขันธ์ (บ้านคลองขุด) (GPS 47P 0727177, 1404390)
Measurement Date	Feb 14 - Feb 15, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 709746

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	49.5	81.9	42.3
01:00 PM - 02:00 PM	47.1	70.5	41.4
02:00 PM - 03:00 PM	48.6	74.1	41.3
03:00 PM - 04:00 PM	57.8	84.7	41.3
04:00 PM - 05:00 PM	47.1	67.2	41.9
05:00 PM - 06:00 PM	48.9	74.4	42.9
06:00 PM - 07:00 PM	48.9	69.6	43.2
07:00 PM - 08:00 PM	53.4	77.2	43.8
08:00 PM - 09:00 PM	56.2	81.7	44.5
09:00 PM - 10:00 PM	45.7	60.8	44.6
10:00 PM - 11:00 PM	46.3	53.4	45.5
11:00 PM - 12:00 AM	55.1	81.2	45.3
12:00 AM - 01:00 AM	44.8	48.7	43.7
01:00 AM - 02:00 AM	44.6	54.4	43.5
02:00 AM - 03:00 AM	49.3	73.4	42.9
03:00 AM - 04:00 AM	50.0	77.9	41.7
04:00 AM - 05:00 AM	54.8	88.6	40.3
05:00 AM - 06:00 AM	56.9	81.8	40.6
06:00 AM - 07:00 AM	51.5	74.6	42.1
07:00 AM - 08:00 AM	53.1	72.4	46.3
08:00 AM - 09:00 AM	52.3	76.8	43.1
09:00 AM - 10:00 AM	48.9	72.2	41.8
10:00 AM - 11:00 AM	51.9	81.1	41.6
11:00 AM - 12:00 PM	55.9	88.2	40.6

Leq Average 24 hrs. (dB(A))	52.5	
Lmax (dB(A))		88.6
L90 (dB(A))		42.3
Ldn (dB(A))	58.8	
Standard (dB(A))	70	115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise rpt (3.24PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232056

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577064-1

Page 1 of 1

Sample Number	232056-2
Parameter	Noise (Leq 24 hrs.)
Location	ถนนบ้านชุมชนพุด (บ้านชุมชนพุด) (GPS 47P 0727177, 1404390)
Measurement Date	Feb 15 - Feb 16, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 709746

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	48.2	71.6	40.3
01:00 PM - 02:00 PM	57.4	86.2	40.5
02:00 PM - 03:00 PM	48.6	77.4	41.5
03:00 PM - 04:00 PM	48.9	75.6	42.5
04:00 PM - 05:00 PM	47.7	70.0	42.5
05:00 PM - 06:00 PM	48.3	72.1	42.5
06:00 PM - 07:00 PM	51.7	80.1	42.5
07:00 PM - 08:00 PM	59.8	88.7	43.6
08:00 PM - 09:00 PM	46.6	71.3	44.2
09:00 PM - 10:00 PM	60.9	93.7	45.5
10:00 PM - 11:00 PM	47.2	59.2	46.3
11:00 PM - 12:00 AM	46.3	67.3	44.9
12:00 AM - 01:00 AM	46.6	53.2	45.7
01:00 AM - 02:00 AM	45.8	49.4	44.7
02:00 AM - 03:00 AM	44.5	52.4	42.9
03:00 AM - 04:00 AM	48.7	77.8	42.5
04:00 AM - 05:00 AM	57.8	85.3	42.3
05:00 AM - 06:00 AM	54.8	77.2	41.8
06:00 AM - 07:00 AM	50.2	72.0	41.4
07:00 AM - 08:00 AM	58.1	83.0	45.6
08:00 AM - 09:00 AM	52.8	75.5	43.2
09:00 AM - 10:00 AM	53.6	83.7	41.8
10:00 AM - 11:00 AM	54.6	76.5	51.2
11:00 AM - 12:00 PM	60.0	84.7	51.8

Leq Average 24 hrs. (dB(A))	54.6		
Lmax (dB(A))		93.7	
L90 (dB(A))			42.5
Ldn (dB(A))	58.9		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salameh
Section Head

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S:\Reports_Air Noise.rpt (3 24PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232056

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577065-1

Page 1 of 1

Sample Number	232056-3
Parameter	Noise (Leq 24 hrs.)
Location	ถนนบ้านชุมชนพุด (บ้านชุมชนพุด) (GPS 47P 0727177, 1404390)
Measurement Date	Feb 16 - Feb 17, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 709746

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	57.8	76.1	46.5
01:00 PM - 02:00 PM	51.7	76.1	47.2
02:00 PM - 03:00 PM	54.8	77.2	48.1
03:00 PM - 04:00 PM	51.5	71.8	46.5
04:00 PM - 05:00 PM	62.5	95.6	47.2
05:00 PM - 06:00 PM	54.8	79.1	46.8
06:00 PM - 07:00 PM	61.1	88.7	47.6
07:00 PM - 08:00 PM	50.2	66.7	47.5
08:00 PM - 09:00 PM	54.6	80.5	48.9
09:00 PM - 10:00 PM	52.0	77.5	48.7
10:00 PM - 11:00 PM	50.8	60.8	49.5
11:00 PM - 12:00 AM	56.2	86.5	49.5
12:00 AM - 01:00 AM	50.6	56.8	49.5
01:00 AM - 02:00 AM	50.4	58.5	49.5
02:00 AM - 03:00 AM	50.4	56.4	49.5
03:00 AM - 04:00 AM	51.4	62.1	50.2
04:00 AM - 05:00 AM	51.3	65.1	50.1
05:00 AM - 06:00 AM	52.8	80.4	50.5
06:00 AM - 07:00 AM	55.7	75.6	50.1
07:00 AM - 08:00 AM	53.9	70.8	51.2
08:00 AM - 09:00 AM	54.7	77.5	50.3
09:00 AM - 10:00 AM	62.0	90.4	49.4
10:00 AM - 11:00 AM	59.1	85.6	48.0
11:00 AM - 12:00 PM	51.5	82.5	47.4

Leq Average 24 hrs. (dB(A))	56.2		
Lmax (dB(A))		95.6	
L90 (dB(A))			48.9
Ldn (dB(A))	60.2		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salameh
Section Head

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S:\Reports_Air Noise.rpt (3 25PM)



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232056

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577066-1

Page 1 of 1

Sample Number	232056-4
Parameter	Noise (Leq 24 hrs.)
Location	ถนนพหลโยธิน (ด้านถนนพหลโยธิน) (GPS 47P 0727177, 1404390)
Measurement Date	Feb 17 - Feb 18, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 709746

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	55.1	76.5	47.7
01:00 PM - 02:00 PM	51.6	77.1	47.2
02:00 PM - 03:00 PM	50.2	73.5	46.2
03:00 PM - 04:00 PM	48.3	69.2	41.3
04:00 PM - 05:00 PM	48.4	72.0	41.5
05:00 PM - 06:00 PM	49.4	67.9	44.4
06:00 PM - 07:00 PM	54.0	80.3	49.5
07:00 PM - 08:00 PM	51.3	60.6	50.0
08:00 PM - 09:00 PM	54.3	78.9	50.1
09:00 PM - 10:00 PM	51.0	62.8	49.9
10:00 PM - 11:00 PM	54.3	78.0	49.6
11:00 PM - 12:00 AM	50.1	55.5	49.4
12:00 AM - 01:00 AM	50.8	67.9	49.5
01:00 AM - 02:00 AM	50.4	58.8	49.7
02:00 AM - 03:00 AM	50.8	68.0	50.0
03:00 AM - 04:00 AM	50.9	63.3	50.1
04:00 AM - 05:00 AM	55.2	77.5	49.8
05:00 AM - 06:00 AM	59.8	86.6	49.4
06:00 AM - 07:00 AM	55.9	79.7	50.2
07:00 AM - 08:00 AM	59.6	93.9	51.1
08:00 AM - 09:00 AM	52.0	66.3	49.4
09:00 AM - 10:00 AM	58.8	86.8	48.6
10:00 AM - 11:00 AM	50.1	67.8	47.4
11:00 AM - 12:00 PM	50.1	70.1	46.9

Leq Average 24 hrs. (dB(A))	54.1		
Lmax (dB(A))		93.9	
L90 (dB(A))			49.4
Ldn (dB(A))	60.8		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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8525-209/ EMAIL

S:\Reports_Air Noise rpt (3.25PM)



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232056

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577067-1

Page 1 of 1

Sample Number	232056-5
Parameter	Noise (Leq 24 hrs.)
Location	ถนนพหลโยธิน (ด้านถนนพหลโยธิน) (GPS 47P 0727177, 1404390)
Measurement Date	Feb 18 - Feb 19, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 709746

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	48.6	66.9	43.2
01:00 PM - 02:00 PM	50.3	79.3	42.6
02:00 PM - 03:00 PM	46.3	67.0	41.5
03:00 PM - 04:00 PM	47.2	70.4	41.2
04:00 PM - 05:00 PM	57.4	84.9	41.6
05:00 PM - 06:00 PM	53.4	72.1	44.8
06:00 PM - 07:00 PM	60.1	85.9	45.4
07:00 PM - 08:00 PM	47.0	69.2	45.1
08:00 PM - 09:00 PM	49.7	70.2	45.8
09:00 PM - 10:00 PM	54.4	76.5	49.3
10:00 PM - 11:00 PM	49.6	56.4	48.8
11:00 PM - 12:00 AM	53.9	85.0	48.9
12:00 AM - 01:00 AM	54.9	81.7	50.4
01:00 AM - 02:00 AM	51.3	56.6	50.5
02:00 AM - 03:00 AM	51.3	56.4	50.3
03:00 AM - 04:00 AM	55.1	76.7	50.0
04:00 AM - 05:00 AM	61.8	89.4	49.6
05:00 AM - 06:00 AM	50.8	70.8	49.3
06:00 AM - 07:00 AM	52.9	69.8	50.4
07:00 AM - 08:00 AM	56.6	90.6	51.0
08:00 AM - 09:00 AM	53.5	74.3	49.3
09:00 AM - 10:00 AM	52.7	74.8	48.8
10:00 AM - 11:00 AM	55.7	83.8	48.3
11:00 AM - 12:00 PM	49.9	64.1	47.5

Leq Average 24 hrs. (dB(A))	54.6		
Lmax (dB(A))		90.6	
L90 (dB(A))			48.8
Ldn (dB(A))	61.6		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise rpt (3.25PM)



Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232056

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577068-1

Page 1 of 1

Sample Number	232056-6
Parameter	Noise (Leq 24 hrs.)
Location	กลุ่มบ้านชุมชน (บ้านคุณสมจิตร) (GPS 47P 0727177, 1404390)
Measurement Date	Feb 19 - Feb 20, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 709746

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	49.2	65.9	46.8
01:00 PM - 02:00 PM	51.5	82.1	43.6
02:00 PM - 03:00 PM	50.1	78.5	39.9
03:00 PM - 04:00 PM	57.4	84.7	40.1
04:00 PM - 05:00 PM	59.4	86.7	41.6
05:00 PM - 06:00 PM	51.0	68.3	44.0
06:00 PM - 07:00 PM	50.1	74.0	44.9
07:00 PM - 08:00 PM	49.3	65.8	47.4
08:00 PM - 09:00 PM	49.6	70.9	48.0
09:00 PM - 10:00 PM	55.9	78.8	48.9
10:00 PM - 11:00 PM	50.5	60.8	49.3
11:00 PM - 12:00 AM	50.3	68.6	49.3
12:00 AM - 01:00 AM	51.6	55.8	49.3
01:00 AM - 02:00 AM	50.9	57.3	49.4
02:00 AM - 03:00 AM	50.9	58.0	50.0
03:00 AM - 04:00 AM	50.3	63.5	48.7
04:00 AM - 05:00 AM	53.4	83.8	49.2
05:00 AM - 06:00 AM	51.9	70.6	49.9
06:00 AM - 07:00 AM	58.0	86.8	51.8
07:00 AM - 08:00 AM	57.3	82.7	51.0
08:00 AM - 09:00 AM	66.4	96.8	48.4
09:00 AM - 10:00 AM	62.4	89.3	48.0
10:00 AM - 11:00 AM	52.4	70.7	47.2
11:00 AM - 12:00 PM	49.8	71.8	45.7

Leq Average 24 hrs. (dB(A))	56.7		
Lmax (dB(A))		96.8	
L90 (dB(A))			48.0
Ldn (dB(A))	60.5		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report



TESTING
No.0042

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232056

Date Received : Feb 21, 2023

Date Reported : Feb 24, 2023

Report Number: 2577069-1

Page 1 of 1

Sample Number	232056-7
Parameter	Noise (Leq 24 hrs.)
Location	กลุ่มบ้านชุมชน (บ้านคุณสมจิตร) (GPS 47P 0727177, 1404390)
Measurement Date	Feb 20 - Feb 21, 2023
Measurement by	Sitpawit Suwannarat
Sound Level meter	Serial No. 709746

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	46.7	64.4	40.7
01:00 PM - 02:00 PM	48.1	70.6	43.9
02:00 PM - 03:00 PM	53.7	91.3	43.2
03:00 PM - 04:00 PM	59.1	88.4	41.9
04:00 PM - 05:00 PM	47.5	72.0	41.5
05:00 PM - 06:00 PM	61.4	91.7	42.3
06:00 PM - 07:00 PM	47.6	66.8	43.3
07:00 PM - 08:00 PM	48.5	67.8	46.7
08:00 PM - 09:00 PM	48.1	66.8	47.2
09:00 PM - 10:00 PM	63.8	97.6	47.1
10:00 PM - 11:00 PM	49.5	54.2	48.4
11:00 PM - 12:00 AM	49.9	60.3	48.6
12:00 AM - 01:00 AM	47.8	55.6	46.6
01:00 AM - 02:00 AM	46.6	63.0	45.6
02:00 AM - 03:00 AM	46.6	51.5	46.0
03:00 AM - 04:00 AM	53.7	77.1	46.0
04:00 AM - 05:00 AM	54.2	76.3	47.7
05:00 AM - 06:00 AM	50.6	70.0	48.6
06:00 AM - 07:00 AM	60.5	94.4	50.0
07:00 AM - 08:00 AM	61.5	86.7	51.0
08:00 AM - 09:00 AM	63.0	78.3	52.5
09:00 AM - 10:00 AM	52.9	66.8	49.7
10:00 AM - 11:00 AM	52.5	75.0	47.3
11:00 AM - 12:00 PM	52.6	77.2	47.0

Leq Average 24 hrs. (dB(A))	56.7		
Lmax (dB(A))		97.6	
L90 (dB(A))			46.7
Ldn (dB(A))	61.0		
Standard (dB(A))	70	115	

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
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Remark : The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Thanita K.

Thanita Kulsuriwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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คุณภาพน้ำทิ้ง



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O :
Project Name : Water Testing
Project Location :

Lot ID: 22154916
Date Received : Jan 11, 2023
Date Reported : Jan 19, 2023
Report Number : 2532447-1

Page 1 of 1						
Sample Number	22154916-1					
Sampled Date	Jan 11, 2023 11:30 AM					
Sample Description	Wastewater					
Location	PUI_EQ Tank					
Date Analysis Commenced	Jan 11, 2023					
Condition of Sample	Contained in two glass vials, three amber glass bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Water Testing						
BOD (5 days at 20 Degree C)	mg/L	-	2.0	778	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Rayong
COD	mg/L	1.5	5	3177	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	18	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	16	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease *	mg/L	-	3	17	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3520 B	Rayong
pH at 25 degree C *	-	-	-	6.7	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Temperature *	Degree C	-	-	32.8	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1400	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	14	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Sampling By : Pathompong Komsawat วิธณิชากร ร-323-9468 , Thanassun Namakunna วนิดาสนวน ร-204-8592

Remark :
LOD : Limit of Detection
"C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Narumon Banchongkit
Supervisor
วิธณิชากร ร-323-9445

Approved by

Dj Changchong
Senior Manager
วิธณิชากร ร-323-9442

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5 (Reports) At 1000 (15 21000)

825-2201-0040



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O :
Project Name : Water Testing
Project Location :

Lot ID: 22154914
Date Received : Jan 11, 2023
Date Reported : Jan 20, 2023
Report Number : 2547224-1

Page 1 of 2						
Sample Number	22154914-1					
Sampled Date	Jan 11, 2023 1:25 PM					
Sample Description	Wastewater					
Location	Inspection Manhole					
Date Analysis Commenced	Jan 11, 2023					
Condition of Sample	Contained in four glass vials, two amber glass bottles and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method
Water Testing						
BOD (5 days at 20 Degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B
COD	mg/L	1.5	25	25	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D
Color (at Original pH)	ADMI	-	5	9	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F
Color (at pH 7.0)	ADMI	-	5	9	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F
Cyanide as CN *	mg/L	0.001	0.005	0.006	≤0.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-CN (C, F)
Formaldehyde	mg/L	0.03	0.1	Not Detected	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5530 C
pH at 25 degree C *	-	-	-	8.0	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)
Phenol	mg/L	0.005	0.01	Not Detected	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5530 C

Technical Management

Narumon Banchongkit
Supervisor
วิธณิชากร ร-323-9445

Approved by

Dj Changchong
Senior Manager
วิธณิชากร ร-323-9442

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5 (Reports) At 1000 (15 21000)

825-2201-0040

Analysis / Test Report

Lot ID: 22154916
Date Received : Jan 11, 2023
Date Reported : Jan 19, 2023
Report Number : 2532447-2

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O :
Project Name : Water Testing
Project Location :

Page 1 of 1						
Sample Number	22154916-1					
Sampled Date	Jan 11, 2023 11:30 AM					
Sample Description	Wastewater					
Location	PUI_EQ Tank					
Date Analysis Commenced	Jan 12, 2023					
Condition of Sample	Contained in two glass vials, three amber glass bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Organic Compounds						
Propylene oxide	mg/L	-	10	<10	In house method based on United States Environmental Protection Agency, EPA Method 8015 B	Bangkok
Water Testing						
Methanol	mg/L	0.05	2.0	14.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6200 B	Bangkok

Sampling By : Pathompong Komsawat วิธณิชากร ร-323-9468 , Thanassun Namakunna วนิดาสนวน ร-204-8592

Remark :
LOD : Limit of Detection
"C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Technical Management

Narumon Banchongkit
Supervisor
วิธณิชากร ร-323-9445

Approved by

Dj Changchong
Senior Manager
วิธณิชากร ร-323-9442

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RIGHT SOLUTIONS

5 (Reports) At 1000 (15 21000)

825-2201-0040



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O :
Project Name : Water Testing
Project Location :

Lot ID: 22154914
Date Received : Jan 11, 2023
Date Reported : Jan 19, 2023
Report Number : 2547224-3

Page 1 of 1

Sample Number	22154914-1						
Sampled Date	Jan 11, 2023 1:25 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Jan 11, 2023						
Condition of Sample	Contained in four glass vials, two amber glass bottles and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
Heachlorobenzene	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Water Testing							
Chlorine	mg/L	-	-	0.53	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Note : Ambient Temperature is 28.7 degree Celsius.

Sampling By :

Remark :
LOD : Limit of Detection
LOQ : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Nant Somb

Nanthavadee Somborn
Specialist 1

ADDRESS 616/10 Moo 5 T. Maenam Khui A. Phadang Rayong 21140 Thailand PHONE +66 0 3104 8555 FAX +66 0 3104 8556
ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company

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0215 220 0160

5 (Hours) All CL, 9 (A 42PM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O :
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 22154914
Date Received : Jan 11, 2023
Date Reported : Jan 19, 2023
Report Number : 2547225-1

Page 1 of 3

Sample Number	22154914-2						
Sampled Date	Jan 11, 2023 1:25 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Jan 12, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Arsenic	mg/L	0.0003	0.0005	0.003	≤0.25	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Barium	mg/L	0.0003	0.0005	0.13	≤1.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Cadmium	mg/L	0.0003	0.0005	Not Detected	≤0.03	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Chromium	mg/L	0.0003	0.0005	0.003	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Copper	mg/L	0.0003	0.0005	0.002	≤2.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Hexavalent Chromium	mg/L	0.003	0.01	Not Detected	≤0.25	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3500-Cr B	Bangkok
Iron	mg/L	0.003	0.005	0.11	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Lead	mg/L	0.0003	0.0005	0.0007	≤0.2	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Technical Management

Savitree N.

Savitree Nissangiam
Manager
โทรศัพท์ 2-204-4-4709

Approved by

Kanokorn Anek

Kanokorn Anek
Senior Manager
โทรศัพท์ 2-204-4-6111

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ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company

0215 220 0160

RIGHT SOLUTIONS ANALYSIS • TESTING • PRESERVATION

5 (Hours) All CL, 9 (A 42PM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O :
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 22154914
Date Received : Jan 11, 2023
Date Reported : Jan 19, 2023
Report Number : 2547225-1

Page 2 of 3

Sample Number	22154914-2						
Sampled Date	Jan 11, 2023 1:25 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Jan 12, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Manganese	mg/L	0.0003	0.0005	0.02	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Mercury *	mg/L	0.0001	0.0005	Not Detected	≤0.005	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3112	Bangkok
Nickel	mg/L	0.0003	0.0005	0.005	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Selenium	mg/L	0.0003	0.0005	Not Detected	≤0.02	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Silver	mg/L	0.0003	0.0005	Not Detected	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Trivalent Chromium *	mg/L	-	0.01	<0.01	≤0.75	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.52	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Sampling By : Pathompong Kornsawat โทรศัพท์ 2-323-4-9468, Thanassou Namakunna โทรศัพท์ 2-204-4-8592

Technical Management

Savitree N.

Savitree Nissangiam
Manager
โทรศัพท์ 2-204-4-4709

Approved by

Kanokorn Anek

Kanokorn Anek
Senior Manager
โทรศัพท์ 2-204-4-6111

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0215 220 0160

RIGHT SOLUTIONS ANALYSIS • TESTING • PRESERVATION

5 (Hours) All CL, 9 (A 42PM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O :
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 22154914
Date Received : Jan 11, 2023
Date Reported : Jan 19, 2023
Report Number : 2547225-1

Page 3 of 3

Remark :
LOD : Limit of Detection
LOQ : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Savitree N.

Savitree Nissangiam
Manager
โทรศัพท์ 2-204-4-4709

Approved by

Kanokorn Anek

Kanokorn Anek
Senior Manager
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0215 220 0160

RIGHT SOLUTIONS ANALYSIS • TESTING • PRESERVATION

5 (Hours) All CL, 9 (A 42PM)



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 231759
Date Received : Feb 01, 2023
Date Reported : Feb 09, 2023
Report Number : 2535973-1

Page 1 of 1						
Sample Number	231759-1					
Sampled Date	Feb 01, 2023 10:00 AM					
Sample Description	Wastewater					
Location	PUL EQ Tank					
Date Analysis Commenced	Feb 01, 2023					
Condition of Sample	Contained in two glass vials, three amber glass bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Water Testing						
BOD (5 days at 20 Degree C)	mg/L	-	2.0	651	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Rayong
COD	mg/L	1.5	25	2579	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	12	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	10	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease *	mg/L	-	3	12	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C *	-	-	-	7.1	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (F)	Rayong
Temperature *	Degree C	-	-	34.2	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1370	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	20	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong

Sampling By : Chaimusorn Lertnathakulchai รหัสประจำตัว >323-9461, Thanasoun Hamakunna รหัสประจำตัว >204-9592

Remark :
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- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * were not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

N. Banngmit

Narumon Banchonglut
Supervisor
รหัสประจำตัว >323-9445

Approved by

D. Chanchong

Dej Chanchong
Senior Manager
รหัสประจำตัว >323-9442

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9129-100 (P&L)

S. Vajravan, AL Q. 02-01-45401



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 231756
Date Received : Feb 01, 2023
Date Reported : Feb 10, 2023
Report Number : 2564322-1

Page 1 of 2							
Sample Number	231756-1						
Sampled Date	Feb 01, 2023 1:55 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Feb 01, 2023						
Condition of Sample	Contained in four amber glass bottles and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Rayong
COD	mg/L	1.5	25	70	≤120	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	11	≤300	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	9	≤300	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Cyanide as CN *	mg/L	0.001	0.005	<0.005	±0.2	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 4500-CH (C, E)	Rayong
Formaldehyde	mg/L	0.03	0.1	<0.1	±1.0	Wastewater Analysis	Rayong
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C *	-	-	-	8.3	5.5-9.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (E)	Rayong
Phenol	mg/L	0.005	0.01	Not Detected	±1.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 5530 C	Rayong

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Technical Management

N. Banngmit

Narumon Banchonglut
Supervisor
รหัสประจำตัว >323-9445

Approved by

D. Chanchong

Dej Chanchong
Senior Manager
รหัสประจำตัว >323-9442

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9129-100 (P&L)

S. Vajravan, AL Q. 02-01-45401



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 231759
Date Received : Feb 01, 2023
Date Reported : Feb 09, 2023
Report Number : 2535973-2

Page 1 of 1						
Sample Number	231759-1					
Sampled Date	Feb 01, 2023 10:00 AM					
Sample Description	Wastewater					
Location	PUL EQ Tank					
Date Analysis Commenced	Feb 02, 2023					
Condition of Sample	Contained in two glass vials, three amber glass bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Organic Compounds						
Propylene oxide	mg/L	-	10	<10	In-house method based on United States Environmental Protection Agency, EPA Method 8033-5	Bangkok
Water Testing						
Methanol	mg/L	0.05	2.0	15.2	In-house method based on United States Environmental Protection Agency, EPA Method 8030 B and 8260 D	Bangkok

Sampling By : Chaimusorn Lertnathakulchai, Thanasoun Hamakunna

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Approved by

Siriluk P.

Siriluk Puengpang
Supervisor

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S. Vajravan, AL Q. 02-01-45401



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 231756
Date Received : Feb 01, 2023
Date Reported : Feb 10, 2023
Report Number : 2564322-1

Page 2 of 2

Sample Number	231756-1						
Sampled Date	Feb 01, 2023 1:55 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Feb 01, 2023						
Condition of Sample	Contained in four amber glass bottles and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Residual Free Chlorine *	mg/L	-	0.1	0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong
Sulfide *	mg/L	-	0.5	<0.5	≤1.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (C, F)	Rayong
Temperature *	Degree C	-	-	32.4	≤40	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	860	≤3000	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	<1.0	≤100	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (C), part 6013 (D)	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of The Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Note : Ambient Temperature is 31.6 degree Celsius.

Sampling By : Chaimusorn Lertnathakulchai รหัสประจำตัว >323-9461, Thanasoun Hamakunna รหัสประจำตัว >204-9592

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Technical Management

N. Banngmit

Narumon Banchonglut
Supervisor
รหัสประจำตัว >323-9445

Approved by

D. Chanchong

Dej Chanchong
Senior Manager
รหัสประจำตัว >323-9442

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9129-100 (P&L)

S. Vajravan, AL Q. 02-01-45401



Analysis / Test Report



TESTING
No.0009

Lot ID: 231756

Date Received : Feb 01, 2023
Date Reported : Feb 10, 2023
Report Number : 2564322-2

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Page 1 of 4

Sample Number : 231756-1
Sampled Date : Feb 01, 2023 1:55 PM
Sample Description : Wastewater
Location : Inspection Manhole
Date Analysis Commenced : Feb 02, 2023
Condition of Sample : Contained in four amber glass bottles and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
2,4-DDD *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
2,4-DDE *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
2,4-DDT *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDD *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDE *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDT *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Aldrin *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

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Approved by

Siriluk P.

Siriluk Puengpang
Supervisor

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ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company

RIGHT SOLUTIONS www.alsglobal.com 15 Moo 2, Asia Industrial Estate, Rayong Thailand



Analysis / Test Report



TESTING
No.0009

Lot ID: 231756

Date Received : Feb 01, 2023
Date Reported : Feb 10, 2023
Report Number : 2564322-2

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Page 2 of 4

Sample Number : 231756-1
Sampled Date : Feb 01, 2023 1:55 PM
Sample Description : Wastewater
Location : Inspection Manhole
Date Analysis Commenced : Feb 02, 2023
Condition of Sample : Contained in four amber glass bottles and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
alpha-BHC *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Atrazine *	ug/L	0.1	0.5	Not Detected	Not Detected	In-house method : STM 04-101 based on Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
beta-BHC *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Chlordane *	ug/L	0.02	0.04	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
delta-BHC *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Dieldrin *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Endosulfan I *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

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RIGHT SOLUTIONS www.alsglobal.com 15 Moo 2, Asia Industrial Estate, Rayong Thailand



Analysis / Test Report



TESTING
No.0009

Lot ID: 231756

Date Received : Feb 01, 2023
Date Reported : Feb 10, 2023
Report Number : 2564322-2

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Page 3 of 4

Sample Number : 231756-1
Sampled Date : Feb 01, 2023 1:55 PM
Sample Description : Wastewater
Location : Inspection Manhole
Date Analysis Commenced : Feb 02, 2023
Condition of Sample : Contained in four amber glass bottles and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
Endosulfan II *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Endrin *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Heptachlor *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Heptachlor-Epoxide *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Hexachlorobenzene *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Lindane (gamma-BHC) *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Methoxychlor *	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

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Analysis / Test Report



TESTING
No.0009

Lot ID: 231756

Date Received : Feb 01, 2023
Date Reported : Feb 10, 2023
Report Number : 2564322-2

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Page 4 of 4

Note : Ambient Temperature is 31.6 degree celcius.
Sampling By : Chaiusorn Lertnathakunchai , Thanassorn Namakunna
Remark :
LOD : Limit of Detection
"u" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * : Item not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 231756
Date Received : Feb 01, 2023
Date Reported : Feb 10, 2023
Report Number : 2564322-3

Sample Number : 231756-1
Sampled Date : Feb 01, 2023 1:55 PM
Sample Description : Wastewater
Location : Inspection Manhole
Date Analysis Commenced : Feb 02, 2023
Condition of Sample : Contained in four amber glass bottles and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Page 1 of 1

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
Toxaphene	ug/L	2	4	Not Detected	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Water Testing							
Chlorine	mg/L	-	-	0.23	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 4500-G (F)	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Note : Ambient Temperature is 31.6 degree Celsius.

Sampling By : Chaisorn Lertnathakunchai , Thanassou Namakunna

Remark :
- LOD : Limit of Detection
- "C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

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ELS-200 (MAL)

5 (Weight) At GL (at 120%)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 231756
Date Received : Feb 01, 2023
Date Reported : Feb 09, 2023
Report Number : 2564322-1

Sample Number : 231756-2
Sampled Date : Feb 01, 2023 1:55 PM
Sample Description : Wastewater
Location : Inspection Manhole
Date Analysis Commenced : Feb 02, 2023
Condition of Sample : Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Page 2 of 2

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Mercury *	mg/L	0.0001	0.0005	Not Detected	≤0.005	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3112	Bangkok
Nickel	mg/L	0.0003	0.0005	0.004	≤1.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Selenium	mg/L	0.0003	0.0005	Not Detected	≤0.02	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Trivalent Chromium *	mg/L	-	0.01	<0.01	≤0.75	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.74	≤5.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Chaisorn Lertnathakunchai vitsouas@n -323-9461, Thanassou Namakunna vitsouas@n -204-8592

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- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

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ELS-200 (MAL)

5 (Weight) At GL (at 120%)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 231756
Date Received : Feb 01, 2023
Date Reported : Feb 09, 2023
Report Number : 2564322-1

Sample Number : 231756-2
Sampled Date : Feb 01, 2023 1:55 PM
Sample Description : Wastewater
Location : Inspection Manhole
Date Analysis Commenced : Feb 02, 2023
Condition of Sample : Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Page 1 of 2

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Arsenic	mg/L	0.0003	0.0005	0.003	≤0.25	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Barium	mg/L	0.0003	0.0005	0.14	≤1.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Cadmium	mg/L	0.0003	0.0005	Not Detected	≤0.03	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Chromium	mg/L	0.0003	0.0005	0.003	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Copper	mg/L	0.0003	0.0005	0.002	≤2.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Hexavalent Chromium	mg/L	0.003	0.01	Not Detected	≤0.25	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3500-G B	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.02	≤5.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

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ELS-200 (MAL)

5 (Weight) At GL (at 120%)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 231756
Date Received : Feb 01, 2023
Date Reported : Feb 09, 2023
Report Number : 2564322-2

Sample Number : 231756-2
Sampled Date : Feb 01, 2023 1:55 PM
Sample Description : Wastewater
Location : Inspection Manhole
Date Analysis Commenced : Feb 02, 2023
Condition of Sample : Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Page 1 of 1

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.13	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Silver	mg/L	0.0003	0.0005	Not Detected	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Chaisorn Lertnathakunchai , Thanassou Namakunna
Remark :
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- "C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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ELS-200 (MAL)

5 (Weight) At GL (at 120%)



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2319542
Date Received : Mar 01, 2023
Date Reported : Mar 10, 2023
Report Number : 2573882-2

Sample Number	2319542-1					
Sampled Date	Mar 01, 2023 10:00 AM					
Sample Description	Wastewater					
Location	PUL EQ Tank					
Date Analysis Commenced	Mar 01, 2023					
Condition of Sample	Contained in two glass vials, three amber glass bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOQ)	Result	Method	Testing Location
Water Testing						
BOD (5 days at 20 Degree C)	mg/L	-	2.0	842	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Rayong
COD	mg/L	1.5	25	3207	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	9	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease *	mg/L	-	3	16	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5200 B	Rayong
pH at 25 degree C *	-	-	-	6.8	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Temperature *	Degree C	-	-	35.7	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1700	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	13	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Sampling By : Chaimusorn Lertnankhunchai วรณัฐวณิช 323-9461, Thanassorn Namakunna วรณัฐวณิช 204-8592

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วรณัฐวณิช 323-9445

Approved by

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2319542
Date Received : Mar 01, 2023
Date Reported : Mar 10, 2023
Report Number : 2573882-2

Sample Number	2319542-1					
Sampled Date	Mar 01, 2023 10:00 AM					
Sample Description	Wastewater					
Location	PUL EQ Tank					
Date Analysis Commenced	Mar 02, 2023					
Condition of Sample	Contained in two glass vials, three amber glass bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOQ)	Result	Method	Testing Location
Organic Compounds						
Propylene oxide	mg/L	-	10	<10	In-house method based on United States Environmental Protection Agency, EPA Method 8015 B	Bangkok
Water Testing						
Methanol	mg/L	0.05	2.0	29.4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6200 B	Bangkok

Sampling By : Chaimusorn Lertnankhunchai, Thanassorn Namakunna

Remark :
LOD : Limit of Detection
"C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

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Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2319535
Date Received : Mar 01, 2023
Date Reported : Mar 10, 2023
Report Number : 2595929-1

Page 1 of 2

Sample Number	2319535-1						
Sampled Date	Mar 01, 2023 1:45 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Mar 01, 2023						
Condition of Sample	Contained in three amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Rayong
COD	mg/L	1.5	25	27	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	7	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	7	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Cyanide as CN *	mg/L	0.001	0.005	<0.005	≤0.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - C (C, D)	Rayong
Formaldehyde	mg/L	0.03	0.1	Not Detected	≤1.0	Wastewater analysis manual, Environmental Engineering Association of Thailand, 4th ed., 2004	Rayong
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5200 B	Rayong
pH at 25 degree C *	-	-	-	8.4	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Phenol	mg/L	0.005	0.01	Not Detected	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5330 D	Rayong

Technical Management

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S (Version) AL-GL-104 (11/2020)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2319535
Date Received : Mar 01, 2023
Date Reported : Mar 10, 2023
Report Number : 2595929-1

Page 2 of 2

Sample Number	2319535-1						
Sampled Date	Mar 01, 2023 1:45 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Mar 01, 2023						
Condition of Sample	Contained in three amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Residual Free Chlorine *	mg/L	-	0.1	0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong
Sulfide *	mg/L	-	0.5	<0.5	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (C, F)	Rayong
Temperature *	Degree C	-	-	33.6	≤40	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550-B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1032	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540-C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	<1.0	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-larg (C), part NH3 (D)	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540-D	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Note : Ambient Temperature is 31.4 degree celsius.

Sampling By : Chaimusorn Lertnankhunchai วรณัฐวณิช 323-9461, Thanassorn Namakunna วรณัฐวณิช 204-8592

Remark :
LOD : Limit of Detection
"C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Narumon Banphonglut
Supervisor
วรณัฐวณิช 323-9445

Approved by

Daj Changchon
Senior Manager
วรณัฐวณิช 323-9442

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S (Version) AL-GL-104 (11/2020)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2319535
Date Received : Mar 01, 2023
Date Reported : Mar 10, 2023
Report Number : 2589529-2

Page 1 of 4

Sample Number	2319535-1					
Sampled Date	Mar 01, 2023 1:45 PM					
Sample Description	Wastewater					
Location	Inspection Manhole					
Date Analysis Commenced	Mar 02, 2023					
Condition of Sample	Contained in three amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method
Pesticides - Organochlorine Group						
2,4-DDO	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
2,4-DDE	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
2,4-DDT	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
4,4-DDO	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
4,4-DDE	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
4,4-DDT	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Aldrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B

Technical Management

Nant Somb
Nanthavadee Sombon
Specialist I
วิไลสุภาวดี ส-204-4716

Approved by

Kanokorn Anek
Kanokorn Anek
Senior Manager
วิไลสุภาวดี ส-204-4711

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S (Version) AL GL ver 1.2 (23M)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2319535
Date Received : Mar 01, 2023
Date Reported : Mar 10, 2023
Report Number : 2589529-2

Page 2 of 4

Sample Number	2319535-1					
Sampled Date	Mar 01, 2023 1:45 PM					
Sample Description	Wastewater					
Location	Inspection Manhole					
Date Analysis Commenced	Mar 02, 2023					
Condition of Sample	Contained in three amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method
Pesticides - Organochlorine Group						
alpha-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
beta-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Chlordane	ug/L	0.02	0.04	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
delta-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Dieldrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Endosulfan I	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Endosulfan II	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B

Technical Management

Nant Somb
Nanthavadee Sombon
Specialist I
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Approved by

Kanokorn Anek
Kanokorn Anek
Senior Manager
วิไลสุภาวดี ส-204-4711

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2319535
Date Received : Mar 01, 2023
Date Reported : Mar 10, 2023
Report Number : 2589529-2

Page 3 of 4

Sample Number	2319535-1					
Sampled Date	Mar 01, 2023 1:45 PM					
Sample Description	Wastewater					
Location	Inspection Manhole					
Date Analysis Commenced	Mar 02, 2023					
Condition of Sample	Contained in three amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method
Pesticides - Organochlorine Group						
Endrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Heptachlor	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Heptachlor-Epoxide	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Hexachlorobenzene	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Lindane (gamma-BHC)	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Methoxychlor	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B
Toxaphene	ug/L	2	4	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Technical Management

Nant Somb
Nanthavadee Sombon
Specialist I
วิไลสุภาวดี ส-204-4716

Approved by

Kanokorn Anek
Kanokorn Anek
Senior Manager
วิไลสุภาวดี ส-204-4711

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2319535
Date Received : Mar 01, 2023
Date Reported : Mar 10, 2023
Report Number : 2589529-2

Page 4 of 4

Note 1	Ambient Temperature is 31.4 degree Celsius.					
Sampling By :	Chainarum Lertnathakunchal วิไลสุภาวดี ส-323-4-9461, Thanasorn Namakunna วิไลสุภาวดี ส-204-4-8592					
Remark :	LOD : Limit of Detection " < " : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)					

Technical Management

Nant Somb
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Specialist I
วิไลสุภาวดี ส-204-4716

Approved by

Kanokorn Anek
Kanokorn Anek
Senior Manager
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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Sample Number	2319535-1							Page 1 of 1
Sampled Date	Mar 01, 2023 1:45 PM							
Sample Description	Wastewater							
Location	Inspection Manhole							
Date Analysis Commenced	Mar 01, 2023							
Condition of Sample	Contained in three amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)							
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location	
Pesticides - Organochlorine Group								
Atrazine	ug/L	0.1	0.5	Not Detected	Not Detected	In-house method : STM 04-101 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6530 D, part 6410 D	Bangkok	
Water Testing								
Chlorine *	mg/L	-	-	0.55	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (G)	Rayong	

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Note : Ambient Temperature is 31.4 degree Celsius.

Sampling By : Chaiyosorn Lertranthakunchai , Thanasoun Namakunna

Remark :
LOD : Limit of Detection
"C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Nanthawadee Somborn
Specialist 1

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Sample Number	2319535-2							Page 2 of 2
Sampled Date	Mar 01, 2023 1:45 PM							
Sample Description	Wastewater							
Location	Inspection Manhole							
Date Analysis Commenced	Mar 02, 2023							
Condition of Sample	Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)							
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location	
Metals Testing								
Mercury *	mg/L	0.0001	0.0005	Not Detected	≤0.005	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3112	Bangkok	
Nickel	mg/L	0.0003	0.0005	0.003	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok	
Selenium	mg/L	0.0003	0.0005	Not Detected	≤0.02	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok	
Trivalent Chromium *	mg/L	-	0.01	<0.01	≤0.75	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok	
Zinc	mg/L	0.003	0.005	0.60	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok	

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Chaiyosorn Lertranthakunchai วิธธูวณวณ 323-9451, Thanasoun Namakunna วิธธูวณวณ 204-8592

Remark :
LOD : Limit of Detection
"C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Sawitree Nongsiam
Manager
วิธธูวณวณ 204-4709

Approved by

Kanokhem Anek
Senior Manager
วิธธูวณวณ 204-6111

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Page 1 of 2

Sample Number	2319535-2						
Sampled Date	Mar 01, 2023 1:45 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Mar 02, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Arsenic	mg/L	0.0003	0.0005	0.003	≤0.25	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Barium	mg/L	0.0003	0.0005	0.15	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Cadmium	mg/L	0.0003	0.0005	Not Detected	≤0.03	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Chromium	mg/L	0.0003	0.0005	0.002	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Copper	mg/L	0.0003	0.0005	0.001	≤2.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Hexavalent Chromium	mg/L	0.003	0.01	Not Detected	≤0.25	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3500-Cr B	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.01	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Technical Management

Sawitree Nongsiam
Manager
วิธธูวณวณ 204-4709

Approved by

Kanokhem Anek
Senior Manager
วิธธูวณวณ 204-6111

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Page 1 of 1

Sample Number	2319535-2						
Sampled Date	Mar 01, 2023 1:45 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Mar 02, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.05	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Silver	mg/L	0.0003	0.0005	Not Detected	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Chaiyosorn Lertranthakunchai วิธธูวณวณ 323-9451, Thanasoun Namakunna วิธธูวณวณ 204-8592

Remark :
LOD : Limit of Detection
"C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Sawitree Nongsiam
Manager
วิธธูวณวณ 204-4709

Approved by

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Senior Manager
วิธธูวณวณ 204-6111

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2336713
Date Received : Apr 05, 2023
Date Reported : Apr 12, 2023
Report Number : 2622505-2

Page 1 of 4

Sample Number	2336713-1						
Sampled Date	Apr 05, 2023 1:30 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Apr 06, 2023						
Condition of Sample	Contained in three amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOD)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
2,4-DDD	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
2,4-DDE	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
2,4-DDT	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDD	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDE	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDT	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Aldrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Technical Management

Siriluk Puengpong
Supervisor
โทร: 09-0949871 > 204-4-4720

Approved by

Kanokkom Anek
Senior Manager
โทร: 09-0949871 > 204-4-6111

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0525-028-0194

RIGHT SOLUTIONS

S: Report_AE/LS/12-02299



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2336713
Date Received : Apr 05, 2023
Date Reported : Apr 12, 2023
Report Number : 2622505-2

Page 2 of 4

Sample Number	2336713-1						
Sampled Date	Apr 05, 2023 1:30 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Apr 06, 2023						
Condition of Sample	Contained in three amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOD)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
alpha-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Atrazine	ug/L	0.1	0.5	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
beta-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Chlordane	ug/L	0.02	0.04	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
delta-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Dieldrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Endosulfan I	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Technical Management

Siriluk Puengpong
Supervisor
โทร: 09-0949871 > 204-4-4720

Approved by

Kanokkom Anek
Senior Manager
โทร: 09-0949871 > 204-4-6111

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S: Report_AE/LS/12-02299



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2336713
Date Received : Apr 05, 2023
Date Reported : Apr 12, 2023
Report Number : 2622505-2

Page 3 of 4

Page 3 of 5

Sample Number	2336713-1						
Sampled Date	Apr 05, 2023 1:30 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Apr 06, 2023						
Condition of Sample	Contained in three amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOD)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
Endosulfan II	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Endrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Heptachlor	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Heptachlor-Epoxide	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Hexachlorobenzene	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Uncane (gamma-BHC)	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Methoxychlor	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Technical Management

Siriluk Puengpong
Supervisor
โทร: 09-0949871 > 204-4-4720

Approved by

Kanokkom Anek
Senior Manager
โทร: 09-0949871 > 204-4-6111

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2336713
Date Received : Apr 05, 2023
Date Reported : Apr 12, 2023
Report Number : 2622505-2

Page 4 of 4

Page 4 of 4

Sample Number	2336713-1
Sampled Date	Apr 05, 2023 1:30 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Apr 06, 2023
Condition of Sample	Contained in three amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)

Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
Toxaphene	ug/L	2	4	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Note : Ambient Temperature is 32.3 degree celcius.

Sampling By : Pithompong Komsoat โทร: 09-0949871 > 323-9468 , Thanosun Namakuma โทร: 09-0949871 > 204-4-8532

Remark :

- LOD : Limit of Detection
- <LOQ : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Technical Management

Siriluk Puengpong
Supervisor
โทร: 09-0949871 > 204-4-4720

Approved by

Kanokkom Anek
Senior Manager
โทร: 09-0949871 > 204-4-6111

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2336713
Date Received : Apr 05, 2023
Date Reported : Apr 12, 2023
Report Number : 2622506-3

Page 1 of 1

Sample Number	2336713-1						
Sampled Date	Apr 05, 2023 1:30 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Apr 05, 2023						
Condition of Sample	Contained in three amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Chlorine	mg/L	-	-	0.23	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Note : Ambient Temperature is 32.3 degree Celsius.

Sampling By : Pathompong Komsawat , Thanassou Namakunna

Remark :
- LOD : Limit of Detection
- "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

N. Banchang

Namron Banchang
Supervisor

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6125-210 (MAL)

S. Vachon, AL Group (10-2049)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 2336713
Date Received : Apr 05, 2023
Date Reported : Apr 18, 2023
Report Number : 2622506-1

Page 1 of 2

Sample Number	2336713-2						
Sample Date	Apr 05, 2023 1:30 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Apr 06, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Arsenic	mg/L	0.0003	0.0005	0.005	≤0.25	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Barium	mg/L	0.0003	0.0005	0.15	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Cadmium	mg/L	0.0003	0.0005	Not Detected	≤0.03	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Chromium	mg/L	0.0003	0.0005	0.01	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Copper	mg/L	0.0003	0.0005	0.001	≤2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Hexavalent Chromium	mg/L	0.003	0.01	Not Detected	≤0.25	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3500-Cr B	Bangkok
Lead	mg/L	0.0003	0.0005	<0.0005	≤0.2	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.09	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Technical Management

Chanatt L.

Chanattagim Limchom
Supervisor
ติดต่อเรา 204-4710

Approved by

Kanokorn Anuk

Kanokorn Anuk
Senior Manager
ติดต่อเรา 204-4611

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6125-210 (MAL)

S. Vachon, AL Group (10-2049)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2336713
Date Received : Apr 05, 2023
Date Reported : Apr 18, 2023
Report Number : 2622506-1

Page 2 of 2

Sample Number	2336713-2						
Sample Date	Apr 05, 2023 1:30 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Apr 06, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Mercury *	mg/L	0.0001	0.0005	<0.0005	≤0.005	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3112	Bangkok
Nickel	mg/L	0.0003	0.0005	0.008	≤1.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Selenium	mg/L	0.0003	0.0005	<0.0005	≤0.02	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Trivalent Chromium *	mg/L	-	0.01	0.01	≤0.75	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.62	≤5.0	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Pathompong Komsawat vidoosawit 204-9466, Thanassou Namakunna vidoosawit 204-45592

Remark :
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- "c" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Kanokorn Anuk

Kanokorn Anuk
Senior Manager
ติดต่อเรา 204-4611

Technical Management

Chanatt L.

Chanattagim Limchom
Supervisor
ติดต่อเรา 204-4710

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S. Vachon, AL Group (10-2049)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 2336713
Date Received : Apr 05, 2023
Date Reported : Apr 12, 2023
Report Number : 2622506-2

Page 1 of 1

Sample Number	2336713-2						
Sampled Date	Apr 05, 2023 1:30 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Apr 06, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.36	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Silver	mg/L	0.0003	0.0005	Not Detected	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Sampling By : Pathompong Komsawat vidoosawit 204-9466, Thanassou Namakunna vidoosawit 204-45592

Remark :
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- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Chanatt L.

Chanattagim Limchom
Supervisor

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6125-210 (MAL)

S. Vachon, AL Group (10-2049)



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2347466
Date Received : May 03, 2023
Date Reported : May 12, 2023
Report Number : 2634940-1

Page 1 of 1

Sample Number	2347466-1					
Sampled Date	May 03, 2023 10:29 AM					
Sample Description	Wastewater					
Location	PUL_EQ Tank					
Date Analysis Commenced	May 03, 2023					
Condition of Sample	Contained in three glass vials, two amber glass bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Water Testing						
BOD (5 days at 20 Degree C)	mg/L	-	2.0	624	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Rayong
COD	mg/L	1.5	25	2781	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	13	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	11	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease *	mg/L	-	3	32	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C *	-	-	-	6.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (8)	Rayong
Temperature *	Degree C	-	-	36.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1600	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Sampling By : Pathompong Komsawat วิษณุเวช ๓-323-๙468, Pattarapol Savangjittam วิษณุเวช ๓-204-๙002

Remark :
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Technical Management

N. Banthit

Approved by

D. Chongchong

Nanum Banchongkit

Dej Chongchong

วิษณุเวช ๓-323-๙445

วิษณุเวช ๓-323-๙442

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2347466
Date Received : May 03, 2023
Date Reported : May 12, 2023
Report Number : 2634940-2

Page 1 of 1

Sample Number	2347466-1					
Sampled Date	May 03, 2023 10:29 AM					
Sample Description	Wastewater					
Location	PUL_EQ Tank					
Date Analysis Commenced	May 03, 2023					
Condition of Sample	Contained in three glass vials, two amber glass bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Organic Compounds						
Propylene oxide	mg/L	-	10	<10	In-house method based on United States Environmental Protection Agency, EPA Method 6915 B	Bangkok
Water Testing						
Methanol	mg/L	0.05	2.0	33.9	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6200 B	Bangkok

Sampling By : Pathompong Komsawat วิษณุเวช ๓-323-๙468, Pattarapol Savangjittam วิษณุเวช ๓-204-๙002

Remark :
LOD : Limit of Detection
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Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

N. Banthit

Approved by

S. Puengsup

Nanum Banchongkit

Siriluk Puengsup

วิษณุเวช ๓-323-๙445

วิษณุเวช ๓-323-๙442

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RIGHT SOLUTIONS

5 (Reports) All Result (1 & 47PM)



Analysis / Test Report

TESTING
No.0042

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2347465
Date Received : May 03, 2023
Date Reported : May 12, 2023
Report Number : 2649327-1

Page 1 of 2

Sample Number	2347465-1						
Sampled Date	May 03, 2023 12:05 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	May 03, 2023						
Condition of Sample	Contained in four amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
BOD (5 days at 20 Degree C)	mg/L	-	2.0	<2.0	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B	Rayong
COD	mg/L	1.5	25	41	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	12	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	11	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Cyanide as CN *	mg/L	0.001	0.005	0.005	≤0.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-CN (C, E)	Rayong
Formaldehyde	mg/L	0.03	0.1	Not Detected	≤1.0	Wastewater analysis manual, Environmental Engineering Association of Thailand, 4th ed., 2004	Rayong
Oil & Grease *	mg/L	-	3	<3	≤5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C *	-	-	-	8.5	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (8)	Rayong
Phenol	mg/L	0.005	0.01	0.01	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5530 D	Rayong

Technical Management

N. Banthit

Approved by

D. Chongchong

Nanum Banchongkit

Dej Chongchong

วิษณุเวช ๓-323-๙445

วิษณุเวช ๓-323-๙442

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RIGHT SOLUTIONS

5 (Reports) All Result (1 & 47PM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2347465
Date Received : May 03, 2023
Date Reported : May 12, 2023
Report Number : 2649327-2

Page 2 of 2

Sample Number	2347465-1						
Sampled Date	May 03, 2023 12:05 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	May 03, 2023						
Condition of Sample	Contained in four amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong
Sulfide *	mg/L	-	0.5	<0.5	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (C, F)	Rayong
Temperature *	Degree C	-	-	34.3	≤40	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1170	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	1.3	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-norg (C), part NHD (D)	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of the Ministry of Industry dated June 07, B.E.2550 (2017).

Note : Ambient Temperature is 32.6 degree celcius.

Sampling By : Pathompong Komsawat วิษณุเวช ๓-323-๙468, Pattarapol Savangjittam วิษณุเวช ๓-204-๙002

Remark :
LOD : Limit of Detection
"C" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

N. Banthit

Approved by

D. Chongchong

Nanum Banchongkit

Dej Chongchong

วิษณุเวช ๓-323-๙445

วิษณุเวช ๓-323-๙442

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RIGHT SOLUTIONS

5 (Reports) All Result (1 & 47PM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2347465
Date Received : May 03, 2023
Date Reported : May 12, 2023
Report Number : 2649327-2

Page 1 of 3

Sample Number	2347465-1
Sampled Date	May 03, 2023 12:05 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	May 06, 2023
Condition of Sample	Contained in four amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
2,4-DDO	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
2,4-DDE	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
2,4-DDT	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDO	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDE	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDT	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Aldrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Technical Management

Siriluk P.

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Approved by

Kanokorn Anuk

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RIGHT SOLUTIONS

825-200 (MAL)

5 (Meters) AS (SL) (7.20M)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2347465
Date Received : May 03, 2023
Date Reported : May 12, 2023
Report Number : 2649327-2

Page 2 of 3

Sample Number	2347465-1
Sampled Date	May 03, 2023 12:05 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	May 06, 2023
Condition of Sample	Contained in four amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
Endrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Heptachlor	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Heptachlor-Epoxyde	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Lindane (gamma-BHC)	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Methoxychlor	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Note : Ambient Temperature is 32.6 degree Celsius.

Sampling By : Pathompong Komsawat vitt@uol.com.br -223-a-9468, Pattarapol Savangitarn vitt@uol.com.br -204-a-0002

Remarks :
- LOD : Limit of Detection
- <LOQ : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Technical Management

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Approved by

Kanokorn Anuk

Kanokorn Anuk
Senior Manager
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RIGHT SOLUTIONS

825-200 (MAL)

5 (Meters) AS (SL) (7.20M)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2347465
Date Received : May 03, 2023
Date Reported : May 12, 2023
Report Number : 2649327-2

Page 2 of 3

Sample Number	2347465-1
Sampled Date	May 03, 2023 12:05 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	May 06, 2023
Condition of Sample	Contained in four amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
alpha-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
beta-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Chlordane	ug/L	0.02	0.04	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
delta-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Dieldrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Endosulfan I	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Endosulfan II	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Technical Management

Siriluk P.

Siriluk Puengpang
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Approved by

Kanokorn Anuk

Kanokorn Anuk
Senior Manager
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RIGHT SOLUTIONS

825-200 (MAL)

5 (Meters) AS (SL) (7.20M)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2347465
Date Received : May 03, 2023
Date Reported : May 12, 2023
Report Number : 2649327-2

Page 1 of 1

Sample Number	2347465-1
Sampled Date	May 03, 2023 12:05 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	May 03, 2023
Condition of Sample	Contained in four amber glass bottles and six plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
Azinphos	ug/L	0.1	0.5	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Hexachlorobenzene	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Toxaphene	ug/L	2	4	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Water Testing							
Chlorine	mg/L	-	-	<0.01	No Standard	Standard Methods for the Examination of Water and Wastewater: APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (G)	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Note : Ambient Temperature is 32.6 degree Celsius.

Sampling By : Pathompong Komsawat vitt@uol.com.br -223-a-9468, Pattarapol Savangitarn vitt@uol.com.br -204-a-0002

Remarks :
- LOD : Limit of Detection
- <LOQ : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

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RIGHT SOLUTIONS

825-200 (MAL)

5 (Meters) AS (SL) (7.20M)



Analysis / Test Report



TESTING

No.0009

Lot ID: 2347465

Date Received : May 03, 2023

Date Reported : May 12, 2023

Report Number : 2649328-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Page 1 of 2

Sample Number	2347465-2						
Sampled Date	May 03, 2023 12:05 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	May 05, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Arsenic	mg/L	0.0003	0.0005	0.004	≤0.25	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Barium	mg/L	0.0003	0.0005	0.13	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Cadmium	mg/L	0.0003	0.0005	Not Detected	≤0.03	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Chromium	mg/L	0.0003	0.0005	0.002	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Copper	mg/L	0.0003	0.0005	0.0009	≤2.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Hexavalent Chromium	mg/L	0.003	0.01	Not Detected	≤0.25	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3500 Cr-B	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.03	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Technical Management

Savitree N.

Savitree Nongsangam
Manager
โทรศัพท์ ๒-๒๐4-๔709

Approved by

Kanokkorn Anek

Kanokkorn Anek
Senior Manager
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RIGHT SOLUTIONS RIGHT PEOPLE RIGHT PLACE

025-250 (EMAIL)

1 (Report) 68 (L) 91 (7 (2PM))



Analysis / Test Report



TESTING

No.0009

Lot ID: 2347465

Date Received : May 03, 2023

Date Reported : May 12, 2023

Report Number : 2649328-2

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Page 1 of 1

Sample Number	2347465-2						
Sampled Date	May 03, 2023 12:05 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	May 05, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.04	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Silver	mg/L	0.0003	0.0005	Not Detected	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Note : Ambient Temperature is 32.6 degree celcius.

Sampling By : Pathompong Komsawat, Pattarapol Savangitiam

Remark :
LOD : Limit of Detection
" < " : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * / are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Savitree N.

Savitree Nongsangam
Manager

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RIGHT SOLUTIONS RIGHT PEOPLE RIGHT PLACE

025-250 (EMAIL)

1 (Report) 68 (L) 91 (7 (2PM))



Analysis / Test Report



TESTING

No.0009

Lot ID: 2347465

Date Received : May 03, 2023

Date Reported : May 12, 2023

Report Number : 2649328-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Page 2 of 2

Sample Number	2347465-2						
Sampled Date	May 03, 2023 12:05 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	May 05, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Mercury *	mg/L	0.0001	0.0005	Not Detected	≤0.005	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3112	Bangkok
Nickel	mg/L	0.0003	0.0005	0.004	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Selenium	mg/L	0.0003	0.0005	Not Detected	≤0.02	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Trivalent Chromium *	mg/L	-	0.01	<0.01	0.75	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.62	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Note : Ambient Temperature is 32.6 degree celcius.

Sampling By : Pathompong Komsawat, Pattarapol Savangitiam

Remark :
LOD : Limit of Detection
" < " : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * / are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Savitree N.

Savitree Nongsangam
Manager
โทรศัพท์ ๒-๒๐4-๔709

Approved by

Kanokkorn Anek

Kanokkorn Anek
Senior Manager
โทรศัพท์ ๒-๒๐4-๔611

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025-250 (EMAIL)

1 (Report) 68 (L) 91 (7 (2PM))



Analysis / Test Report



TESTING

No.0042

Lot ID: 2362419

Date Received : Jun 07, 2023

Date Reported : Jun 15, 2023

Report Number : 2667098-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Page 1 of 1

Page 1 of 1

Sample Number	2362419-1					
Sampled Date	Jun 07, 2023 10:00 AM					
Sample Description	Wastewater					
Location	PUI_EQ Tank					
Date Analysis Commenced	Jun 07, 2023					
Condition of Sample	Contained in two glass vials, three amber glass bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Water Testing						
BOD (5 days at 20 Degree C)	mg/L	-	2.0	778	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O-G	Rayong
COD	mg/L	1.5	25	1788	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	23	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease *	mg/L	-	3	14	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C *	-	-	-	6.5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (8)	Rayong
Temperature *	Degree C	-	-	35.4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1370	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Sampling By : Chansorn Lertnathakulchai, Thanassorn Namkumna

Remark :
LOD : Limit of Detection
" < " : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
Analyte(s) marked * / are not included in scope of Accreditation ISO/IEC 17025.
The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

N. Banthit

Narumon Banthit
Supervisor
โทรศัพท์ ๒-๒๐๔-๙๔๔๕

Approved by

Dej Changchon

Dej Changchon
Senior Manager
โทรศัพท์ ๒-๒๐๔-๙๔๔๕

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RIGHT SOLUTIONS RIGHT PEOPLE RIGHT PLACE

025-250 (EMAIL)

1 (Report) 68 (L) 91 (7 (2PM))



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2362419
Date Received : Jun 07, 2023
Date Reported : Jun 15, 2023
Report Number : 2685670-2

Page 1 of 1						
Sample Number	2362419-1					
Sampled Date	Jun 07, 2023 10:00 AM					
Sample Description	Wastewater					
Location	PUI_EQ Tank					
Date Analysis Commenced	Jun 08, 2023					
Condition of Sample	Contained in two glass vials, three amber glass bottles and three plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOD)	Result	Method	Testing Location
Organic Compounds						
Propylene oxide	mg/L	-	10	<10	In-house method based on United States Environmental Protection Agency, EPA Method 8015 B	Bangkok
Water Testing						
Methanol	mg/L	0.05	2.0	15.1	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6200 B	Bangkok

Sampling By: Chaiyusorn Lertnathakunchai, Thanasoun Namakunna

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOQ (Limit of Reporting)

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Approved by

Surin Chaiyusorn
Scientist (3)

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RIGHT SOLUTIONS

5 (Square) AL CL (Net) 7 (2PM)

8123-2102 (Email)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

TESTING
No.0042
Lot ID: 2362416
Date Received : Jun 07, 2023
Date Reported : Jun 15, 2023
Report Number : 2685670-1

Sample Number	2362416-1					
Sampled Date	Jun 07, 2023 1:40 PM					
Sample Description	Wastewater					
Location	Inspection Manhole					
Date Analysis Commenced	Jun 07, 2023					
Condition of Sample	Contained in four amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)					
Analyte	Unit	LOD	LOQ (LOD)	Result	Guideline / Specification	Testing Location
Water Testing						
BOD (5 days at 20 Degree C)	mg/L	-	2.0	<2.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	42	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Rayong
Color (at Original pH)	ADU	-	5	16	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Color (at pH 7.0)	ADU	-	5	14	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Cyanide as CN *	mg/L	0.001	0.005	<0.005	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 C1 (C, S)	Rayong
Formaldehyde	mg/L	0.03	0.1	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 C1 (C, S)	Rayong
Oil & Grease *	mg/L	-	3	3	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5510 B	Rayong
pH at 25 degree C *	-	-	-	8.5	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Phenol	mg/L	0.005	0.01	0.02	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5510 D	Rayong

Technical Management

Narumon Banchonglut
Supervisor

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Approved by

Dej Changchon
Senior Manager

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RIGHT SOLUTIONS

5 (Square) AL CL (Net) 7 (2PM)

8123-2102 (Email)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2362416
Date Received : Jun 07, 2023
Date Reported : Jun 15, 2023
Report Number : 2685670-1

							Page 2 of 2
Sample Number	2362416-1						
Sampled Date	Jun 07, 2023 1:40 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Jun 07, 2023						
Condition of Sample	Contained in four amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOD)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Residual Free Chlorine *	mg/L	-	0.1	0.1	≤10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong
Sulfide *	mg/L	-	0.5	<0.5	≤10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-S2 (C, F)	Rayong
Temperature *	Degree C	-	-	34.1	≤40	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1100	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	4.0	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Hg (C), part 4500-Hg (D)	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	<5	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).

Note : Ambient Temperature is 30.5 degree celcius.

Sampling By : Chaiyusorn Lertnathakunchai โทรศัพท์ +323-8-9445, Thanasoun Namakunna โทรศัพท์ +323-8-9442

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOQ (Limit of Reporting)
- Analyte(s) marked * /are not included in scope of Accreditation ISO/IEC 17025.
- The Laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Narumon Banchonglut
Supervisor

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Approved by

Dej Changchon
Senior Manager

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RIGHT SOLUTIONS

5 (Square) AL CL (Net) 7 (2PM)

8123-2102 (Email)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2362416
Date Received : Jun 07, 2023
Date Reported : Jun 15, 2023
Report Number : 2685670-2

Page 1 of 3

Sample Number	2362416-1						
Sampled Date	Jun 07, 2023 1:40 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Jun 08, 2023						
Condition of Sample	Contained in four amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standard.						
	(APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOD)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
2,4-DDD	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
2,4-DDE	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
2,4-DDT	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDD	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDE	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
4,4-DDT	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Aldrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Technical Management

Tanyatorn Mongkornpratt
Supervisor

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Approved by

Kanokorn Anok
Senior Manager

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RIGHT SOLUTIONS

5 (Square) AL CL (Net) 7 (2PM)

8123-2102 (Email)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2362416
Date Received : Jun 07, 2023
Date Reported : Jun 15, 2023
Report Number : 2685670-2

Page 2 of 2

Sample Number	2362416-1						
Sampled Date	Jun 07, 2023 1:40 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Jun 08, 2023						
Condition of Sample	Contained in four amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
alpha-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
beta-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Chlordane	ug/L	0.02	0.04	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
delta-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Dieldrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Endosulfan I	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Endosulfan II	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Technical Management

Tanyatorn Mongkrojiravit
Tanyatorn Mongkrojiravit
Supervisor
โทรศัพท์มือถือ : 09-204-4-4719

Approved by

Kanokkorn Anek
Kanokkorn Anek
Senior Manager
โทรศัพท์มือถือ : 09-204-4-6111

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5 (Water) Lab. (CLPT 7.23PM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2362416
Date Received : Jun 07, 2023
Date Reported : Jun 15, 2023
Report Number : 2685670-2

Page 3 of 3

Sample Number	2362416-1						
Sampled Date	Jun 07, 2023 1:40 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Jun 08, 2023						
Condition of Sample	Contained in four amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
Endrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Heptachlor	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Heptachlor-Epoxide	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Lindane (gamma-BHC)	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok
Methoxychlor	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Note : Ambient Temperature is 30.9 degree Celsius.

Sampling By : Chainorn Lerbanthakunchai โทรศัพท์มือถือ : 09-204-4-8592

Remark :
LOD : Limit of Detection
LOQ : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Technical Management

Tanyatorn Mongkrojiravit
Tanyatorn Mongkrojiravit
Supervisor
โทรศัพท์มือถือ : 09-204-4-4719

Approved by

Kanokkorn Anek
Kanokkorn Anek
Senior Manager
โทรศัพท์มือถือ : 09-204-4-6111

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2362416
Date Received : Jun 07, 2023
Date Reported : Jun 15, 2023
Report Number : 2685670-3

Page 1 of 1

Sample Number	2362416-1							Page 1 of 1
Sampled Date	Jun 07, 2023 1:40 PM							
Sample Description	Wastewater							
Location	Inspection Manhole							
Date Analysis Commenced	Jun 07, 2023							
Condition of Sample	Contained in four amber glass bottles and six plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)							
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location	
Pesticides - Organochlorine Group								
Atrazine	ug/L	0.1	0.5	Not Detected	Not Detected	In - house method : STM 04 101 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok	
Hexachlorobenzene	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok	
Toxaphene	ug/L	2	4	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6630 D, part 6410 B	Bangkok	
Water Testing								
Chlorine	mg/L	-	-	0.57	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Rayong	

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Note : Ambient Temperature is 30.9 degree Celsius.

Sampling By : Chainorn Lerbanthakunchai , Thanassoon Namakunna

Remark :
LOD : Limit of Detection
LOQ : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Tanyatorn Mongkrojiravit
Tanyatorn Mongkrojiravit
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

Lot ID: 2362416
Date Received : Jun 07, 2023
Date Reported : Jun 15, 2023
Report Number : 2685671-1

Page 1 of 2

Page 1 of 2

Sample Number	2362416-2						
Sampled Date	Jun 07, 2023 1:40 PM						
Sample Description	Wastewater						
Location	Inspection Manhole						
Date Analysis Commenced	Jun 08, 2023						
Condition of Sample	Contained in two glass vials and two plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Arsenic	mg/L	0.0003	0.0005	0.004	≤0.25	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Barium	mg/L	0.0003	0.0005	0.14	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Cadmium	mg/L	0.0003	0.0005	Not Detected	≤0.03	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Chromium	mg/L	0.0003	0.0005	0.0010	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Copper	mg/L	0.0003	0.0005	0.0008	≤2.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Hexavalent Chromium	mg/L	0.003	0.01	Not Detected	≤0.25	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3500-Cr B	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.12	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Technical Management

Savitree Nosangnam
Savitree Nosangnam
Manager
โทรศัพท์มือถือ : 09-204-4-7079

Approved by

Kanokkorn Anek
Kanokkorn Anek
Senior Manager
โทรศัพท์มือถือ : 09-204-4-6111

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 2362416
Date Received : Jun 07, 2023
Date Reported : Jun 15, 2023
Report Number : 2685671-1

Page 2 of 2

Sample Number : 2362416-2
Sampled Date : Jun 07, 2023 1:40 PM
Sample Description : Wastewater
Location : Inspection Manhole
Date Analysis Commenced : Jun 08, 2023
Condition of Sample : Contained in two glass vials and two plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)

Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Mercury *	mg/L	0.0001	0.0005	Not Detected	≤0.005	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3112	Bangkok
Nickel	mg/L	0.0003	0.0005	0.005	≤1.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Selenium	mg/L	0.0003	0.0005	Not Detected	≤0.02	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Trivalent Chromium *	mg/L	-	0.01	<0.01	0.75	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Zinc	mg/L	0.003	0.005	0.50	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Sampling By : Chainusorn Lerbanthakunchai มิวโบลแชน 323-4-3461, Thanasorn Hanakulnua มิวโบลแชน 204-4-3552

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management

Savitree N.

Savitree Notsangam
Manager
มิวโบลแชน 204-4-4709

Approved by

Kasolkorn Anich

Kasolkorn Anich
Senior Manager
มิวโบลแชน 204-4-6111

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5 (Report), 48 (Q. 1st) (7 20PM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4514155499
Project Name : Water Testing
Project Location :

TESTING
No.0009
Lot ID: 2362416
Date Received : Jun 07, 2023
Date Reported : Jun 15, 2023
Report Number : 2685671-2

Page 1 of 1

Sample Number : 2362416-2
Sampled Date : Jun 07, 2023 1:40 PM
Sample Description : Wastewater
Location : Inspection Manhole
Date Analysis Commenced : Jun 08, 2023
Condition of Sample : Contained in two glass vials and two plastic bottles. Sample containers comply to pretreatment - preservation standards (APHA / USEPA)

Analyte	Unit	LOD	LOQ (LOQ)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.05	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Silver	mg/L	0.0003	0.0005	Not Detected	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Guideline : Effluent standard for factories, industrial estate and industrial park set by Notification of the Ministry of Natural Resource and Environment and effluent standard for factories and industrial park set by Notification of The Ministry of Industry dated June 07, B.E.2560 (2017).
Sampling By : Chainusorn Lerbanthakunchai มิวโบลแชน 323-4-3461, Thanasorn Hanakulnua มิวโบลแชน 204-4-3552

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Savitree N.

Savitree Notsangam
Manager

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0125 226 (M40)

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5 (Report), 48 (Q. 1st) (7 20PM)

ระดับความร้อน



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232060

Date Received : Feb 08, 2023

Date Reported : Feb 13, 2023

Report Number: 2567244-1

Page 1 of 1

Sample Number 232060-1
Parameter Heat Stress (Sampling Time : 09.00 AM - 11.00 AM)
Measurement Date Feb 06, 2023
Measurement by Natthapon Jiengwareewong
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
TOX Area (ERU)	120	29.4	27.0	36.4	32.5
Average (WBGT)		29.4			
Guideline WBGT (°C)		32.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Note:

This Analysis test report is reissued to supersede report No. 2536566-1 Date Reported : Feb 09, 2023 due to revise analytical information.

Technical Management

Supot Salamteh
Section Head

Approved by

Wichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2348243

Date Received : May 10, 2023

Date Reported : May 13, 2023

Report Number: 2636481-1

Page 1 of 1

Sample Number 2348243-1
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date May 08, 2023
Measurement by Norranon Tathongkham
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณหน่วย TOX (ERU)	120	31.3	28.7	37.9	36.2
Average (WBGT)		31.3			
Guideline WBGT (°C)		32.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

1. Notification of Department Labour Protection and Welfare on the Criteria and Procedures for Measurement and Analysis of Working Conditions in relation to Heat, Light or Noise Levels, including Duration and Types of Business that must perform (B.E. 2561)
2. Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

Supot Salamteh
Section Head

Approved by

Wichan Choonharat
Assistant Manager

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ระดับเสียงในสถานประกอบการ (Leq 8 hrs)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPPO-TPO Plant

Lot ID: 232057

Date Received : Feb 08, 2023

Date Reported : Feb 14, 2023

Report Number: 2568178-1

Page 1 of 1

Sample Number	232057-1		
Parameter	Noise (Leq 8 hrs.)		
Location	Compressor Area		
Measurement Date	Feb 06, 2023		
Measurement by	Pipat Nipatsed		
Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:30 AM - 10:30 AM	79.1	82.9	78.6
10:30 AM - 11:30 AM	78.7	81.9	78.5
11:30 AM - 12:30 PM	79.0	93.0	78.4
12:30 PM - 01:30 PM	78.5	79.5	78.3
01:30 PM - 02:30 PM	78.7	79.6	78.4
02:30 PM - 03:30 PM	78.6	83.7	78.3
03:30 PM - 04:30 PM	78.8	79.7	78.5
04:30 PM - 05:30 PM	78.8	79.6	78.5
Leq Average 8 hrs. (dB(A))	78.8		
Lmax (dB(A))		93.0	
Standard (dB(A))	90	140	
Reference Method : ISO1996-1 and 1996-2			
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๕๖			



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPPO-TPO Plant

Lot ID: 232057

Date Received : Feb 08, 2023

Date Reported : Feb 14, 2023

Report Number: 2568179-1

Page 1 of 1

Sample Number	232057-2		
Parameter	Noise (Leq 8 hrs.)		
Location	Cooling Tower		
Measurement Date	Feb 06, 2023		
Measurement by	Pipat Nipatsed		
Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:17 AM - 10:17 AM	80.8	81.4	80.6
10:17 AM - 11:17 AM	80.6	81.1	80.4
11:17 AM - 12:17 PM	80.9	96.3	80.3
12:17 PM - 01:17 PM	80.3	80.9	80.2
01:17 PM - 02:17 PM	80.5	81.0	80.3
02:17 PM - 03:17 PM	80.5	81.0	80.4
03:17 PM - 04:17 PM	80.6	81.1	80.5
04:17 PM - 05:17 PM	80.7	81.3	80.6
Leq Average 8 hrs. (dB(A))	80.6		
Lmax (dB(A))		96.3	
Standard (dB(A))	90	140	
Reference Method : ISO1996-1 and 1996-2			
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๕๖			

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (8:50AM)

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (8:50AM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 232057

Date Received : Feb 08, 2023

Date Reported : Feb 14, 2023

Report Number: 2568180-1

Page 1 of 1

Sample Number 232057-3
Parameter Noise (Leq 8 hrs.)
Location TOX Area (ERU)
Measurement Date Feb 06, 2023
Measurement by Pipat Nipatsed

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:44 AM - 10:44 AM	81.7	83.3	81.3
10:44 AM - 11:44 AM	82.5	101.2	81.2
11:44 AM - 12:44 PM	81.4	82.7	81.1
12:44 PM - 01:44 PM	81.5	82.6	81.1
01:44 PM - 02:44 PM	81.3	82.6	80.9
02:44 PM - 03:44 PM	81.3	82.3	81.0
03:44 PM - 04:44 PM	81.4	82.6	81.1
04:44 PM - 05:44 PM	81.6	82.4	81.2

Leq Average 8 hrs. (dB(A))

81.6

Lmax (dB(A))

101.2

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๖๖

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports\Air Noise.rpt (8:50AM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPO-TPO Plant

Lot ID: 2348237

Date Received : May 10, 2023

Date Reported : May 15, 2023

Report Number: 2651452-1

Page 1 of 1

Sample Number 2348237-1
Parameter Noise (Leq 8 hrs.)
Location Compressor Area
Measurement Date May 08, 2023
Measurement by Noranon Tathongkham

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:46 AM - 10:46 AM	76.5	80.6	76.3
10:46 AM - 11:46 AM	76.9	90.0	76.3
11:46 AM - 12:46 PM	76.6	78.5	76.4
12:46 PM - 01:46 PM	76.8	91.7	76.4
01:46 PM - 02:46 PM	76.9	78.4	76.5
02:46 PM - 03:46 PM	76.9	78.1	76.6
03:46 PM - 04:46 PM	76.9	78.4	76.6
04:46 PM - 05:46 PM	76.8	78.7	76.6

Leq Average 8 hrs. (dB(A))

76.8

Lmax (dB(A))

91.7

Standard (dB(A))

90

140

Reference Method : ISO1996-1 and 1996-2

Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๖๖

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports\Air Noise.rpt (3:21PM)



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPPO-TPO Plant

Lot ID: 2348237

Date Received : May 10, 2023

Date Reported : May 15, 2023

Report Number: 2651453-1

Page 1 of 1

Sample Number 2348237-2
Parameter Noise (Leq 8 hrs.)
Location Cooling Tower
Measurement Date May 08, 2023
Measurement by Norranon Tathongkham

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:32 AM - 10:32 AM	79.5	102.5	79.3
10:32 AM - 11:32 AM	79.4	80.3	79.2
11:32 AM - 12:32 PM	80.4	98.9	79.2
12:32 PM - 01:32 PM	79.4	80.3	79.1
01:32 PM - 02:32 PM	79.4	80.3	79.2
02:32 PM - 03:32 PM	79.5	80.4	79.2
03:32 PM - 04:32 PM	79.5	80.5	79.3
04:32 PM - 05:32 PM	79.6	80.5	79.4

Leq Average 8 hrs. (dB(A)) 79.6
Lmax (dB(A)) 102.5
Standard (dB(A)) 90
Reference Method : ISO1996-1 and 1996-2
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการคุ้มครองความปลอดภัย
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๕๖

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.

10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130

P/O : 4514156966

Project Name : Environmental Quality Monitoring

Project Location : AIE_HPPPO-TPO Plant

Lot ID: 2348237

Date Received : May 10, 2023

Date Reported : May 15, 2023

Report Number: 2651454-1

Page 1 of 1

Sample Number 2348237-3
Parameter Noise (Leq 8 hrs.)
Location TOX Area (ERU)
Measurement Date May 08, 2023
Measurement by Norranon Tathongkham

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:35 AM - 10:35 AM	82.3	105.3	82.1
10:35 AM - 11:35 AM	82.2	83.1	82.0
11:35 AM - 12:35 PM	83.2	101.7	82.0
12:35 PM - 01:35 PM	82.2	83.1	81.9
01:35 PM - 02:35 PM	82.2	83.1	82.0
02:35 PM - 03:35 PM	82.3	83.2	82.0
03:35 PM - 04:35 PM	82.3	83.3	82.1
04:35 PM - 05:35 PM	82.4	83.3	82.2

Leq Average 8 hrs. (dB(A)) 82.4
Lmax (dB(A)) 105.3
Standard (dB(A)) 90
Reference Method : ISO1996-1 and 1996-2
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรฐานการคุ้มครองความปลอดภัย
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๕๖

Technical Management

Thanita K.

Thanita Kulsunwong
Scientist (4)

Approved by

Supot S.

Supot Salamteh
Section Head

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คุณภาพน้ำใต้ดิน



Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 21147467
Date Received : Aug 22, 2022
Date Reported : Sep 02, 2022
Report Number : 2418852-1 C9

Page 1 of 1

Sample Number	21147467-1					
Sampling Date	Aug 22, 2022 11:10 AM					
Sample Description	Groundwater					
Location	MW-1 (GW1)					
Date Analysis Commenced	Aug 23, 2022					
Condition of Sample	Contained in four glass vials, two amber glass bottles and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method
Water Testing						
pH at 25 degree C		-	-	4.4	6.5-9.2 (I)	Based on APHA (2017), 4500-H (B)

Guideline: Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

(I): ในกรณีที่มีการปนเปื้อนของกรวดหรือสิ่งต่างไปที่ปนเปื้อนหรือคราบที่อาจเกิดจากกระบวนการบำบัดน้ำที่ไม่มีการติดตามตรวจสอบการปนเปื้อนกับผลวิเคราะห์จากจุดเก็บตัวอย่างต่อเนื่องน้ำที่ใช้เป็นบ่อล้างถังบรรจุน้ำเสียของน้ำใต้ดินในพื้นที่ โดยค่าที่เฝ้าระวังเปลี่ยนแปลงจะต้องไม่เกินหนึ่งระดับ และไม่ปล่อยค่าเกินค่าเกณฑ์ของมาตรฐานคุณภาพน้ำบาดาลที่ไม่บริโภคคือ 6.5-9.2

Sampling By : Tanasit Wongsachai, Thanasoun Namakunna

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Technical Management

N. Banongkit

Narumon Banchongkit
Supervisor
หมายเลขที่ 3-323-จ-9445

Approved by

D. Changchon

Dej Changchon
Manager
หมายเลขที่ 3-225-ก-5283

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 21147467
Date Received : Aug 22, 2022
Date Reported : Sep 02, 2022
Report Number : 2418852-2 C9

Page 1 of 1

Sample Number	21147467-1					
Sampling Date	Aug 22, 2022 11:10 AM					
Sample Description	Groundwater					
Location	MW-1 (GW1)					
Date Analysis Commenced	Aug 23, 2022					
Condition of Sample	Contained in four glass vials, two amber glass bottles and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)					
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method
Metals Testing						
Zinc	mg/L	0.003	0.005	0.008	10	Based on APHA (2017), 3125

Guideline: Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Sampling By : Tanasit Wongsachai, Thanasoun Namakunna

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Technical Management

Sawitree N.

Sawitree Nisangiam
Manager
หมายเลขที่ 3-204-จ-4709

Approved by

Kanokorn Anek

Kanokorn Anek
Senior Manager
หมายเลขที่ 3-204-ก-6111

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4512888163
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPPO-TPO Plant



TESTING
No.0009
Lot ID: 21149512
Date Received : Aug 22, 2022
Date Reported : Aug 30, 2022
Report Number : 2184574-1

Page 1 of 2

Sample Number	21149512-1
Sampled Date	Aug 22, 2022 11:10 AM
Sample Description	Groundwater
Location	MW-1 (GW1)
Date Analysis Commenced	Aug 23, 2022
Condition of Sample	Contained in one amber glass bottle and one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	Not Detected	No Standard	Based on APHA (2017), 3125	Bangkok
Organic Compounds							
Propylene oxide *	mg/L	-	10	<10	No Standard	Based on US EPA, Method 8015B	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Sampled By : Thanasoun Namakunna

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Sawitree N.

Sawitree Naisangiam
Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPPO-TPO Plant

Lot ID: 21147467
Date Received : Aug 22, 2022
Date Reported : Sep 02, 2022
Report Number : 2418854-1 C9

Page 1 of 1

Sample Number	21147467-3
Sampling Date	Aug 22, 2022 12:11 PM
Sample Description	Groundwater
Location	MW-6 (GW2)
Date Analysis Commenced	Aug 23, 2022
Condition of Sample	Contained in four glass vials, two amber glass bottles and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
pH at 25 degree C	-	-	-	6.4	6.5-9.2 (I)	Based on APHA (2017), 4500-H (B)	Rayong

Guideline: Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

(I): ในกรณีที่มีการปนเปื้อนของกรดหรือด่างไม่เพียงพอให้วิเคราะห์ค่าที่ได้อีกจากจุดเก็บตัวอย่างอย่างป้อนเข้าที่ในการติดตามตรวจสอบการปนเปื้อนกับผลวิเคราะห์จากจุดเก็บตัวอย่างต่อเนื่องที่ให้เป็นอย่างถึงขั้นที่ทางการให้ดำเนินการในทันที โดยค่าที่เกินที่เปลี่ยนแปลงจะต้องไม่เกินหนึ่งระดับ และไม่ควรออกช่วงค่า

Sampling By : Tanasit Wongsachai, Thanasoun Namakunna

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Technical Management

N. Banongkit

Narumon Banchongkit
Supervisor

ทะเบียนเลขที่ ร-323-จ-9445

Approved by

D. Changchon

Dej Changchon
Manager

ทะเบียนเลขที่ ร-225-ค-5283

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Lot ID: 21147467
Date Received : Aug 22, 2022
Date Reported : Sep 02, 2022
Report Number : 2418854-2 C9

Page 1 of 1

Sample Number	21147467-3						
Sampling Date	Aug 22, 2022 12:11 PM						
Sample Description	Groundwater						
Location	MW-6 (GW2)						
Date Analysis Commenced	Aug 23, 2022						
Condition of Sample	Contained in four glass vials, two amber glass bottles and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/L	0.003	0.005	0.01	10	Based on APHA (2017), 3125	Bangkok

Guideline: Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures
Sampling By : Tanasit Wongsachai, Thanasoun Namakunna

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Technical Management

Savitree N.

Savitree Noisanglam
Manager

หมายเลขที่ 204-2-4709

Approved by

Kanokorn Anek

Kanokorn Anek
Senior Manager

หมายเลขที่ 204-2-6111

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4512888163
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant



TESTING
No.0009

Lot ID: 21149512
Date Received : Aug 22, 2022
Date Reported : Aug 30, 2022
Report Number : 2184574-1

Page 2 of 2

Sample Number	21149512-2						
Sampled Date	Aug 22, 2022 12:11 PM						
Sample Description	Groundwater						
Location	MW-6 (GW2)						
Date Analysis Commenced	Aug 23, 2022						
Condition of Sample	Contained in one amber glass bottle and one plastic bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						
Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	Not Detected	No Standard	Based on APHA (2017), 3125	Bangkok
Organic Compounds							
Propylene oxide *	mg/L	-	10	<10	No Standard	Based on US EPA, Method 8015B	Bangkok

Guideline : Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures

Sampled By : Thanasoun Namakunna

Remark :
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- Analyte(s) marked * is/are not included in scope of Accreditation ISO/IEC 17025.
- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Savitree N.

Savitree Noisanglam
Manager

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Lot ID: 213070
Date Received : Jul 12, 2021
Date Reported : Jul 23, 2021
Report Number : 2053743-1 C9

Page 1 of 1

Sample Number 213070-1
Sampling Date Jul 12, 2021 11:46 AM
Sample Description Soil
Location MW-1 (GW1)
Date Analysis Commenced Jul 13, 2021
Condition of Sample Packed in two glass bottles and one plastic bag, refrigerated

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	18.4	1000	Based on US EPA, Method 3050B and 6010D	Bangkok

Guideline: Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures
Sampling By : Pathompong Kornasawat, Thanasoun Namakunna

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Siriluk P.

Siriluk Puengpang
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Lot ID: 213070
Date Received : Jul 12, 2021
Date Reported : Jul 23, 2021
Report Number : 2053743-3 C9

Page 1 of 1

Sample Number 213070-1
Sampling Date Jul 12, 2021 11:46 AM
Sample Description Soil
Location MW-1 (GW1)
Date Analysis Commenced Jul 13, 2021
Condition of Sample Packed in two glass bottles and one plastic bag, refrigerated

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	2.21	No Standard	Based on US EPA, Method 3050B and 6010D	Bangkok
Organic Compounds							
Propylene Oxide	mg/kg	-	20	<20	No Standard	Based on US EPA, Method 5035 and GC/FID	Bangkok

Guideline: Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures
Sampling By : Pathompong Kornasawat, Thanasoun Namakunna

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Siriluk P.

Siriluk Puengpang
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Lot ID: 213070
Date Received : Jul 12, 2021
Date Reported : Jul 23, 2021
Report Number : 2053744-1 C9

Page 1 of 1

Sample Number 213070-3
Sampling Date Jul 12, 2021 3:25 PM
Sample Description Soil
Location MW-6 (GW2)
Date Analysis Commenced Jul 13, 2021
Condition of Sample Packed in two glass bottles and one plastic bag, refrigerated

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	4.28	1000	Based on US EPA, Method 3050B and 6010D	Bangkok

Guideline: Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures
Sampling By : Pathompong Kornasawat, Thanasoun Namakunna

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Siriluk P.
Siriluk Puenggang
Supervisor

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Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4510824480
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Lot ID: 213070
Date Received : Jul 12, 2021
Date Reported : Jul 23, 2021
Report Number : 2053744-3 C9

Page 1 of 1

Sample Number 213070-3
Sampling Date Jul 12, 2021 3:25 PM
Sample Description Soil
Location MW-6 (GW2)
Date Analysis Commenced Jul 13, 2021
Condition of Sample Packed in two glass bottles and one plastic bag, refrigerated

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	3.06	No Standard	Based on US EPA, Method 3050B and 6010D	Bangkok
Organic Compounds							
Propylene Oxide	mg/kg	-	20	<20	No Standard	Based on US EPA, Method 5035 and GC/FID	Bangkok

Guideline: Notification of the Ministry of Industry B.E. 2559 (2016) on Soil and Groundwater Contamination Criteria, Monitoring of Soil and Groundwater Quality, Report Submission and Report Preparation of Soil and Groundwater Quality, and Proposal Report of Soil and Groundwater Controlling and Reduction Measures
Sampling By : Pathompong Kornasawat, Thanasoun Namakunna

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

Approved by

Siriluk P.
Siriluk Puenggang
Supervisor

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand PHONE +66 0 2760 3000 FAX +66 0 2760 3197

ภาคผนวก ง

ใบรับรองการสอบเทียบเครื่องมือ



Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Ambient	Total Suspended Particulate	High Volume	RVG-150177			On site Calibration
Ambient	Total Suspended Particulate	High Volume	RVG-150353			On site Calibration
Ambient	Total Suspended Particulate	High Volume	RVG-150594			On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	RVG-100001	23 May 22	23 May 23	12
Ambient	Nitrogen Dioxide	NO _x Analyzer	RVG-150261	5 Jan 23	5 Jul 23	6
Ambient	Nitrogen Dioxide	NO _x Analyzer	RVG-151054	5 Jan 23	5 Jul 23	6
Ambient	Nitrogen Dioxide	NO _x Analyzer	RVG-150263	5 Jan 23	5 Jul 23	6
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG-150081	18 Jan 23	18 Jul 23	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG-150111	17 Nov 22	17 May 24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG-150110	17 Nov 22	17 May 24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG-150085	8 Oct 21	8 Apr 23	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG-150611	17 Nov 22	17 May 24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG-150109	19 Jan 23	19 Jul 24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG-150403	5 Jan 23	5 Jul 24	12
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG-150411	10 Feb 23	10 Aug 24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RVG-150087	19 Jan 23	19 Jul 24	18
Ambient	1,4-dichlorobenzene	GC-MSD	RVG-150136	7 Jul 22	7 Jan 24	18
Ambient	Acetaldehyde	GC-MSD	RVG-150135	7 Jul 22	7 Jan 24	18
Ambient	Isobutene	GC-MSD	RVG-150138	7 Jul 22	7 Jan 24	18
Ambient	n-Isobutane	GC-MSD	RVG-150137	7 Jul 22	7 Jan 24	18
Ambient	Propylene	GC-MSD	RVG-150136	7 Jul 22	7 Jan 24	18
Ambient	Isobutene	GC-MSD	RVG-150136	7 Jul 22	7 Jan 24	18
Ambient	Propylene Oxide	Field Instrument	RVG-150149	3 Jan 23	3 Apr 23	3
Ambient	Propylene Oxide	Field Instrument	RVG-151006	1 Apr 23	1 Jul 23	3
Ambient	Propylene Oxide	GC-TCD	RVG-150126	21 Apr 23	21 Oct 24	3
Ambient	Hydrogen Peroxide	Field Instrument	RVG-150580	5 Jan 23	3 Apr 23	3
Ambient	Hydrogen Peroxide	Field Instrument	RVG-150109	1 Apr 23	1 Jul 23	3
Ambient	Hydrogen Peroxide	Spectrophotometer	RVG-150018	16 Sep 22	16 Sep 23	12
Stack	Oxides of Hydrogen	Coriolis Control Unit	RVG-150327	13 Jan 23	13 Jul 23	6
Stack	Oxides of Hydrogen	Coriolis Control Unit	RVG-150468	13 Jan 23	13 Jul 23	6
Stack	Oxides of Hydrogen	Flue gas Analyzers	RVG-150544	20 Jan 23	20 Jan 24	12
Stack	Oxides of Hydrogen	Flue gas Analyzers	RVG-150465	20 Jan 23	20 Jan 24	12
Stack	Oxides of Hydrogen	Scrubber Gauge	RVG-150343	6 Oct 21	6 Apr 23	24
Stack	Oxides of Hydrogen	Flue Gas Analyzer	RVG-150332	21 Sep 21	22 May 23	18
Stack	Oxides of Hydrogen	SH-CHROM-CO/CH ₄ THER	RVG-150037	27 Sep 22	27 Sep 24	18
Stack	Oxygen	Coriolis Control Unit	RVG-150327	13 Jan 23	13 Jul 23	6
Stack	Oxygen	Coriolis Control Unit	RVG-150468	13 Jan 23	13 Jul 23	6
Stack	Total Suspended Particulate	Coriolis Control Unit	RVG-150327	13 Jan 23	13 Jul 23	6
Stack	Total Suspended Particulate	Coriolis Control Unit	RVG-150468	13 Jan 23	13 Jul 23	6
Stack	Total Suspended Particulate	Flue gas Analyzers	RVG-150544	20 Jan 23	20 Jan 24	12
Stack	Total Suspended Particulate	Flue gas Analyzers	RVG-150465	20 Jan 23	20 Jan 24	12
Stack	Total Suspended Particulate	Digital Balance	RVG-150003	23 Mar 22	23 Mar 24	12
Workplace	Propylene Oxide	Field Instrument	RVG-150149	3 Jan 23	3 Apr 23	3
Workplace	Propylene Oxide	Field Instrument	RVG-151006	1 Apr 23	1 Jul 23	3
Workplace	Propylene Oxide	GC-TCD	RVG-150126	21 Apr 23	21 Oct 24	3
Workplace	Isopropyl Alcohol Hydrocarbon as Propane	Field Instrument	RVG-150109	3 Jan 23	3 Apr 23	3
Workplace	Isopropyl Alcohol Hydrocarbon as Propane	Total Hydrocarbon Analyzer	RVG-150018	25 Jan 23	25 Jan 24	12
Workplace	Total Hydrocarbon as Propane	Field Instrument	RVG-150109	3 Jan 23	3 Apr 23	3
Workplace	Total Hydrocarbon as Propane	Total Hydrocarbon Analyzer	RVG-150018	25 Jan 23	25 Jan 24	12
Noise	1/8g 24 hrs	Sound Calibrator	RVG-150213	26 Jan 23	26 Jan 24	12
Noise	1/8g 24 hrs	Sound Level Meter	RVG-150023	13 Jan 23	13 Jan 24	12
Noise	1/8g 24 hrs	Sound Level Meter	RVG-150018	7 Sep 22	7 Sep 23	12
Noise	1/8g 24 hrs	Sound Level Meter	RVG-150419	7 Sep 22	7 Sep 23	12
Noise	1/8g 24 hrs	Sound Level Meter	RVG-150411	13 Jan 23	13 Jan 23	12



Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Water Lab	Copper	ICP-AES	IKK_F10025	14 Jun-22	14 Dec-23	18
Water Lab	Copper	Hot Block	IKK_F10054	7 Apr-22	7 Oct-23	18
Water Lab	Amesel	Chamber (Cold Room)	IKK_F10012	30 Jun-22	30 Dec-23	18
Water Lab	Zinc	ICP-AES	IKK_F10025	14 Jun-22	14 Dec-23	18
Water Lab	Zinc	Hot Block	IKK_F10054	7 Apr-22	7 Oct-23	18
Water Lab	Zinc	Chamber (Cold Room)	IKK_F10017	30 Jun-22	30 Dec-23	18
Soil	Propylene Oxide	Gas Chromatography (HID)	IKK_F100126	29 Apr-21	23 Oct-21	18
Soil	Copper	ICP-AES	IKK_F10037	2 Mar-21	2 Mar-22	12
Soil	Copper	Hot Block	IKK_F10054	18 May-20	18 May-22	18
Soil	Copper	Chamber (Cold Room)	IKK_F10017	18 May-21	18 Nov-22	18
Soil	Zinc	ICP-AES	IKK_F10037	2 Mar-21	2 Mar-22	12
Soil	Zinc	Hot Block	IKK_F10054	17 Nov-20	18 May-22	18
Soil	Zinc	Chamber (Cold Room)	IKK_F10017	18 May-21	18 Nov-22	18

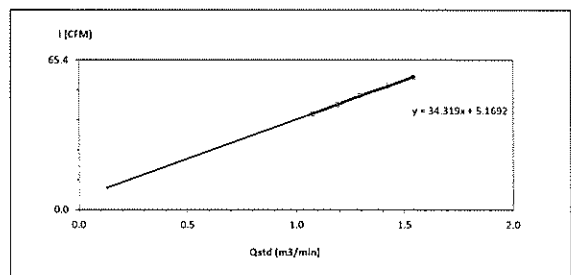


Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal.	Freq. Calibrate (Months)
Noise	eq 8 Hrs	Sound Calibrator	RWG-190218	26 Jan 23	26 Jan 24	12
Noise	eq 8 Hrs	Sound Level Meter	RWG-190017	5 Jan 23	5 Jan 24	12
Noise	eq 8 Hrs	Sound Level Meter	RWG-190018	5 Jan 23	5 Jan 24	12
Noise	eq 8 Hrs	Sound Level Meter	RWG-190019	13 Jan 23	13 Jan 24	12
Noise	eq 8 Hrs	Sound Calibrator	RWG-190496	17 Jan 23	17 Jan 24	12
Noise	eq 8 Hrs	Sound Level Meter	RWG-190625	25 Jan 23	25 Jan 24	12
Noise	eq 8 Hrs	Sound Level Meter	RWG-190626	25 Jan 23	25 Jan 24	12
Noise	eq 8 Hrs	Sound Level Meter	RWG-190027	13 Jan 23	13 Jan 24	12
Heat	Heat Stress	Heat Stress Monitor	RWG-190326	21 Nov 22	21 Nov 23	12
Heat	Heat Stress	Heat Stress Monitor	RWG-190221	14 Mar 23	14 Mar 24	12
Humidity Lab	pH at 25.0C	pH meter	RWG-190183	27 Feb 23	27 Feb 24	12
Humidity Lab	BOD	Incubator with Sensor	RWG-190032	14 Feb 22	15 Aug 23	18
Humidity Lab	BOD	Incubator	RWG-190184	25 Apr 22	21 Oct 23	18
Humidity Lab	CO2	Electrode/Analyzer	RWG-190037	27 Feb 22	27 Feb 23	12
Humidity Lab	Total Suspended Solids	Electronic Balance	RWG-190002	1 Mar 23	1 Mar 24	12
Humidity Lab	Total Suspended Solids	Hot Air Oven	RWG-190010	20 Oct 22	20 Apr 24	12
Humidity Lab	Total Dissolved Solids 180C	Electronic Balance	RWG-190002	1 Mar 23	1 Mar 24	12
Humidity Lab	Total Dissolved Solids 180C	Hot Air Oven	RWG-190010	20 Oct 22	20 Apr 24	12
Humidity Lab	Oil & Grease	Electronic Balance	RWG-190002	1 Mar 23	1 Mar 24	12
Humidity Lab	Oil & Grease	Hot Air Oven	RWG-190006	20 Oct 22	20 Apr 24	12
Humidity Lab	Oil & Grease	Water Bath	RWG-190061	20 Oct 22	20 Apr 24	18
Humidity Lab	Temperature	pH meter	RWG-190604	7 Sep 22	7 Sep 23	12
Humidity Lab	Color Lat. Original pH	Electrode/Analyzer	RWG-190037	27 Sep 22	27 Mar 24	12
Humidity Lab	Color Lat. pH 7.0	Electrode/Analyzer	RWG-190037	27 Sep 22	27 Mar 24	18
Water Lab	Methanol	Gas Chromatography (MS)	PKK-160559	21 Apr 22	21 Dec 23	18
Water Lab	Silver	ICP-MS	PKK-161026	14 Apr 22	14 Dec 23	18
Water Lab	Iron	Hot Block	PKK-161054	7 Apr 22	7 Oct 23	18
Water Lab	Silver	Chamber (Cold Room)	PKK-161017	30 Apr 22	30 Dec 23	18
Water Lab	Barium	ICP-MS	PKK-161026	14 Apr 22	14 Dec 23	18
Water Lab	Barium	Hot Block	PKK-161054	7 Apr 22	7 Oct 23	18
Water Lab	Barium	Chamber (Cold Room)	PKK-161017	30 Apr 22	30 Dec 23	18
Water Lab	Lead	ICP-MS	PKK-161026	14 Apr 22	14 Dec 23	18
Water Lab	Lead	Hot Block	PKK-161054	7 Apr 22	7 Oct 23	18
Water Lab	Lead	Chamber (Cold Room)	PKK-161017	30 Apr 22	30 Dec 23	18
Water Lab	Chromium	ICP-MS	PKK-161026	14 Apr 22	14 Dec 23	18
Water Lab	Chromium	Hot Block	PKK-161054	7 Apr 22	7 Oct 23	18
Water Lab	Chromium	Chamber (Cold Room)	PKK-161017	30 Apr 22	30 Dec 23	18
Water Lab	Manganese	ICP-MS	PKK-161026	14 Apr 22	14 Dec 23	18
Water Lab	Manganese	Hot Block	PKK-161054	7 Apr 22	7 Oct 23	18
Water Lab	Manganese	Chamber (Cold Room)	PKK-161017	30 Apr 22	30 Dec 23	18
Water Lab	Nickel	ICP-MS	PKK-161026	14 Apr 22	14 Dec 23	18
Water Lab	Nickel	Hot Block	PKK-161054	7 Apr 22	7 Oct 23	18
Water Lab	Nickel	Chamber (Cold Room)	PKK-161017	30 Apr 22	30 Dec 23	18
Water Lab	Arsenic	ICP-MS	PKK-161026	14 Apr 22	14 Dec 23	18
Water Lab	Arsenic	Hot Block	PKK-161054	7 Apr 22	7 Oct 23	18
Water Lab	Arsenic	Chamber (Cold Room)	PKK-161017	30 Apr 22	30 Dec 23	18
Water Lab	Selenium	ICP-MS	PKK-161026	14 Apr 22	14 Dec 23	18
Water Lab	Selenium	Hot Block	PKK-161054	7 Apr 22	7 Oct 23	18
Water Lab	Selenium	Chamber (Cold Room)	PKK-161017	30 Apr 22	30 Dec 23	18
Water Lab	Cadmium	ICP-MS	PKK-161026	14 Apr 22	14 Dec 23	18
Water Lab	Cadmium	Hot Block	PKK-161054	7 Apr 22	7 Oct 23	18
Water Lab	Cadmium	Chamber (Cold Room)	PKK-161017	30 Apr 22	30 Dec 23	18
Water Lab	Mercury	SW-001 (JC-1668)	PKK-161029	24 Mar 22	24 Mar 23	12
Water Lab	Proteinase Green	UV-1600 Spectrophotometer	PKK-161025	21 Apr 22	21 Oct 24	12



Project Site :	Dow Chemical Thailand Ltd.	Barometric Pressure (mm Hg) :	758
Calibrate Location :	มณฑลอุดร	Temperature (°C) :	32
Calibrate Date :	14-Feb-23	High Volume Id :	RYG_FS0177
CalibrationSheet No.:	C-140223-RYG_FS0177	High Volume Model :	TE-S170D
Calibrator ID:	RYG_FS0205	High Volume S/N :	4803
Calibrator Model :	TE-S028A	Calibrator Slope :	1.50765
Calibrator S/N :	1166	Calibrator Intercept :	-0.02043

Test No.	Delta H ₂ O (inch)	Q ₁₀₀ (m ³ /min)	1:Chart (CFM)	Linear Regression	
1	2.6	1.0762	42	Slope:	34.3195
2	3.2	1.1917	46	Intercept:	5.1692
3	3.8	1.2968	50	Correlation Coefficient	0.9996
4	4.6	1.4247	54		
5	5.4	1.5420	58		



Calibrated by Satcha P.
(Mr.Satcha Phetsawaeng)
Field Scientist(2)

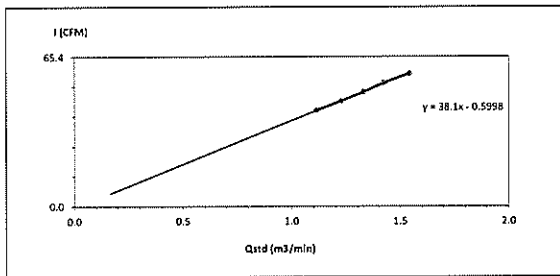
Approved by: 2. Pong
(Mr Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)



High Volume Air Sampler Calibration Worksheet

Project Site: Dow Chemical Thailand Ltd. Barometric Pressure (mm Hg): 758
 Calibrate Location: WUWUNHUNGH Temperature (°C): 32
 Calibrate Date: 14-Feb-23 High Volume ID: RYG_F50393
 Calibration Sheet No.: C-140223-RYG_F50393 High Volume Model: TE-S170D
 Calibrator ID: RYG_F50205 High Volume S/N: 5682
 Calibrator Model: TE-S028A Calibrator Slope: 1.50765
 Calibrator S/N: 1166 Calibrator Intercept: -0.02043

Test No.	Delta H ₂ O (inch)	Q _{ad} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	2.8	1.1161	42	Slope: 38.0997 Intercept: -0.5998 Correlation Coefficient: 0.9995
2	3.4	1.2277	46	
3	4.0	1.3300	50	
4	4.6	1.4247	54	
5	5.4	1.5420	58	



Calibrated by Satcha P.
 (Mr. Satcha Phetsawaeng)
 Field Scientist (2)

Approved by [Signature]
 (Mr. Noppong Jantarapan)
 Enviro Field Coordinator Scientist (3)

FORM NO. T-06-073 REVISION NO. - ISSUE DATE: 14/03/16

RYG_EN0001



PENTA CALIBRATION CO., LTD.
 66/124 The Connect 33 Village Kanchanaphisek Road
 Dokmai Pravej Bangkok 10250
 Tel: +66 (0) 2089 9773
 www.pentalcal.com

Certificate of Calibration

Represent to Certificate of Calibration ,PTC/07/22102

Certificate No: PTC/07/22102 Page: 1 of 2
 Equipment: Digital Balance Condition: Normal
 Manufacturer: Sartorius Serial No: 25409064
 Model: LA1105-F ID No: RYG_EN0001
 Type of Balance: Single Interval



Customer: ALS Laboratory Group (Thailand) Co. Ltd.
616/10 Moo 5 T.Maenamkoo, A.Phiakdaeng,
Rayong 21140, Thailand

REVIEW BY Thantit
 APPROVED BY [Signature]
 NEXT CAL DATE 03/09/23

Environment Condition: Temperature 23.9 °C ± 0.3 °C
 Humidity 58 ± 3%RH ± 4 %RH
 Air density 1.17 kg/m³

Calibration Place: ALS Laboratory Group (Thailand) Co. Ltd.
616/10 Moo 5 T.Maenamkoo, A.Phiakdaeng,
Rayong 21140, Thailand

The Method used: In house method PTC W167 base on Euramet eg 18

Traceability: This certificate is traceable to the SI Units through Tha. Calibration Service Co. Ltd
NSC-ONSC Accreditation No. Calibration 0189

Date Received: March 23, 2022

Calibration Date: March 23, 2022

Issued Date: March 25, 2022

Calibration By: Mr. Rungroje Metakul

Reviewed by [Signature]
 (Mr. Khongsak Kalasin)

Approved By [Signature]
 (Mr. Keatitak Kerato)
 Laboratory Manager

This certificate is issued under the scope of measurement according to the international system of units (SI). It is provided for the use of the customer to ensure that the balance is traceable to the international system of units (SI) through the calibration service of Penta Calibration Co., Ltd.

The measurement uncertainty is stated in the report of the calibration, which is determined from the standard uncertainty multiplied by the coverage factor, $k = 2$, to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM). This effect that the results relate only to the items submitted.

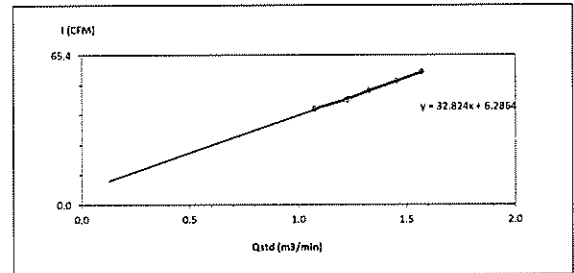
This certificate is valid for the period of validity of the calibration, which is determined by Penta Calibration Co., Ltd.



High Volume Air Sampler Calibration Worksheet

Project Site: Dow Chemical Thailand Ltd. Barometric Pressure (mm Hg): 758
 Calibrate Location: WUWUNHUNGH Temperature (°C): 32
 Calibrate Date: 14-Feb-23 High Volume ID: RYG_F50394
 Calibration Sheet No.: C-140223-RYG_F50394 High Volume Model: TE-S170D
 Calibrator ID: RYG_F50205 High Volume S/N: 5690
 Calibrator Model: TE-S028A Calibrator Slope: 1.50765
 Calibrator S/N: 1166 Calibrator Intercept: -0.02043

Test No.	Delta H ₂ O (inch)	Q _{ad} (m ³ /min)	I: Chart (CFM)	Linear Regression
1	2.6	1.0762	42	Slope: 32.8244 Intercept: 6.2864 Correlation Coefficient: 0.9983
2	3.4	1.2277	46	
3	4.0	1.3300	50	
4	4.8	1.4549	54	
5	5.6	1.5699	58	



Calibrated by Satcha P.
 (Mr. Satcha Phetsawaeng)
 Field Scientist (2)

Approved by [Signature]
 (Mr. Noppong Jantarapan)
 Enviro Field Coordinator Scientist (3)

FORM NO. F-06-073 REVISION NO. - ISSUE DATE: 14/03/16



PENTA CALIBRATION CO., LTD.
 66/124 The Connect 33 Village Kanchanaphisek Road
 Dokmai Pravej Bangkok 10250
 Tel: +66 (0) 2089 9773
 www.pentalcal.com

Represent to Certificate of Calibration ,PTC/07/22102

Certificate No: PTC/07/22102

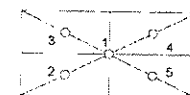
Page: 2 of 2

Measurement Results:

Without Adjustment

Function Calibration: Non Adjustment

Eccentric Error: Weight to be 1/3, 1/2 or of Maximum capacity



Eccentricity test 50 (g)				
Position (g)				
1	2	3	4	5
0.0000	0.0000	-0.0001	0.0000	0.0001
Maximum deviation 0.0001				

Repeatability Test: Weight to be 1/2 ≤ L ≤ Maximum capacity

Determination of the standard deviation of weighing balance: Repeatability: 0.0001 (g)

Nominal test value (g)	Standard Deviation
100	0.00003

Error of Indication: from nominal value - Repeatability: 0.0001 (g)

Nominal Value (g)	Conventional Mass (g)	Indication (g)	Correction of Balance (g)	Uncertainty (g)	k
0	0.00000	0.0000	0.0000	0.00026	2.87
0.01	0.01000	0.0100	0.0000	0.00026	2.85
0.05	0.05000	0.0500	0.0000	0.00026	2.85
0.1	0.10000	0.1000	0.0000	0.00026	2.85
0.5	0.50000	0.4999	0.0001	0.00026	2.65
1	1.00000	0.9999	0.0001	0.00026	2.65
2	2.00000	1.9999	0.0001	0.00026	2.65
5	5.00001	5.0000	0.0000	0.00026	2.65
10	10.00000	10.0001	-0.0001	0.00026	2.65
20	20.00003	20.0001	-0.0001	0.00026	2.52
100	100.00004	100.0001	-0.0001	0.00027	2.18

Note: Weight of adjust (g)

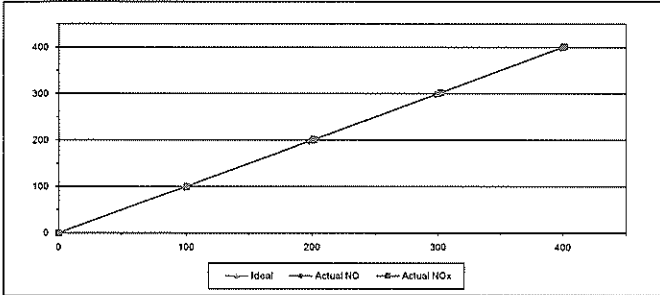
The End of Certificate



MULTIPOINT CALIBRATION REPORT

Calibration Date	5-Jan-23	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	SEEAW53E	Equipment ID	RYG_FS0281
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Airgas Inc.
Certified Date	9-Feb-22	Expired Date	9-Feb-30

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	98.70	-1.30	-1.30	100.40	0.40	0.40
2	200.00	197.80	-2.20	-1.10	201.50	1.50	0.75
3	300.00	298.10	-1.90	-0.63	302.20	2.20	0.73
4	400.00	398.50	-1.50	-0.38	401.40	1.40	0.35
AVERAGE (%)				-0.68			0.47



Calibrated By

Approved By

(Mr.Jirawut Sakam)
Field Environmental Scientist (3)

(Mr.Sarayuth Ultrantont)
Assistant General Manager

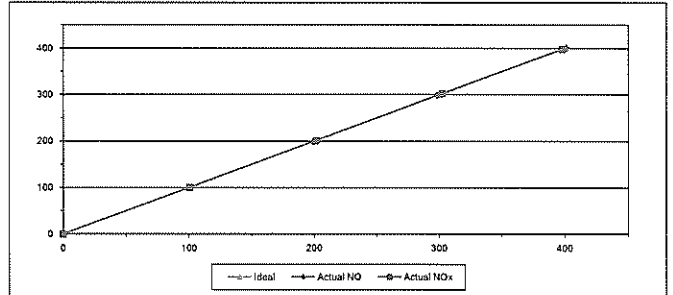
ALS Laboratory Group
FORM NO F 06-056 REVISION NO - ISSUE DATE 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	5-Jan-23	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	148EH0E0	Equipment ID	BKK_FS1084
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Airgas Inc.
Certified Date	9-Feb-22	Expired Date	9-Feb-30

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.00	-1.00	-1.00	100.70	0.70	0.70
2	200.00	199.40	-0.60	-0.30	201.50	1.50	0.75
3	300.00	298.60	-1.40	-0.47	302.30	2.30	0.77
4	400.00	401.40	1.40	0.35	398.00	-2.00	-0.50
AVERAGE (%)				-0.28			0.36



Calibrated By

Approved By

(Mr.Jirawut Sakam)
Field Environmental Scientist (3)

(Mr.Sarayuth Ultrantont)
Assistant General Manager

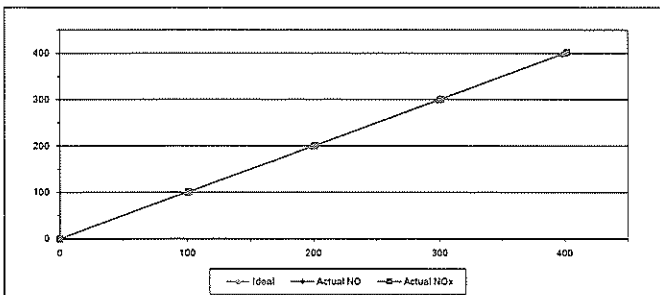
ALS Laboratory Group
FORM NO F 06-056 REVISION NO - ISSUE DATE 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	5-Jan-23	Equipment Name	NOx Analyzer
Manufacturer	Teledyne API	Model	T200
Serial No.	7238	Equipment ID	RYG_FS0533
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	947		
Std. Gas Concentration (PPM)	55.88	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Airgas Inc.
Certified Date	9-Feb-22	Expired Date	9-Feb-30

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.50	-0.50	-0.50	101.10	1.10	1.10
2	200.00	198.70	-1.30	-0.65	201.20	1.20	0.60
3	300.00	298.80	-1.20	-0.40	301.10	1.10	0.37
4	400.00	398.00	-2.00	-0.50	402.00	2.00	0.50
AVERAGE (%)				-0.39			0.53



Calibrated By

Approved By

(Mr.Jirawut Sakam)
Field Environmental Scientist (3)

(Mr.Sarayuth Ultrantont)
Assistant General Manager

ALS Laboratory Group
FORM NO F 06-056 REVISION NO - ISSUE DATE 02/04/12



JIRANATE ASSOCIATES CO., LTD.

1. Jirante Associate Co., Ltd.
P.O. Box 15, 67121-30
Pochaisarn 7, 711, Rd. Nakhon Si Thammaraj,
Bangkok 10200 (Thailand)
Tel: +662-0209192
Mobile: +662-02091453
E-mail: jirante@jirante.co.th
Website: www.jirante.co.th

Accredited calibration laboratory
ISO/IEC 17025:2017
MSC 1751-715 17025
CALIBRATION 0367

Air speed measurement laboratory
Calibration services department

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE

SERIAL NUMBER

ID NUMBER
CONDITION AS RECEIVED
CUSTOMER

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follow:
Temperature
Relative Humidity
Atmospheric Pressure

PLACE OF CALIBRATION

CALIBRATION CONDITIONS

Preconditioning
Measurement Condition

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by
Mr. Sarawut Jirantont
Miss Sarayuth Jirantont

Remarks:
1. Wind energy generation area of the wind tunnel
2. Wind energy generation area of the tested object inside mounting pipe
3. Diameter of mounting pipe
4. Ratio 1 to 1

Cup anemometer
Novatex
Sensor: WS-026
Data logger: 110-WS-16N

Sensor:

Data logger: 1159

RYG_FS0001

Used item

ALS laboratory group (Thailand) co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

23.0 ± 0.0 °C

55.0 ± 15.0 %RH

1010 ± 10 hPa

Efficient wind tunnel of Jirante Associates Co., Ltd.

Wind tunnel cross-section area

Win direction frontal area

Diameter of mounting pipe

Blockage ratio of test object

500 cm²100 cm²

201 mm

0.111

1:1

26 hours at ambient conditions.

The average values during measurement are (23.0 ± 0.0 °C, (55.0 ± 15.0) %RH and (1010.0 ± 10.0) hPa.

Calibration procedure:
The cup anemometer was calibrated against
Standard of velocity transducer model: 855502
and a list tube with pressure sensor: 855502
error reader: DP41000 in a pressure calibration
facility-type wind tunnel with 500 mm² cross
section area. The WS-CL-026 based on IEC 61400-
12-1, Wind energy generation systems - Part 12-
1, Power performance measurements of
electricity producing wind turbines, March 2017
was used for calibration guideline.

Traceability:
This certificate provides a traceability of the
measurement to recognize the national
standard, and to realization of the international
system of units (SI) through the NIST (National
Bureau of Standards) Institute of the United States
Certificate Number: MIV-0052-21 and MIV-0052-22

Uncertainty of Measurement:
The reported uncertainty of measurement is
based on the standard uncertainty multiplied by a
coverage factor k=2, which for a normal
distribution corresponds to a coverage probability
of approximately 95%. The standard uncertainty
has been determined in accordance with the GUM
Evaluation of measurement data. Guide to the expression of uncertainty in
measurement.

Approved signature

Mr. Parinya Boonchareon
Calibration Department Manager

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED
IN WRITING FROM THE LABORATORY

Certificate Number
CL-009-66

Page 2 of 2 Pages

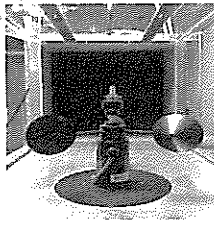
MEASUREMENT RESULTS¹

The cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle. UUC was installed in center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V_{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V_{UUC} (m/s)	Error (m/s)	U (K=2) (m/s)
0.581	23.56	23.45	0.8	-0.2	0.15
2.030	23.40	23.45	1.9	-0.2	0.16
3.049	23.50	23.45	2.9	-0.2	0.17
4.129	23.50	23.45	3.9	0.3	0.20
5.01	23.50	23.45	4.8	-0.2	0.17
5.97	23.54	23.45	5.7	-0.3	0.17
7.05	23.47	23.45	6.8	-0.3	0.18
8.18	23.50	23.45	7.9	-0.3	0.19
9.10	23.34	23.45	8.8	-0.3	0.19
10.10	23.40	23.45	9.7	-0.4	0.18
11.14	23.40	23.45	10.8	-0.4	0.20
12.13	23.32	23.45	11.8	-0.4	0.20
13.20	23.10	23.45	12.9	-0.3	0.20
14.25	23.36	23.45	13.9	-0.4	0.22
15.24	23.22	23.45	14.8	-0.4	0.21
16.30	23.40	23.45	15.8	-0.5	0.22

Remarks:
¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.
² Velocity of standard.
³ Velocity of Unit Under Calibration.

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the cup anemometer calibration in the wind tunnel of Jiranatee Associates Co., Ltd. The cup anemometer shown may differ from the calibrated one. Re-mark. The proportion of the set-up is not true to scale due to imaging geometry.

End of Certificate of Calibration

Accredited calibration laboratory
 ISO/IEC 17025:2017
 NSC-TSI-1517025
 CALIBRATION 0367
 Address: Room 202, 2/F, 315
 Chulalongkorn Rd., Bangrak
 Bangkok 10500 (Thailand)
 Tel: +6620565012
 Mobile: +6620565013
 E-mail: jnac@jiranatee.com
 Website: www.jiranatee.com

Accredited calibration laboratory
 ISO/IEC 17025:2017
 NSC-TSI-1517025
 CALIBRATION 0367

Air speed measurement laboratory
 Calibration services department

Certificate Number
CL-009-66

CERTIFICATE OF CALIBRATION

Page 2 of 2 Pages

MEASUREMENT ITEM

Wind Direction Sensor

MANUFACTURER

Novalyne

MODEL/TYPE

Sensor: WS-02E

SERIAL NUMBER

Data logger: 110-WS-16N

ID NUMBER

Sensor: -

CONDITION AS-RECEIVED

Data logger: 1159

CUSTOMER

RYG, J50081
 Used item
 ALS laboratory group (Thailand) Co., Ltd.
 104 Phatthanasak 40, Phatthanasak Rd., Khwaeng Suan Luang,
 Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE

16 Jan 2023

MEASUREMENT DATE

19 Jan 2023

ISSUE DATE

19 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature: 23.0 ± 3.0 °C
 Relative Humidity: 55.0 ± 15.0 %RH
 Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

Effel type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITION

Wind tunnel cross section area¹ 900 cm²
 Win direction frontal area² 129 cm²
 Diameter of mounting pipe³ mm
 Blockage ratio of test object⁴ 0.143 [-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

The average values during measurement are (23.8) °C, (47.3) %RH and (1014.8) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

Mr. Sarawat Thakhalad
 Chief of Measurement Laboratory

Approved signatory

Mr. Parinya Boonlathum
 Calibration Department Manager

Remarks:

¹ Nozzle cross section area of the wind tunnel
² Projected cross section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio % to %

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Certificate Number
CL-009-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° intervals in clockwise and counter-clockwise directions after offset adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed m/s	D _{ref} Degree (°)	D _{UUC} Degree (°)	Error Degree (°)	U (K=2) Degree (°)
	0.000	0	0	0.58
	45.000	43	-3	0.76
	90.000	89	-2	0.76
	135.000	134	-1	0.74
	180.000	177	3	0.74
	225.000	229	4	0.58
	270.000	273	3	0.68
	315.000	317	2	0.74

Remarks:
¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.
² Direction of standard.
³ Direction of Unit Under Calibration.

End of Certificate of Calibration

Accredited calibration laboratory
 ISO/IEC 17025:2017
 NSC-TSI-1517025
 CALIBRATION 0367
 Address: Room 202, 2/F, 315
 Chulalongkorn Rd., Bangrak
 Bangkok 10500 (Thailand)
 Tel: +6620565012
 Mobile: +6620565013
 E-mail: jnac@jiranatee.com
 Website: www.jiranatee.com

Accredited calibration laboratory
 ISO/IEC 17025:2017
 NSC-TSI-1517025
 CALIBRATION 0367

Air speed measurement laboratory
 Calibration services department

Certificate Number
CL 009-65

CERTIFICATE OF CALIBRATION

Page 2 of 2 Pages

MEASUREMENT ITEM

Wind Direction Sensor

MANUFACTURER

Novalyne

MODEL/TYPE

Sensor: WS-02E

SERIAL NUMBER

Data logger: 110-WS-250i-D

ID NUMBER

Sensor: WSD 014

CONDITION AS-RECEIVED

Data logger: AS912

CUSTOMER

RYG, J50611
 New item
 ALS laboratory group (Thailand) Co., Ltd.
 104 Phatthanasak 40, Phatthanasak Rd., Khwaeng Suan Luang,
 Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE

09 Nov 2022

MEASUREMENT DATE

17 Nov 2022

ISSUE DATE

23 Nov 2022

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature: 23.0 ± 1.0 °C
 Relative Humidity: 55.0 ± 15.0 %RH
 Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

Effel type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITION

Wind tunnel cross section area¹ 900 cm²
 Win direction frontal area² 129 cm²
 Diameter of mounting pipe³ mm
 Blockage ratio of test object⁴ 0.143 [-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

The average values during measurement are (24.5) °C, (48.1) %RH and (1012.4) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

Mr. Sarawat Thakhalad
 Chief of Measurement Laboratory

Approved signatory

Mr. Parinya Boonlathum
 Calibration Department Manager

Remarks:

¹ Nozzle cross section area of the wind tunnel
² Projected cross section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio % to %

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Certificate Number
CL-004-65

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The wind direction sensor was calibrated against standard sine wave tested by comparison method. During calibration, the measurement was carried out at 45 intervals in clockwise and counterclockwise directions after offset adjustment has been made. The flow speed of wind tunnel (initially 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed m/s	D ₁₀₀ Degree (°)	D ₁₀₀ Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	0.001	0	0	0.58
	45.000	45	0	0.74
	90.001	45	-1	0.68
	135.000	134	-1	0.74
	180.000	180	0	0.74
	225.000	227	2	0.74
	270.001	272	2	0.74
	315.000	318	3	0.68

Remark:
Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.
Direction of standard:
Direction of Unit Under Calibration:



Our office is located at:
63/14 15,67/35 36, Soi Petchkasem 7/1, Petchkasem Rd.,
Wathapra, Bangkoko, Bangkok 10600 Thailand
Tel.: (66) 02 8680812 Fax: (66) 02 8680860
E-mail: nate@iranate.co.th
E-mail: nate@iranate.co.th
E-mail: nate@iranate.co.th

Accredited calibration laboratory
ISO/IEC 17025:2017
NAC 101 16 17025
CALIBRATION 0367

As speed measurement laboratory
Calibration services department

Certificate Number
CL-004-65

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

ENVIRONMENTAL CONDITIONS:

PLACE OF CALIBRATION

CALIBRATION CONDITIONS

Preconditioning

Measurement Condition

TABULATION OF RESULTS:

Calibrated by

Approved signature

Remark:

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Calibration procedure

Traceability:

Uncertainty of Measurement:

Environmental conditions:

Place of calibration

Calibration conditions

Preconditioning

Measurement condition

Tabulation of results:

Calibrated by

Approved signature

Remark:

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Certificate Number
CL-004-65

Page 2 of 2 Pages

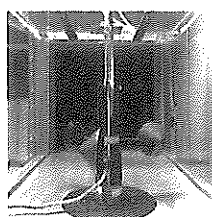
MEASUREMENT RESULTS¹

The cup anemometer, Unit 1011, Calibration (NAC) was carried out at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity of 5 m/s to 5 m/s was calculated by a standard air velocity transducer and chosen 5 m/s to 10 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 100 mm respectively away from wind tunnel nozzle. Unit 1011 was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 10 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V _{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V _{ref} (m/s)	Error (m/s)	U (k=2) (m/s)
0.988	23.70	23.80	0.8	0.2	0.15
2.053	23.90	23.80	1.8	0.2	0.16
3.040	23.84	23.80	2.8	0.2	0.19
4.227	23.85	23.80	3.8	0.4	0.19
5.03	23.70	23.80	4.8	0.2	0.25
6.02	23.84	23.80	5.8	0.1	0.24
7.07	23.70	23.80	6.8	0.2	0.28
8.10	23.80	23.80	7.9	0.3	0.20
9.12	23.66	23.80	8.9	0.2	0.20
10.12	23.82	23.80	9.9	0.1	0.20
11.16	23.50	23.80	10.9	0.3	0.21
12.15	23.90	23.80	11.8	0.4	0.23
13.21	23.40	23.80	12.9	0.3	0.23
14.27	23.74	23.80	13.9	0.4	0.23
15.26	23.56	23.80	14.9	0.3	0.23
16.32	23.62	23.80	16.0	0.3	0.26

Remark:
Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.
Velocity of standard:
Velocity of unit under calibration:

PHOTO OF CALIBRATION SET UP



Calibration set up of the cup anemometer calibration in the wind tunnel of Iranate Associates Co., Ltd. The cup anemometer shown is different from the calibration item. The position of the set up is different due to image priority.



63/14 15,67/35 36, Soi Petchkasem 7/1, Petchkasem Rd.,
Wathapra, Bangkoko, Bangkok 10600 Thailand
Tel.: (66) 02 8680812 Fax: (66) 02 8680860 www.jiranate.co.th

CERTIFICATE OF CALIBRATION

Calibration No. RH-04112022
Page 1 of 1 Pages

Measurement Item

Manufacturer

Model/Type

Serial Number

ID No.

Customer

Environmental Condition:

Measurement Method:

Traceability:

Measurement Date

Issued Date

Measurement Results:

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up

Calibration set up



Approved Signature

Mr. Pinyak Boonlathorn

Calibration Department Manager

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CALIBRATION REPORT

Page 1 of 2 Page 1

Measurement Item	Flow, range, and data history
Manufacturer	Flow, range, and data history Flow, range, and data history
Model/Type	Flow, range, and data history Flow, range, and data history
Serial Number	Flow, range, and data history Flow, range, and data history
IP Net	Flow, range, and data history
Features	Advanced, range, and data history Flow, range, and data history Flow, range, and data history Flow, range, and data history

References and Citations

[illegible]

Measurement Method

The Runge-Kutta type double integration (RK2) was implemented in Fortran on a digital PDP-11 with 4 Kbytes of core. The computer made 1.1 seconds core per second. The program, written, was determined by procedures follow:

- [illegible]

Note: This figure is fully skewed and leveling prior the calibration performed.

Measurement Date: 11-08-2017
Sensor ID: 14-001-0000

Performed by

☒ $f(x) = 0.2x^2 - 0.1x + 0.1$

☐ $f(x) = 0.1x^2 - 0.2x + 0.1$



Approved Signature: _____
 Lt. Eugene H. ...
 1st Lt. ...

Continuation of Calibration of Calibration Numbers

Publication Number: 2016-10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 84

[illegible]

Result of Calibration: ☒ Allowed to proceed ☐ Not Accepted

Quantity of H.O. (tmt)	Determined Tipping	Tipping count	Acceptable Tipping count
5000	0.6	0.1	0.3, 0.4
5000	0.6	0.1	0.3, 0.5
5000	0.6	0.0	0.1, 0.4
5000	0.6	0.0	0.1, 0.6
5000	0.6	0.1	0.0, 0.4

Remark. The proof of both lemmata is similar, starting at the first intersection point where a ray is sent out from the origin. In the first lemma, the ray is sent out in the direction of the vector $(1, 0)$, while in the second lemma, the ray is sent out in the direction of the vector $(0, 1)$. The proof of the second lemma is left as an exercise for the reader.

Case of exhibition request



CERTIFICATE OF CALIBRATION

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Equipment Name Data Logger with Temperature Sensor
Manufacturer Novak
Model: 110WS-250-D
Serial No.: A5912
ID No.: NYG-150611

Customer
Name: Al's Laboratory group (Thailand) Co. Ltd
Address: 104 Phatthanakiet 40, Hatthamae
Bd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand

Received date: 09 Nov 2022
Calibration date: 18 Nov 2022
Issue date: 23 Nov 2022

Reference Used During Calibration
 1. Standard Temperature Probe Model: 515, 1000 A-ME
 Serial No.: 667682 09, Due date: 23 Mar 2023
 2. Digital Temperature Indicator Model: DT1 1000 A-ME
 II Serial No.: G71497 005/91 Due date: 22 July 2023


Calibration Condition
Temperature: (23 ± 3) °C
Relative Humidity: (55 ± 15)%

Calibration Procedure
The temperature calibration was done by in-house calibration method as WGL 001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale used was based on ITS-90.

Traceability
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology, Thailand (NIMT) Certificate number TH 0634-22 Certificate number TH 0002-22.

Calibrated by
 1. Mr. Satevat Thachukud
 2. Mr. Jitnorn Leeksomphol



Approved Signatory: 
Mr. Patsy Leontchen
Calibration Department Manager



For the case $S_{\text{max}} = 2.5 \times 10^4$,
 $\text{E}_{\text{max}} = 10^6$

Result of Calibration:	1- Without Adjustment	2- With Adjustment
Calibration Rings:	20, 40, 60	

Function: This equipment was connected with temperature sensor Model: HMP60 S/N: UC911241
Dimension: Diameter 12 mm, Length 80 mm

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	19.99	19.99	0.0	0.00
60	24.99	24.9	0.0	0.00
60	30.00	29.98	0.0	0.00
60	35.01	34.99	0.0	0.00
60	39.99	39.99	0.0	0.00

HHC⁴ and Under-Collection:

The reported expected uncertainty is based on standard uncertainty multiplied by a coverage factor of 2 providing a level of confidence of approximately 95%.

*** End of Certificate ***



CERTIFICATE OF CALIBRATION

Certificate No. CL 017 65

Page 1 of 2 Pages

MEASUREMENT ITEM Digital barometer
MANUFACTURER Newlyn
MODEL/TYPE 110 WS 25BP
SERIAL NUMBER A5912
ID NUMBER RVG_F50611
CONDITION AS RECEIVED New item
CUSTOMER AIS laboratory group (Thailand) co., Ltd.
 104 Phatthanakan Rd. Phatthanakan Rd.
 Khwaeng Suan Luang, Khwaeng Suan Luang,
 Bangkok 10250 Thailand
RECEIVED DATE 09 Nov 2022
MEASUREMENT DATE 22 Nov 2022
ISSUE DATE 23 Nov 2022

Calibration procedure:
 The pressure calibration was done by in-house calibration method as per CL 001 according to comparison method with Digital pressure calibrator based on DKS R 6.1

Traceability:
 The measurement results are traceable to the international system of units (SI) through MENSOR which complies with the requirements of ISO/IEC 17025:2017, AIS/MSL 2540-1 via Certificate number 201479

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of 2, providing a level of confidence of approximately 95%.

CONDITION OF THIS RESULT OF CALIBRATION

1. Reference Standard Instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
Absolute Pressure Transducer	CPC2500	41001H1	201479	13 Sep 2022

- Calibration effort for calibration sequence A
- The UUC* was used as a reference standard instrument and center of UUC* was used as the reference level
- Calibration conditions
- Condition

Condition	Normal	Abnormal
Pressure transmitting medium	Oil	
Pressure (20°C, 1 bar)	1.19 kgf/cm ²	
Humidity	(55±15) %	
Temperature	(23±3) °C	
Pressure	(1010±10) mbar	
- The certificate is valid only for the item calibrated on date and place of calibration

Calibrated by:
 1. Mr. Sorawan Thakhalad
 2. Miss Jitaporn Jiratanaporn



Approved signatory

Mr. Pongpan Booncharoen
 Calibration Department Manager

CERTIFICATE OF CALIBRATION

Certificate No. CL 017 65

Page 2 of 2 Pages

MEASUREMENT RESULTS Without adjustment With adjustment

CALIBRATION IN THE RANGE OF 950 1050 mbar

The results of calibration and associated measurement uncertainties are reported in the table below

STD (mbar)	UUC* (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
950.00	950.6	0.6	0.63
970.00	970.4	0.4	0.55
990.00	990.1	0.1	0.45
1010.00	1010.0	0.0	0.38
1030.00	1029.8	0.2	0.45
1050.00	1029.6	0.4	0.59

Note: UUC* Unit Under Calibration

To convert the result in report unit to Pa should be multiply by 100

End of certificate



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Page 1 of 2 Pages

MEASUREMENT ITEM Cup anemometer
MANUFACTURER Newlyn
MODEL/TYPE Sensor WS 021
SERIAL NUMBER Data logger: 110 WS 25BP-D
 Sensor: WS0-013
 Data logger: A5911
ID NUMBER RVG_F50610
CONDITION AS RECEIVED New item
CUSTOMER AIS laboratory group (Thailand) co., Ltd.
 104 Phatthanakan Rd. Phatthanakan Rd.
 Khwaeng Suan Luang, Khwaeng Suan Luang,
 Bangkok 10250 Thailand

RECEIVED DATE 09 Nov 2022
MEASUREMENT DATE 17 Nov 2022
ISSUE DATE 23 Nov 2022

ENVIRONMENTAL CONDITIONS:

Environment conditions in the laboratory are as follows:
 Temperature: 23.0 ± 3.0 °C
 Relative Humidity: 55.0 ± 15.0 %RH
 Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

Eller type wind tunnel of Jiranate Associates Co., Ltd.

CALIBRATION CONDITIONS

Calibration conditions	Value	Unit
Wind tunnel cross-section area ¹	900	cm ²
Wind direction frontal area ²	100	cm ²
Diameter of mounting pipe ³		mm
Blockage ratio of test object ⁴	0.111	%

Preconditioning 24 hours at ambient conditions.
Measurement Condition The average values during measurement are (24.1 ± 1.1) °C (46.6) °C and (1015.4) hPa

TABULATION OF RESULTS

The table on next page give the measured values

Calibrated by:
 1. Mr. Sorawan Thakhalad
 2. Miss Jitaporn Jiratanaporn



Approved signatory

Mr. Pongpan Booncharoen
 Calibration Department Manager

Remark:
¹ Nozzle cross-section area of the wind tunnel
² Projected cross-section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio (%)

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Master P
 17/11/24

Certificate Number

CL 003 65

CERTIFICATE OF CALIBRATION

Page 2 of 2 Pages

MEASUREMENT RESULTS

The cup anemometer, the Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calibrated by a standard B air velocity transducer and above 5 m/s to 40 m/s was calibrated by a pitot tube with pressure differential pressure meter which was installed 40 mm and 100 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V _{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V _{UUC} (m/s)	Error (m/s)	U (k=2) (m/s)
0.994	24.08	24.65	0.8	0.2	0.17
1.036	24.10	24.65	1.8	-0.2	0.17
1.054	24.09	24.65	2.9	0.2	0.17
4.117	24.10	24.65	3.9	0.4	0.17
5.02	23.92	24.05	4.9	-0.1	0.17
6.00	24.24	24.05	5.9	0.1	0.18
7.08	23.88	24.05	6.8	-0.2	0.20
8.20	24.12	24.05	7.9	0.1	0.20
9.13	23.74	24.05	8.8	0.3	0.19
10.11	24.04	24.05	9.8	0.3	0.19
11.17	23.80	24.05	10.9	0.2	0.20
12.15	23.58	24.05	11.8	0.3	0.21
13.20	23.78	24.05	12.9	0.3	0.26
14.25	23.80	24.05	14.0	0.2	0.26
15.25	23.80	24.05	14.9	0.3	0.23
16.30	23.80	24.05	16.0	0.3	0.23

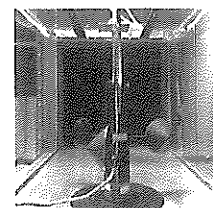
Remark:

Calibration results only valid for the tested environmental and test condition during which calibration took place

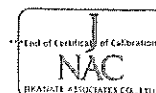
Velocity of standard

Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the cup anemometer calibration in the wind tunnel of Jiranate Associates Co., Ltd. The cup anemometer shown in the photo is the calibrated unit. The photograph of the set-up is not true to scale due to scale of the photograph.



CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Cup anemometer
MANUFACTURER : Novasym
MODEL/TYPE : Sensor: WS 027
Data logger: 110 WS 2504 D
SERIAL NUMBER : Sensor: WSD 013
Data logger: AS011
ID NUMBER : RYG_150610
CONDITION AS RECEIVED : New item
CUSTOMER : AIS Laboratory group (Thailand) co., Ltd
104 Phatthanakan Rd, Phatthanakan Rd, Kwang Sam Luang,
Khet Sam Luang, Bangkok 10250 Thailand

RECEIVED DATE : 09 Nov 2022
MEASUREMENT DATE : 17 Nov 2022
ISSUE DATE : 23 Nov 2022

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1030 ± 10 hPa

PLACE OF CALIBRATION

(Bell type wind tunnel of Jananate Associates Co., Ltd)

CALIBRATION CONDITIONS

Wind tunnel cross-section area¹ : 900 cm²
Wind direction frontal area² : 100 cm²
Diameter of mounting pipe³ : 50 mm
Blockage ratio of test object⁴ : 0.11 [%]

Preconditioning : 24 hours at ambient conditions

Measurement Condition : The average values during measurement are (24.1) °C, (46.8) %RH and (1015.4) hPa

TABULATION OF RESULTS

The table on next page give the measured values

Calibrated by : Mr. Sorawat Thacharad
Mr. Jitraporn Lertrongsit



Approved signatory

Mr. Porng Porngchotorn
Calibration Department Manager

Remark:
¹ Inside cross-section area of the wind tunnel.
² Projected cross-section area of the tested object include mounting pipe.
³ Diameter of mounting pipe.
⁴ Ratio %.

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CERTIFICATE OF CALIBRATION

Certificate No. CL 016 65

Page 1 of 2 Pages

MEASUREMENT ITEM : Digital barometer
MANUFACTURER : Novasym
MODEL/TYPE : 110 WS 2504
SERIAL NUMBER : AS011
ID NUMBER : RYG_150610
CONDITION AS RECEIVED : New item
CUSTOMER : AIS Laboratory group (Thailand) co., Ltd
104 Phatthanakan Rd, Phatthanakan Rd, Kwang Sam Luang,
Khet Sam Luang, Bangkok 10250 Thailand

RECEIVED DATE : 09 Nov 2022
MEASUREMENT DATE : 23 Nov 2022
ISSUE DATE : 23 Nov 2022

CONDITION OF THIS RESULT OF CALIBRATION:

1. Reference Standard Instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
Absolute Pressure Transducer	CPG2500	41001R1	201426	13 Sep 2022

1. Calibration effort for calibration sequence A
2. The UUC* was installed in vertical orientation above reference standard instrument and center of UUC* was used as the reference level
3. Calibration conditions

4. Condition : ☒ Normal ☐ Abnormal
Pressure transmitting medium : Air
 p_1 (20°C, 1 bar) : 1.01325 kg/m³
 H_{rel} : (55±15)%
 t_{amb} : (23±3) °C
 p_{rel} : (1010±10) mbar

5. The certificate is valid only to the item calibrated on date and place of calibration

Calibration procedure
The pressure calibration was done by in house calibration method on WG CL 600 according to comparison method with Digital pressure calibrator based on DKD R.6.1

Traceability
The measurement results are traceable to the international system of units (SI) through MPEM which complies with the requirements of ISO/IEC 17025:2017, ANSI/ISO IL 2540 1 via Certificate number 201479

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%

Calibrated by : Mr. Sorawat Thacharad
Mr. Jitraporn Lertrongsit



Approved signatory

Mr. Porng Porngchotorn
Calibration Department Manager

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Page 2 of 2 Pages

MEASUREMENT RESULTS⁵

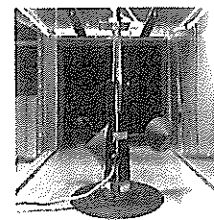
The cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 10 m/s was calculated by a pitot tube with pressure differential pressure meter which was installed 40 mm and 100 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below

v_{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	v_{meas} (m/s)	Error (m/s)	U (k=2) (m/s)
0.994	24.08	24.05	0.8	0.2	0.17
2.036	24.10	24.05	1.8	-0.2	0.17
3.044	24.09	24.05	2.9	0.2	0.17
4.227	24.10	24.05	3.9	0.4	0.19
5.02	23.92	24.05	4.9	0.1	0.17
6.00	24.24	24.05	5.9	0.1	0.18
7.08	23.88	24.05	6.8	0.2	0.20
8.20	24.12	24.05	7.9	-0.3	0.20
9.13	23.74	24.05	8.8	-0.3	0.19
10.11	24.04	24.05	9.8	0.1	0.19
11.17	23.80	24.05	10.9	-0.3	0.20
12.15	23.98	24.05	11.8	0.3	0.21
13.20	23.78	24.05	12.9	-0.3	0.26
14.25	23.80	24.05	14.0	0.2	0.26
15.25	23.80	24.05	14.9	0.3	0.23
16.30	23.80	24.05	16.0	0.3	0.23

Remark:

Calibration results only count for the tested measurement and environmental conditions during which calibration took place
Velocity of standard
Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET UP



Calibration setup of the cup anemometer calibration in the wind tunnel of Jananate Associates Co., Ltd. The cup anemometer design may differ from the calibrated one. Remark: The proportion of the set-up may not be to scale due to mapping geometry



CERTIFICATE OF CALIBRATION

Certificate No. CL 016 65

Page 2 of 2 Pages

MEASUREMENT RESULTS : ☒ Without adjustment ☐ With adjustment
CALIBRATION IN THE RANGE OF : 9.50 - 10.0 mbar

The results of calibration and associated measurement uncertainties are reported in the table below

STD (mbar)	UUC* (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
9.50 00	9.50 00	0.0	0.37
9.70 00	9.69 8	0.2	0.40
9.90 00	9.89 6	0.4	0.42
10.10 00	10.09 5	0.4	0.44
10.30 00	10.29 3	0.9	1.1
10.50 00	10.49 0	1.0	1.2

Note: UUC* Unit Under Calibration

To convert the result in report unit to Pa should be multiply by 100

End of certificate





63/14-15,67/35-36, Soi Petchkasem7,7/1, Petchkasem Rd,
Wattthapra, Bangkokyay,Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatec.com

Continuation of Certificate of Calibration Number

Certificate No. WD-01102001
Pages 2 of 2 pages

Result of calibration: ☐ Without adjustment ☒ With adjustment

Calibration in the range of 0 - 360 ° at a calibration interval of 45°

The results of calibration and associated measurement uncertainties are reported in table below

NO	Turning Direction	Nominal Angle (°)	Standard Reading (°)	UUC* Reading (°)	Error (°)	Uncertainty ±(°)
1	Clockwise	0/360	360	359	1	±0
2		45	45	45	0	±0
3		90	90	90	0	±0
4		135	135	135	0	±0
5		180	180	180	0	±0
6		225	225	225	0	±0
7		270	270	270	0	±0
8		315	315	316	1	±0
9	Anticlockwise	0/360	360	359	1	±0
10		45	45	45	0	±0
11		90	90	90	0	±0
12		135	135	135	0	±0
13		180	180	180	0	±0
14		225	225	225	0	±0
15		270	270	270	0	±0
16		315	315	316	1	±0

UUC* In Under Calibration Test reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor of 2, which provides a level of confidence of approximately 95%.

End of Certificate of Calibration



Accredited calibration laboratory
ISO/IEC 17025:2017
MSC 100115-10205
CALIBRATION 0167

An speed measurement laboratory
Calibration services department

Naikem P

17/6/24

Certificate Number

CL 004 65

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

Wind Direction Sensor

Novasys

Sensor: WS-02F

Data logger: 110-WS-250U-D

Sensor: WSD-014

Data logger: AS912

RYG_F50611

New item

ALS laboratory group (Thailand) Co., Ltd

104 Phatthanasukan Rd, Phatthanasukan Rd, Khwaeng Suan Luang

Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

09 Nov 2022

17 Nov 2022

23 Nov 2022

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature

Relative Humidity

Atmospheric Pressure

23.0 ± 3.0

55.0 ± 35.0

1010 ± 10

°C

%RH

hPa

PLACE OF CALIBRATION

Effel-type wind tunnel of Jiranatec Associates Co., Ltd

CALIBRATION CONDITION

Wind tunnel cross-section area¹

Wind direction frontal area²

Diameter of mounting pipe³

Blockage ratio of test object⁴

500

125

0.143

cm²

cm²

mm

1:1

Preconditioning

Measurement Condition

24 hours at ambient conditions

The average values during measurement are (24.5) °C, (48.1) %RH and (1012.4) hPa

TABULATION OF RESULTS:

The table on next page give the measured values

Calibrated by

1. Mr. Sorawat Thuchakul

2. Ms. Jiraporn Leetsumrit



Approved signatory

Mr. Pongpang Boonwattana
Calibration Department Manager

Remarks:

¹ Nozzle cross-section area of the wind tunnel

² Projected cross-section area of the tested object include mounting pipe

³ Diameter of mounting pipe

⁴ Ratio 1:1

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY



Accredited calibration laboratory
ISO/IEC 17025:2017
MSC 100115-10205
CALIBRATION 0167

An speed measurement laboratory
Calibration services department

Certificate Number

CL 004 65

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS RECEIVED

CUSTOMER

Cup anemometer

Novasys

Sensor: WS-02F

Data logger: 110-WS-250U-D

Sensor: WSD-014

Data logger: AS912

RYG_F50611

New item

ALS laboratory group (Thailand) Co., Ltd

104 Phatthanasukan Rd, Phatthanasukan Rd, Khwaeng Suan Luang

Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

09 Nov 2022

17 Nov 2022

23 Nov 2022

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature

Relative Humidity

Atmospheric Pressure

23.0 ± 3.0

55.0 ± 35.0

1010 ± 10

°C

%RH

hPa

PLACE OF CALIBRATION

Effel-type wind tunnel of Jiranatec Associates Co., Ltd

CALIBRATION CONDITIONS

Wind tunnel cross-section area¹

Wind direction frontal area²

Diameter of mounting pipe³

Blockage ratio of test object⁴

500

100

0.111

cm²

cm²

mm

1:1

Preconditioning

Measurement Condition

24 hours at ambient conditions

The average values during measurement are (23.6) °C, (50.9) %RH and (1011.1) hPa

TABULATION OF RESULTS:

The table on next page give the measured values

Calibrated by

1. Mr. Sorawat Thuchakul

2. Ms. Jiraporn Leetsumrit



Approved signatory

Mr. Pongpang Boonwattana
Calibration Department Manager

Remarks:

¹ Nozzle cross-section area of the wind tunnel

² Projected cross-section area of the tested object include mounting pipe

³ Diameter of mounting pipe

⁴ Ratio 1:1

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY



63/14 15,677/35-36, Soi Petchkasem 7/71, Petchkasem Rd.
Walthapra, Bangkhobai, Bangkok 10600 Thailand
Tel. (66) 02-8680812#13 Fax: (66) 02-8680860 www.jranatec.com



63/14 15,677/35-36, Soi Petchkasem 7/71, Petchkasem Rd.
Walthapra, Bangkhobai, Bangkok 10600 Thailand
Tel. (66) 02-8680812#13 Fax: (66) 02-8680860 www.jranatec.com



CERTIFICATE OF CALIBRATION

Certificate No. CL 159-05
Page 1 of 2

Equipment Name: Data Logger with Temperature
Sensor

Manufacturer: HANALYS
Model: 316 WS 2531-B
Serial No.: A5912
ID No.: RYG 150614

Customer
Name: AIS Laboratory group (Thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.
Khwang Soan Luang, Khet Soan Luang, Bangkok
10250 Thailand

Received date: 09 Nov 2022
Calibration date: 16 Nov 2022
Issue date: 23 Nov 2022

Reference Used During Calibration
1. Standard Temperature Probe Model: NIS 100 M000
Serial No.: G67682 09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: D11 1000 A MK II, Serial No.: G71407 00591, Due date: 22 July 2023

Calibration Condition
Temperature: (23 ± 1) °C
Relative Humidity: (55 ± 15)%

Calibration Procedure

The temperature calibration was done by in-house calibration method as WI-E 001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale also was based on ITS-90.

Traceability

The measurement results are traceable to the international system of units (SI) through National Institute of Metrology, Thailand (NIMT) Certificate number: TH 0034 22. Certificate number: PA 0052 22.

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 - 40 °C

Function

This equipment was connected with temperature sensor Model: HMP60 S/N: U3911247

Dimension: Diameter 12 mm Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	19.99	19.9	0.1	0.30
60	24.96	24.7	0.2	0.30
60	30.00	29.8	0.2	0.30
60	35.01	34.6	0.4	0.30
60	39.99	39.5	0.5	0.30

UUC*: Unit Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k = 2 providing a level of confidence of approximately 95%.

★ End of Certificate ★



Calibrated by
F. Mr. Sorawit Thakulad
F. Miss Jittaporn Lertanontkul



Approved Signatory:
Mr. Panya Boonharoon
Calibration Department Manager

CERTIFICATE OF CALIBRATION

Certificate No. CL 017-05

Page 1 of 2 Pages

MEASUREMENT ITEM

Digital barometer

MANUFACTURER

HANALYS

MODEL/TYPE

110-WS 2530

SERIAL NUMBER

A5912

ID NUMBER

RYG 150614

CONDITION AS RECEIVED

Reversion

CUSTOMER

AIS Laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.
Khwang Soan Luang, Khet Soan Luang,
Bangkok 10250 Thailand

RECEIVED DATE

09 Nov 2022

MEASUREMENT DATE

22 Nov 2022

ISSUE DATE

23 Nov 2022

Calibration procedure:

The pressure calibration was done by in-house calibration method as WI-E 001 according to comparison method with Digital pressure calibrator based on DGD R & I.

Traceability:

The measurement results are traceable to the international system of units (SI) through NIMT which complies with the requirements of ISO/IEC 17025:2017, JIS/NIS 17025-1 via Certificate number 201429.

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%.

CONDITION OF THIS RESULT OF CALIBRATION

1. Reference Standard Instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
Absolute Pressure Transducer	CEG2500	41001R11	201475	13 Sep 2022

2. The UUC* was included in verification above reference standard instrument and error of UUC* was used as the reference level

3. Calibration conditions

4. Condition	<input checked="" type="checkbox"/> Normal <input type="checkbox"/> Abnormal
Pressure transmitting medium	Air
p_1 (20°C, 1 bar)	1.19 kg/m ³
H_{p1}	(55 ± 15)%
T_{p1}	(23 ± 1) °C
p_{max}	(1010 ± 10) mbar

5. This certificate is valid only to the item calibrated on date and place of calibration

Calibrated by
F. Mr. Sorawit Thakulad
F. Miss Jittaporn Lertanontkul



Approved signatory
Mr. Panya Boonharoon
Calibration Department Manager

CERTIFICATE OF CALIBRATION

Certificate No. CL 017-05

Page 2 of 2 Pages

MEASUREMENT RESULTS

☒ Without adjustment ☐ With adjustment

CALIBRATION IN THE RANGE OF: 950 - 1050 mbar

The results of calibration and associated measurement uncertainties are reported in the table below

STD (mbar)	UUC* (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
950.00	950.6	0.6	0.83
970.00	970.4	0.4	0.55
990.00	990.1	0.1	0.45
1010.00	1010.0	0.0	0.38
1030.00	1029.8	0.2	0.46
1050.00	1049.6	0.4	0.59

Note: UUC* Unit Under Calibration

To convert the result in report unit to Pa should be multiply by 100

End of certificate



Handwritten: 19/1/24

Certificate Number
CL-012-65

Certificate Number
CL-012-65

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° intervals in clockwise and counter-clockwise directions after offset adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed m/s	D _{rot} Degree (°)	D _{enc} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
0.000	0	0	0	0.58
45.000	45	47	-3	0.74
90.000	88	88	2	0.74
135.000	133	133	-2	0.68
180.000	179	179	1	0.74
225.000	226	226	1	0.74
270.000	270	270	0	0.74
315.000	316	316	1	0.74

Remarks:

¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.

² Direction of standard

³ Direction of Unit Under Calibration

End of Certificate of Calibration

Page 1 of 2 Pages

MEASUREMENT ITEM MANUFACTURER MODEL/TYPE

Wind Direction Sensor

Novamys

Sensor: WS-03F

Data logger: 110-WS-250L-D

SERIAL NUMBER

Sensor: WS0-011

Data logger: AS660

ID NUMBER

RYG_F50530

CONDITION AS-RECEIVED

Used item

CUSTOMER

AIS Laboratory group (Thailand) Co., Ltd.
104 Phatthanakarn Rd, Phatthanakarn Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE

16 Jan 2023

MEASUREMENT DATE

19 Jan 2023

ISSUE DATE

20 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	23.0 ± 3.0	°C
Relative Humidity	55.0 ± 15.0	%RH
Atmospheric Pressure	1010 ± 10	hPa

PLACE OF CALIBRATION

Ellet-type wind tunnel of Hiranatee Associates Co., Ltd.

CALIBRATION CONDITION

Wind tunnel cross section area	900	cm ²
Wind section frontal area ¹	129	cm ²
Diameter of mounting pipe ²	mm	
Blockage ratio of test object ³	0.143	[-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

The average values during measurement are (23.7) °C, (54.2) %RH and (1015.2) hPa

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

☒ Mr. Sravit Thachai

☐ Miss Intaraporn Leetmahan

Approved signatory

Handwritten: Sravit Thachai
Mr. Sravit Thachai
Calibration Department Manager

Remarks:

¹ Inside cross section area of the wind tunnel

² Projected cross section area of the tested object include mounting pipe

³ Diameter of mounting pipe

⁴ Ratio "to 1"

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

Certificate Number
CL-012-66

Certificate Number
CL-012-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 20 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 350 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V _{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V _{uuc} (m/s)	Error (m/s)	U (k=2) (m/s)
0.979	23.56	23.70	0.8	-0.2	0.16
2.025	23.80	23.70	1.6	-0.2	0.16
3.045	23.50	23.70	2.8	0.3	0.10
4.120	23.64	23.70	3.9	-0.3	0.20
5.01	23.64	23.70	4.8	-0.2	0.18
5.98	23.60	23.70	5.8	-0.2	0.18
7.05	23.28	23.70	6.9	-0.1	0.19
8.17	23.60	23.70	8.0	-0.2	0.19
9.09	23.20	23.70	9.0	0.0	0.22
10.09	23.52	23.70	9.9	-0.3	0.20
11.13	23.20	23.70	10.9	-0.2	0.21
12.13	23.50	23.70	11.9	-0.2	0.21
13.19	23.20	23.70	13.0	0.7	0.22
14.25	23.45	23.70	14.1	0.0	0.24
15.22	23.20	23.70	15.1	-0.1	0.34
16.31	23.30	23.70	16.1	-0.2	0.23

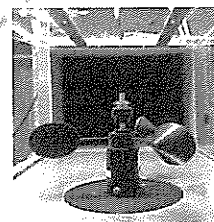
Remarks:

¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.

² Velocity of standard

³ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the cup anemometer calibration in the wind tunnel of Hiranatee Associates Co., Ltd. The cup anemometer shown may differ from the calibrated one. Remark: The proportion of the set-up is not true to scale due to imaging geometry.

End of Certificate of Calibration

Page 1 of 2 Pages

MEASUREMENT ITEM MANUFACTURER MODEL/TYPE

Cup anemometer

Novamys

Sensor: WS-02F

Data logger: 110-WS-250L-D

SERIAL NUMBER

Sensor: WS0-011

Data logger: AS660

ID NUMBER

RYG_F50530

CONDITION AS-RECEIVED

Used item

CUSTOMER

AIS Laboratory group (Thailand) Co., Ltd.
104 Phatthanakarn Rd, Phatthanakarn Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE

16 Jan 2023

MEASUREMENT DATE

18 Jan 2023

ISSUE DATE

20 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature	23.0 ± 3.0	°C
Relative Humidity	55.0 ± 15.0	%RH
Atmospheric Pressure	1010 ± 10	hPa

PLACE OF CALIBRATION

Ellet-type wind tunnel of Hiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS

Wind tunnel cross section area	900	cm ²
Wind section frontal area ¹	100	cm ²
Diameter of mounting pipe ²	mm	
Blockage ratio of test object ³	0.111	[-]

Preconditioning

24 hours at ambient conditions.

Measurement Condition

The average values during measurement are (23.7) °C, (50.2) %RH and (1017.3) hPa

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

☒ Mr. Sravit Thachai

☐ Miss Intaraporn Leetmahan

Approved signatory

Handwritten: Sravit Thachai
Mr. Sravit Thachai
Calibration Department Manager

Remarks:

¹ Inside cross section area of the wind tunnel

² Projected cross section area of the tested object include mounting pipe

³ Diameter of mounting pipe

⁴ Ratio "to 1"

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CERTIFICATE OF CALIBRATION

Certificate No.: CL-005-66
Page 1 of 2

Equipment Name: Data Logger with Temperature
Sensor
Manufacturer: Novolyne
Model: 110-WS-25DL-D
Serial No.: A5660
ID No.: RYG_FS0530

Customer
Name: ALS laboratory group (Thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 16 Jan 2023
Calibration date: 18 Jan 2023
Issue date: 20 Jan 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500.
Serial No.: 667682 09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI 1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3)°C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TI-0034-22, Certificate number: ER-0092-
22

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment
Calibration Range: 20-40 °C

Function:

This equipment was connected with temperature sensor Model: HMP60 S/N: S4620631.

Dimension : Diameter 12 mm. Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.066	19.8	-0.3	0.099
60	25.058	24.6	-0.5	0.14
60	30.052	29.5	-0.6	0.099
60	35.047	34.5	-0.5	0.099
60	40.038	39.4	-0.6	0.099

UUC*: Unit Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of
confidence of approximately 95%.

★ End of Certificate ★



Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol

Approved Signatory:
Mr. Parinya Booncharoen
Calibration Department Manager

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BEEN OBTAINED IN WRITING FROM THE LABORATORY

CERTIFICATE OF CALIBRATION

Calibration No.: RH-05012023
Page 1 of 1 Pages

Measurement Item: Relative humidity with data logger
Manufacturer: Novolyne
Model/Type: 110-WS-25DL-D
Serial Number: A5660
ID No.: RYG_FS0530
Customer: ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand

Environmental Condition:

The measurement was carried out in an ambient temperature of (26±3)°C, and relative humidity of (60±16)%.

Measurement Method:

Unit Under Calibration (UUC) was calibrated by comparison method with standard thermo hygrometer in the humidity gen-
erator chamber to determine the errors.

Traceability:

This instrument was calibrated using standard equipment whose accuracy is traceability through National Institute of
Standards and Technology to the international system of units (SI) via MCS Calibration, Inc. Certificate number:
20314 101. Due date: Mar 14, 2023

Measurement Date: Jan 18, 2023
Issued Date: Jan 20, 2023

Measurement Result:

This equipment was connected with indoor air quality probe and Displayed UUC on display. Model: HMP60. Serial num-
ber: S4620631

Calibration was performed in the range of 20%RH to 80%RH
The results of calibration are reported in table below

Determined (%RH)	Standard Reading (%RH)	UUC Reading (%RH)	Error (%RH)	Uncertainty (%RH)
20	20.033	17.8	-2.2	0.58
60	60.28	48.6	-1.7	0.57
80	80.29	79.8	-0.5	0.58

Page 1 of 2 Pages

MEASUREMENT ITEM

Cup anemometer
Novolyne
Sensor: WS-001
Data logger: 110-WS-25DL-D
Model/Type: WSID-004
Serial Number: A5465
Data logger: A5465
ID Number: RYG_FS0435
Condition as received
Customer: ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE: 28 Dec 2022
MEASUREMENT DATE: 05 Jan 2023
ISSUE DATE: 09 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow
Temperature: 23.0 ± 3.0 °C
Relative Humidity: 55.0 ± 15.0 %RH
Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION

Wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS

Wind tunnel cross-section area¹: 900 cm²
Wind direction frontal area²: 100 cm²
Diameter of mounting pipe³: 10 mm
Discharge ratio of test object⁴: 0.113 [1]

Preconditioning

Measurement Condition: 24 hours at ambient conditions
The average values during measurement are (24.0)°C, (64.2) %RH and (1010.5) hPa

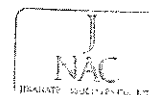
TABULATION OF RESULTS

The tables on next page give the measured values.

Calibrated by:
Mr. Sorawit Thachalad
Miss Jitraporn Lertsomphol

Approved Signatory:
Mr. Parinya Booncharoen
Calibration Department Manager

Remarks:
1. Inside cross-section area of the wind tunnel
2. Projected cross-section area of the tested object include mounting pipe
3. Diameter of mounting pipe
4. Ratio to



THIS CALIBRATION REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUC-
TION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED
IN WRITING FROM THE LABORATORY

Certificate Number
CL-004-66

Page 2 of 2 Pages

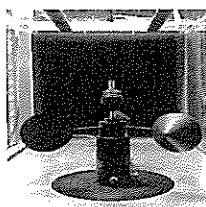
MEASUREMENT RESULTS¹

The cup anemometer, the 1 Under Calibration (UUC) was exposed at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity (wind) sensor and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 100 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

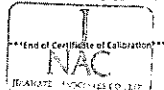
V_{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	v_{meas} (m/s)	Error (m/s)	$U(\%)$
0.993	23.88	23.55	0.9	-0.1	0.17
2.031	23.98	23.55	1.9	-0.2	0.17
3.050	24.00	23.55	3.0	-0.1	0.18
4.125	23.64	23.55	4.0	-0.2	0.19
5.01	24.04	23.55	4.9	-0.3	0.25
5.99	24.10	23.55	5.9	-0.3	0.19
7.06	23.74	23.55	6.9	-0.1	0.20
8.17	24.06	23.55	8.0	-0.1	0.20
9.09	23.80	23.55	9.0	-0.1	0.20
10.05	23.90	23.55	10.0	-0.1	0.22
11.14	23.90	23.55	11.1	-0.1	0.27
12.13	23.66	23.55	11.9	-0.2	0.24
13.20	23.82	23.55	13.2	0.0	0.27
14.26	23.56	23.55	14.3	0.0	0.25
15.25	23.74	23.55	15.3	0.0	0.29
16.31	23.64	23.55	16.3	0.0	0.26

Remark:
¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.
² Velocity of standard.
³ Velocity of Unit Under Calibration.

PHOTO OF CALIBRATION SET UP



Calibration set-up of the cup anemometer calibration in the wind tunnel of Jranatee Associates Co., Ltd. The cup anemometer shown may differ from the calibrated one. Remark: The proportion of the set up may not be accurate due to missing geometry.



Certificate Number
CL-004-66

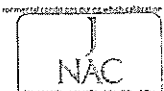
Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° intervals in clockwise and counter-clockwise directions after offset adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed (m/s)	D_{true} Degree (°)	D_{meas} Degree (°)	Error Degree (°)	$U(\%)$ Degree (°)
	0.000	0	0	0.58
	45.000	42	3	0.68
	90.000	87	-3	0.74
	135.000	133	-2	0.74
	180.000	181	1	0.74
	225.000	229	3	0.76
	270.000	274	4	0.74
	315.000	319	4	0.68

Remark:
¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.
² Direction of standard.
³ Direction of Unit Under Calibration.



End of Certificate of Calibration

Accredited calibration laboratory
 ISO/IEC 17025:2017
 NSC TIS-TIS 17025
 CALIBRATION 0367

Accredited calibration laboratory
 ISO/IEC 17025:2017
 NSC TIS-TIS 17025
 CALIBRATION 0367

Air speed measurement laboratory
 Calibration services department

Certificate Number
CL-004-66

CERTIFICATE OF CALIBRATION

Page 2 of 2 Pages

MEASUREMENT ITEM	Wind Direction Sensor
MANUFACTURER	Novalynx
MODEL/TYPE	Sensor: WS-027 Data logger: 310 WS 250P D Sensor: WSD-004 Data logger: AS445 RTG: 150436
SERIAL NUMBER	Used item
ID NUMBER	AS4 laboratory group (Thailand) Co., Ltd 104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.
CONDITION AS RECEIVED	
CUSTOMER	

RECEIVED DATE	28 Dec 2022
MEASUREMENT DATE	05 Jan 2023
ISSUE DATE	09 Jan 2023

ENVIRONMENTAL CONDITIONS:
 Ambient condition in the laboratory are as follows:
 Temperature: 23.0 ± 3.0 °C
 Relative Humidity: 55.0 ± 15.0 %RH
 Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION: Effel-type wind tunnel of Jranatee Associates Co., Ltd

CALIBRATION CONDITION	Wind tunnel cross-section area ¹	500	cm ²
	Win direction frontal area ²	120	cm ²
	Diameter of mounting pipe ³		mm
	Blockage ratio of test object ⁴	0.143	[-]

Preconditioning: 24 hours at ambient conditions
Measurement Condition: The average values during measurement are (23.81 °C, (47.33) %RH and (1034.8) hPa)

TABULATION OF RESULTS:
 The table on next page give the measured values

Calibrated by:
☒ Mr. Srisawat Thacharad
☒ Mr. Jettaporn Jettacharad



Approved signatory
 Mr. Panyaporn Boonchuan
 Calibration Department Manager

Remark:
¹ Inside cross-section area of the wind tunnel
² Prescribed cross-section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio: 1/1

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

Accredited calibration laboratory
 ISO/IEC 17025:2017
 NSC TIS-TIS 17025
 CALIBRATION 0367

Accredited calibration laboratory
 ISO/IEC 17025:2017
 NSC TIS-TIS 17025
 CALIBRATION 0367

Pressure measurement laboratory
 Calibration services department



NSC - TIS - TIS 17025
 CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. CL-002-66

Page 1 of 2 Pages

MEASUREMENT ITEM	Digital barometer
MANUFACTURER	Novalynx
MODEL/TYPE	310-WS 250P
SERIAL NUMBER	AS445
ID NUMBER	RTG_150436
CONDITION AS RECEIVED	Used item
CUSTOMER	ALS laboratory group (Thailand) Co., Ltd 104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang Bangkok 10250 Thailand

RECEIVED DATE	28 Dec 2022
MEASUREMENT DATE	05 Jan 2023
ISSUE DATE	09 Jan 2023

Calibration procedure
 The pressure calibration was done by In house calibration method as WI-CL-003 according to comparison method with Digital pressure calibrator based on DSK-R 6.1

Traceability:
 The measurement results are traceable to the international system of units (SI) through the NIST (National Metrology Institute) The units which comply with the requirements of ISO/IEC 17025:2017. ASIS/NSC 17040-1 via Certificate number: MP-0205-22

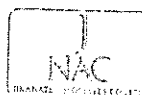
The reported uncertainty is based on a standard uncertainty multiplied by a coverage k=2, providing a level of confidence of approximately 95%.

CONDITION OF THIS RESULT OF CALIBRATION:

Instrument	Model	Serial No.	Certificate No.	Exp. Date
Absolute Pressure Transducer	CPG2500	4100126P	MP-0205-22	02 Dec 2023

1. Calibration effort for calibration sequence A
 2. The UUC¹ was installed in vertical orientation above reference standard instrument and center of UUC² was used as the reference level
 3. Calibration condition:
 4. Condition:
☒ Normal
☐ Abnormal
 Pressure transmitting medium: Air
 p_0 (20 °C, 1 bar): 1.19 kg/m³
 H_{ref} (155±15) %
 T_{ref} (23±3) °C
 p_{ref} (1013±10) mbar
 5. This certificate is valid only to the item calibrated on date and place of calibration

Calibrated by:
☒ Mr. Srisawat Thacharad
☒ Mrs. Jettaporn Jettacharad



Approved signatory
 Mr. Panyaporn Boonchuan
 Calibration Department Manager

THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

CERTIFICATE OF CALIBRATION

Calibration No. RH 01012023
Page 1 of 1 Pages

CERTIFICATE OF CALIBRATION

Certificate No. CL-002-66

Page 2 of 2 Pages

MEASUREMENT RESULTS

☒ Without adjustment ☐ With adjustment

CALIBRATION IN THE RANGE OF

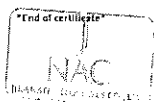
950 – 1050 mbar

The results of calibration and associated measurement uncertainties are reported in the table below

STD (mbar)	UUC* (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
950.17	950.9	0.7	0.94
970.13	970.6	0.5	0.64
990.08	990.4	0.3	0.53
1010.10	1010.3	0.2	0.42
1030.10	1030.1	0.0	0.37
1050.09	1049.9	-0.1	0.41

Note UUC* Unit Under Calibration

To convert the result in report unit to Pa, should be multiply by 100



Measurement Item: Relative humidity with data logger
Manufacturer: Novolyx
Model/Type: H10 WS 250L-D
Serial Number: A5445
ID No: RVG_F80456
Customer: A.S. laboratory group (Thailand) Co., Ltd.
104 Phothanakan 40, Phothanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand

Environmental Condition:

The measurement was carried out in an ambient temperature of (25±5)°C and relative humidity of (50±15)%

Measurement Method:

Unit Under Calibration (UUC) was calibrated by comparison method with standard thermal hygrometer in the humidity gasometer chamber to determine the errors.

Traceability:

This instrument was calibrated using standard equipment whose accuracy is traceable through National Institute of Standards and Technology to the International System of Units (SI) via MCS Calibration Inc. Certificate number 20314101. Cal date: Mar 14, 2023.

Measurement Date: Jan 05, 2023

Issued Date: Jan 09, 2023

Measurement Results:

The equipment was connected with H10 WS 250L-D and displayed UUC on display. Model: HMP60 S/N: R1131113

Calibration was performed in the range of 20%RH to 80%RH

The results of calibration are reported in the table below

Determined (%RH)	Standard Reading (%RH)	UUC Reading (%RH)	Error (%RH)	Uncertainty ±(%RH)
20	0.67	19.4	0.0	0.03
40	59.19	49.1	1.0	0.07
60	60.32	70.9	1.0	0.07

Performed by

☒ Mr. Sereeth Thachadon
☐ Mr. Chiraporn Kiatwongkiet



Approved Signatory

M. Panyas Boonchander
Calibration Department Manager

THIS CALIBRATION REPORT MAY NOT BE REPRODUCED OR EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

CERTIFICATE OF CALIBRATION

Certificate No. CL 001-66
Page 1 of 2

Equipment Name: Data Logger with Temperature

Sensor

Manufacturer: Novolyx

Model: H10 WS 250L-D

Serial No: A5445

ID No: RVG_F80456

Customer

Name: A.S. laboratory group (Thailand) Co., Ltd.

Address: 104 Phothanakan 40, Phothanakan Rd,

Khwaeng Suan Luang, Khet Suan Luang, Bangkok

10250 Thailand

Received date: 28 Dec 2022

Calibration date: 05 Jun 2023

Issue date: 09 Jun 2023

Reference Used During Calibration

1 Standard Temperature Probe Model: GTS-100 A590,

Serial No.: 667682-09, Due date: 23 Mar 2023

2 Digital Temperature Indicator Model: DTI 1000A Mk II

Serial No.: 671407 00591 Due date: 22 July 2023

Calibration Condition

Temperature: (25±3)°C

Relative Humidity: (55±15)%

Traceability

The measurement results are traceable to the international system of units (SI) through National Institute of Metrology (Thailand) (NIMT) Certificate number: TT 0934 22, Certificate number: ER 0089 22

Calibration Procedure

The temperature calibration was done by In House calibration method as WtCL 001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature span use was based on ITS 90

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20-40 °C

Function:

This equipment was connected with temperature sensor Model: HMP60 S/N: R1131113

Dimension: Diameter 12 mm, Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.061	20.0	0.1	0.099
60	25.067	25.0	-0.1	0.099
60	30.045	29.9	0.1	0.10
60	35.043	34.9	0.1	0.099
60	40.019	39.9	0.1	0.099

UUC* Unit Under Calibration:

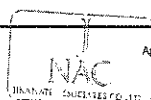
The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%

★ End of Certificate ★



Calibrated by

M. Sereeth Thachadon
Novolyx (Thailand) Co., Ltd.



Approved Signatory

M. Panyas Boonchander
Calibration Department Manager

Certificate Number
CL-016-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Cup anemometer
MANUFACTURER : Novalyra
MODEL/TYPE : Sensor WS-02T
Data logger 200-WS-25LB
SERIAL NUMBER : Sensor
Data logger AS369
ID NUMBER : RYG_150411
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE : 27 Jan 2023
MEASUREMENT DATE : 10 Feb 2023
ISSUE DATE : 10 Feb 2023

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

PLACE OF CALIBRATION : Eiffel type wind tunnel of Jirantee Associates Co., Ltd.

CALIBRATION CONDITIONS : Wind tunnel cross section area¹ : 900 cm²
Win direction frontal area² : 100 cm²
Diameter of mounting pipe³ : mm
Blockage ratio of test object⁴ : 0.111 [-]

Preconditioning : 24 hours at ambient conditions
Measurement Condition : The average values during measurement are (23.8) °C, (44.8) %RH and (1010.3) hPa

TABULATION OF RESULTS:
The table on next page give the measured values.

Calibration procedure:
The cup anemometer was calibrated against Standard air velocity transducer model B555-12 and pitot tube with precision differential pressure meter model DP23500 in an open test-section of Eiffel-type wind tunnel with 900-cm² cross test section area. The WI CL-007 based on IEC 61400-12 2. Wind energy generation systems - Part 12.2 Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.

Traceability:
This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NMAT (National Metrology Institute of Thailand) via Certificate Number: NMV 0052-21 and NMV 0066-22

Uncertainty of Measurement:
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2. Which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM Evaluation of measurement data: Guide to the expression of uncertainty in measurement

Calibrated by:
Mr. Sorawit Thachalad
Miss Jiraporn Jongsompol



Approved signatory: Mr. Parinya Booncharoen
Calibration Department Manager

Remark:
¹ Inside cross section area of the wind tunnel
² Projected cross section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio 1 to 1

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

Certificate Number
CL-016-66

Page 2 of 2 Pages

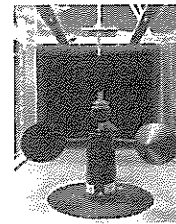
MEASUREMENT RESULTS¹

The cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below

V _{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V _{uuc} (m/s)	Error (m/s)	U (k=2) (m/s)
0.093	23.60	23.55	0.8	-0.2	0.15
2.038	23.50	23.55	1.8	-0.2	0.16
3.044	23.50	23.55	2.9	-0.2	0.18
4.147	23.58	23.55	3.9	-0.3	0.19
5.09	23.50	23.55	4.9	-0.1	0.18
5.98	23.61	23.55	5.9	-0.1	0.18
7.04	23.28	23.55	7.0	0.1	0.18
8.16	23.56	23.55	8.0	-0.3	0.19
9.10	23.26	23.55	9.0	-0.1	0.19
10.07	23.50	23.55	10.0	-0.1	0.19
11.13	23.10	23.55	11.0	-0.2	0.20
12.13	23.50	23.55	12.1	-0.1	0.20
13.21	23.12	23.55	13.1	-0.1	0.22
14.25	23.36	23.55	14.0	-0.2	0.27
15.24	23.10	23.55	15.1	-0.2	0.28
16.29	23.20	23.55	16.0	-0.3	0.24

Remark:
Calibration results only count for the tested circumstances and environmental conditions during which calibration took place
¹ Velocity of standard
² Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set up of the cup anemometer calibration in the wind tunnel of Jirantee Associates Co., Ltd. The cup anemometer shown may differ from the calibrated one. Remark: The position of the set-up is not true to scale due to imaging geometry



Certificate Number
CL-016-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Wind Direction Sensor
MANUFACTURER : Novalyra
MODEL/TYPE : Sensor WS-02T
Data logger 200-WS-25LB
SERIAL NUMBER : Sensor
Data logger AS369
ID NUMBER : RYG_150411
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE : 27 Jan 2023
MEASUREMENT DATE : 10 Feb 2023
ISSUE DATE : 10 Feb 2023

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

PLACE OF CALIBRATION : Eiffel type wind tunnel of Jirantee Associates Co., Ltd.

CALIBRATION CONDITION : Wind tunnel cross section area¹ : 900 cm²
Win direction frontal area² : 129 cm²
Diameter of mounting pipe³ : mm
Blockage ratio of test object⁴ : 0.143 [-]

Preconditioning : 24 hours at ambient conditions
Measurement Condition : The average values during measurement are (23.9) °C, (45.3) %RH and (1011.4) hPa

TABULATION OF RESULTS:
The table on next page give the measured values.

Calibration procedure:
The wind direction sensor was calibrated against Standard Rotary Encoder model AR4000TS-DK04-P1 510 in an open test-section of Eiffel-type wind tunnel with 900-cm² cross test section area. The WI CL-008 based on IEC 61400-12 2. Wind energy generation systems - Part 12.2 Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.

Traceability:
This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NMAT (National Metrology Institute of Thailand) via Certificate number: DA-0043-22

Uncertainty of Measurement:
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2. Which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM Evaluation of measurement data: Guide to the expression of uncertainty in measurement

Calibrated by:
Mr. Sorawit Thachalad
Miss Jiraporn Jongsompol



Approved signatory: Mr. Parinya Booncharoen
Calibration Department Manager

Remark:
¹ Inside cross section area of the wind tunnel
² Projected cross section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio 1 to 1

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

Certificate Number
CL-016-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° intervals in clockwise and counterclockwise directions after offset adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below

Air speed m/s	D ¹ _{ref} Degree (°)	D ² _{ref} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
	0.000	0	0	0.58
	45.000	41	-4	0.58
	90.000	87	-3	0.58
	135.000	135	0	0.58
5.00	180.000	182	2	0.74
	225.000	230	5	0.68
	270.001	275	5	0.58
	315.000	320	5	0.58

Remark:
Calibration on results only count for the tested circumstances and environmental conditions during which calibration took place
¹ Direction of standard
² Direction of Unit Under Calibration



CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Wind Direction Sensor
MANUFACTURER : Novallix
MODEL/TYPE : Sensor: WS-029
Data logger: 200-WS-250L
SERIAL NUMBER : Sensor :
Data logger: A4986
RNG: F30087
ID NUMBER :
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE : 16 Jan 2023
MEASUREMENT DATE : 19 Jan 2023
ISSUE DATE : 20 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

PLACE OF CALIBRATION : Effel type wind tunnel of Jiranatee Associates Co., Ltd

CALIBRATION CONDITION : Wind tunnel cross section area¹ : 900 cm²
Win direction frontal area² : 120 cm²
Diameter of mounting pipe : mm
Blockage ratio of test object³ : 0.143 [-]

Preconditioning : 24 hours at ambient conditions.

Measurement Condition : The average values during measurement are (23.5) °C, (47.4) %RH and (1015.6) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
[] Mr. Sorawit Thongphad
[] Miss Jiraporn Jitthapiphat

Approved signatory

Mr. Parinya Booncharoen
Calibration Department Manager

Remarks:
¹ Inside cross section area of the wind tunnel
² Projected cross section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio 1 to 1

Calibration procedure
The wind direction sensor was calibrated against Standard Rotary Encoder, model: AXR0275/2504 P3 S UD in an case of direction of 100° type wind sensor with 200 cm² legs in calibration area. The WI CL-003 based on IEC 61420-12.1 Wind energy generation systems - Part 12.1 Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.
Traceability
This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate Number: NM-0043-22

Uncertainty of Measurement:
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM Evaluation of measurement data - Guide to the expression of uncertainty in measurement⁴

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM : Cup anemometer
MANUFACTURER : Novallix
MODEL/TYPE : Sensor: WS-001
Data logger: 200-WS-250L
SERIAL NUMBER : Sensor :
Data logger: A4986
RNG: F30087
ID NUMBER :
CONDITION AS-RECEIVED : Used item
CUSTOMER : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd, Khwaeng Suan Luang,
Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE : 16 Jan 2023
MEASUREMENT DATE : 19 Jan 2023
ISSUE DATE : 20 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

PLACE OF CALIBRATION : Effel type wind tunnel of Jiranatee Associates Co., Ltd

CALIBRATION CONDITIONS : Wind tunnel cross section area¹ : 900 cm²
Win direction frontal area² : 100 cm²
Diameter of mounting pipe : mm
Blockage ratio of test object³ : 0.111 [-]

Preconditioning : 24 hours at ambient conditions.

Measurement Condition : The average values during measurement are (23.6) °C, (55.3) %RH and (1013.5) hPa

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:
[] Mr. Sorawit Thongphad
[] Miss Jiraporn Jitthapiphat

Approved signatory

Mr. Parinya Booncharoen
Calibration Department Manager

Remarks:
¹ Inside cross section area of the wind tunnel
² Projected cross section area of the tested object include mounting pipe
³ Diameter of mounting pipe
⁴ Ratio 1 to 1

Calibration procedure
The cup anemometer was calibrated against Standard air velocity transducer model: 0-05532 and pitot tube with precision differential pressure meter model: DP40550 in calibration area of Effel-type wind tunnel with 900 cm² cross test section area. The WI CL-002 based on IEC 61420-12.1 Wind energy generation systems - Part 12.1 Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.
Traceability
This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate Number: NM-0052-23 and NM-0066-22

Uncertainty of Measurement:
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM Evaluation of measurement data - Guide to the expression of uncertainty in measurement⁴

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

Page 2 of 2 Pages

MEASUREMENT RESULTS⁴

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° intervals in clockwise and counterclockwise directions after offset adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed m/s	D _{ref} Degree (°)	D _{meas} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
0.000	0	0	0	0.58
45.000	43	43	-2	0.74
90.000	88	88	-2	0.74
135.000	133	133	2	0.74
180.000	179	179	1	0.74
225.000	225	225	0	0.68
270.000	273	273	3	0.58
315.000	319	319	4	0.74

Remarks:

¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place

² Direction of standard

Direction of Unit Under Calibration

End of Certificate of Calibration

Page 2 of 2 Pages

MEASUREMENT RESULTS⁴

The cup anemometer Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

v _{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	v _{meas} (m/s)	Error (m/s)	U (k=2) (m/s)
0.095	23.68	23.60	0.8	-0.2	0.15
2.033	23.54	23.60	1.8	-0.2	0.16
3.046	23.68	23.60	2.9	-0.1	0.19
4.136	23.66	23.60	3.9	0.2	0.20
5.03	23.50	23.60	4.9	-0.1	0.20
5.98	23.50	23.60	5.9	0.1	0.18
7.05	23.36	23.80	7.0	-0.1	0.18
8.18	23.54	23.60	8.0	0.2	0.20
9.10	23.30	23.60	8.9	-0.2	0.20
10.10	23.50	23.60	10.0	-0.1	0.19
11.14	23.28	23.60	11.1	-0.1	0.22
12.12	23.40	23.60	11.9	-0.2	0.21
13.19	23.10	23.60	13.0	-0.2	0.26
14.25	23.46	23.60	14.0	-0.2	0.32
15.26	23.10	23.60	15.0	-0.2	0.23
16.31	23.26	23.60	16.2	-0.1	0.29

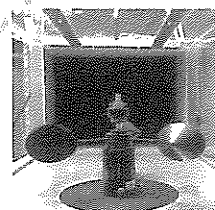
Remarks:

¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place

² Velocity of standard

³ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the cup anemometer calibration in the wind tunnel of Jiranatee Associates Co., Ltd. The cup anemometer shown may differ from the calibrated one. Remark: The position of the set-up is not true to scale due to imaging geometry.

End of Certificate of Calibration

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: RYG_EN0136
Organization Name: ALS Laboratory Group (Thailand) Co Ltd.
Organization Location: 616/10 Moo 5, Tambol Mae Nam Koo, A.Pluksaeng, Rayong, 21140, Thailand

Date: July 7, 2022 11:27:53 AM
EQP Name: Agilent/Recommended, Agilent/Recommended
EQP Revision: GC.02.52, GCMS.02.52
Overall Qualification Status: Pass

REVIEW BY: N. Bunnit
APPROVED BY: [Signature]
NEXT CAL. DATE: 09/01/24

CDS Logon Verification - GC

Logon: de.changchon

Overall CDS Logon Verification - GC Test Status

Pass

System Inspection and Basic Safety and Operation

Name: 7890
Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Front SSL
Setpoint Status: Pass
Inlet Pressure: Setpoint 25.0 psi, Actual 25.1 psi
Accuracy: 0.1 psi
Agilent Recommended: ≤ 1.2

Date: July 7, 2022 11:27:53 AM
System ID: RYG_EN0136

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Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890
Setpoint Status: Pass
Zone: Oven
Setpoint/Actual: 230.0, 230.6 °C
Accuracy: 0.6 °C
Agilent Recommended: ≥ -1.0 % setpoint in K, ≤ 1.0 % setpoint in K
(-5.0 °C), (5.0 °C)

Setpoint Status: Pass
Zone: Oven
Setpoint/Actual: 100.0, 99.9 °C
Accuracy: -0.1 °C
Agilent Recommended: ≥ -1.0 % setpoint in K, ≤ 1.0 % setpoint in K
(-3.7 °C), (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890
Setpoint Status: Pass
Setpoint/Average: 100.0, 99.91667 °C
Temperature: 100.0 °C
Stability: 0.1 °C
Agilent Recommended: ≤ 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Date: July 7, 2022 11:27:53 AM
System ID: RYG_EN0136

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Log Amp

Tested Combination1: Front SSL / External SQ
Name: 5977B
Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RPPA

Tested Combination1: Front SSL / External SQ
Name: 5977B
Setpoint Status: Pass
Amu: 1050 mV, Drift After Five Minutes: -1 mV, RPPA Voltage: 479 mV
Agilent Recommended: ≥ -100 and ≤ 100 , ≤ 1100

Overall RPPA Test Status

Pass

Tune EI

Tested Combination1: Front SSL / External SQ
Name: 5977B
Setpoint Status: Pass
Filament: 1
Setpoint Status: Pass
Filament: 2

Overall Tune EI Test Status

Pass

Signal to Noise EI

Date: July 7, 2022 11:27:53 AM
System ID: RYG_EN0136

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Tested Combination1: Front SSL / External SQ
Name: 5977B
Source: EI - Extractor, Filament: 1
Setpoint Status: Pass
Signal to Noise: 7485
Agilent Recommended: ≥ 1200
Source: EI - Extractor, Filament: 2
Setpoint Status: Pass
Signal to Noise: 2097
Agilent Recommended: ≥ 1200

This test's 2 comment(s) and 7 deviation(s) are available in the Attachments section.

Overall Signal to Noise EI Test Status

Pass

Date: July 7, 2022 11:27:53 AM
System ID: RYG_EN0136

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Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	RYG_EN0135
Manufacturer	Agilent Technologies
Name	7850
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

Injection Technique	Manual Injection
Inlet	Front
Detector	External
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	7893
Model Number	G3442B
Serial Number	CN16453238
Firmware Revision	B.02.04.3
Component ID/Asset No.	081117000236
Oven Type	Standard

Date: July 7, 2022 11:27:53 AM
System ID: RYG_EN0136

Intel 3

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5977B
Serial Number	US1701M008
Firmware Revision	5977 5.00.34
High Vacuum System	Torbo Pump
Scouting Run Standard	OFN Std
Component ID/Asset No.	081117000236

MS-EI Source 1

Manufacturer	Agilent Technologies
Source Type	E1 - Extractor
Number of filaments	2

Date: July 7, 2022 11:27:53 AM
System ID: RYG_EN0136

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer:	Eaknarin Puangsopa
Logged On User Name:	eaknarin_puangsoa@agilent.com
Signature Creation Date:	July 7, 2022
Reason for Signature:	Executed protocol and published this original version of document

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Date: July 7, 2022 11:27:53 AM
System ID: RYG_EN0130

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 8, 2022 1:11:04 PM	Audit	SessionCreated	Session	None
July 8, 2022 1:11:54 PM	Start	Configuration	Session	None
July 8, 2022 1:11:54 PM	Audit	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
July 8, 2022 1:17:10 PM	Audit	Exploited	Session	<p>EOP details for primary technique [Gcj] -</p> <p>File path: [Photoshop/Adobe/Configuration/02.52/Gcjh.02.52.esq].</p> <p>EOP File Name: [Gcjh.02.52.esq]. EOP Name: [Agent/Recommended]</p> <p>EOP details for hyperthread technique [Gdth] -</p> <p>File path: [Photoshop/Adobe/Configuration/02.53/Gdth.02.53.esq].</p> <p>EOP File Name: [Gdth.02.53.esq]. EOP Name: [Agent/Recommended]</p>
July 6, 2022 1:17:25 PM	End	Configuration	Session	None
July 6, 2022 1:17:29 PM	Start	Qualification	Session	QQ
July 6, 2022 1:17:20 PM	Start	Execution	CDS Logon Verification - GC :	None
			- Qualitative test	
July 6, 2022 1:19:43 PM	End	Execution	CDS Logon Verification - GC :	Run Count : 1
			- Qualitative test	
July 6, 2022 1:19:40 PM	Start	Execution	System Inspection and Basic Safety and Operation - 782C - Qualitative Test - No response associated	None

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Date: July 7, 2022 11:27:53 AM
System ID: RYG-EN0136

User Name: sakharin_puangsope
 Hostname: ASRYGW7002
 System ID: RYG_EN0136
 Print Date: July 7, 2022 11:27:58 AM

ALS_RYG_EN0136 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 1:19:58 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	Run Count: 1
July 6, 2022 1:20:15 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
July 6, 2022 1:21:43 PM	End	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count: 1
July 6, 2022 1:21:45 PM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
July 6, 2022 1:23:12 PM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
July 6, 2022 1:25:15 PM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count: 1
July 6, 2022 1:25:17 PM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
July 6, 2022 1:25:32 PM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
July 6, 2022 1:31:35 PM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

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Date: July 7, 2022 11:27:53 AM
 System ID: RYG_EN0136

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User Name: sakharin_puangsope
 Hostname: ASRYGW7002
 System ID: RYG_EN0136
 Print Date: July 7, 2022 11:27:58 AM

ALS_RYG_EN0136 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 1:32:43 PM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count: 1
July 6, 2022 1:33:45 PM	Start	Execution	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
July 6, 2022 1:33:05 PM	Audit	Data	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
July 6, 2022 1:33:07 PM	End	Execution	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count: 1
July 6, 2022 1:33:11 PM	Start	Execution	Log Amp - 5977B SQ - Source: None EI - Extractor	None
July 6, 2022 1:37:10 PM	End	Execution	Log Amp - 5977B SQ - Source: None EI - Extractor	Run Count: 1
July 6, 2022 1:57:24 PM	Start	Execution	RIPA - 5977B SQ - Source: EI - Extractor	None
July 6, 2022 2:09:24 PM	End	Execution	RIPA - 5977B SQ - Source: EI - Extractor	Run Count: 1
July 6, 2022 2:09:28 PM	Start	Execution	Tune EI - 5977B SQ - Source: None EI - Extractor Filament 1 (Qualitative - No setpoints associated)	None
July 6, 2022 2:24:46 PM	End	Qualification	Session	OQ
July 6, 2022 2:24:48 PM	Start	Reporting	Session	None
July 6, 2022 2:41:59 PM	End	Reporting	Session	None
July 6, 2022 2:41:59 PM	Start	Configuration	Session	None
July 6, 2022 2:41:40 PM	End	Configuration	Session	None

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Date: July 7, 2022 11:27:53 AM
 System ID: RYG_EN0136

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User Name: sakharin_puangsope
 Hostname: ASRYGW7002
 System ID: RYG_EN0136
 Print Date: July 7, 2022 11:27:58 AM

ALS_RYG_EN0136 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 2:41:40 PM	Start	Qualification	Session	OQ
July 6, 2022 2:41:49 PM	Start	Execution	Tune EI - 5977B SQ - Source: None EI - Extractor Filament 1 (Qualitative - No setpoints associated)	None
July 6, 2022 2:41:56 PM	End	Execution	Tune EI - 5977B SQ - Source: None EI - Extractor Filament 1 (Qualitative - No setpoints associated)	Run Count: 1
July 6, 2022 2:41:58 PM	Start	Execution	Tune EI - 5977B SQ - Source: None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	None
July 6, 2022 2:42:48 PM	End	Qualification	Session	OQ
July 6, 2022 2:42:48 PM	Start	Reporting	Session	None
July 6, 2022 2:50:52 PM	End	Reporting	Session	None
July 6, 2022 2:50:52 PM	Start	Qualification	Session	OQ
July 6, 2022 2:50:52 PM	Start	Execution	Tune EI - 5977B SQ - Source: None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	None
July 6, 2022 2:51:12 PM	End	Qualification	Session	OQ
July 6, 2022 2:51:12 PM	Start	Reporting	Session	None
July 6, 2022 2:55:29 PM	End	Reporting	Session	None
July 6, 2022 2:55:29 PM	Start	Qualification	Session	OQ
July 6, 2022 2:55:29 PM	Start	Execution	Tune EI - 5977B SQ - Source: None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	None

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Date: July 7, 2022 11:27:53 AM
 System ID: RYG_EN0136

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User Name: sakharin_puangsope
 Hostname: ASRYGW7002
 System ID: RYG_EN0136
 Print Date: July 7, 2022 11:27:58 AM

ALS_RYG_EN0136 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 6, 2022 2:55:45 PM	End	Execution	Tune EI - 5977B SQ - Source: None EI - Extractor Filament 2 (Qualitative - No setpoints associated)	Run Count: 1
July 6, 2022 2:56:45 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 6, 2022 3:21:52 PM	End	Qualification	Session	OQ
July 6, 2022 3:21:52 PM	Start	Reporting	Session	None
July 6, 2022 3:25:04 PM	End	Reporting	Session	None
July 6, 2022 3:25:04 PM	Start	Qualification	Session	OQ
July 6, 2022 3:25:04 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 6, 2022 4:06:40 PM	Audit	AccClosed	Session	None
July 7, 2022 9:13:47 AM	Audit	AccRestarted	Session	None
July 7, 2022 9:13:49 AM	Audit	SessionRetarded	Session	None
July 7, 2022 9:13:54 AM	Start	Qualification	Session	OQ
July 7, 2022 9:13:54 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	None
July 7, 2022 9:28:04 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	Data File Path: D:\NO2022\QFN_EN_F01.D

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Date: July 7, 2022 11:27:53 AM
 System ID: RYG_EN0136

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User Name: sakharin_puangapa System ID: RYG_EN0136
 Hostname: ASRYGW7002 Print Date: July 7, 2022 11:27:55 AM

ALS_RYG_EN0136 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 9:59:53 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Run Count: 1
July 7, 2022 10:01:48 AM	Audit	Test/Unlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Deviation filed for Run Count 1
July 7, 2022 10:01:48 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	None
July 7, 2022 10:02:00 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Data File Path: D:\Q0222\QFN_SH_F01.D
July 7, 2022 10:04:55 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Run Count: 2
July 7, 2022 10:07:30 AM	Audit	Test/Unlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Deviation filed for Run Count 2
July 7, 2022 10:07:30 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	None
July 7, 2022 10:07:44 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Data File Path: D:\Q0222\QFN_SH_F01.D

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Date: July 7, 2022 11:27:55 AM
 System ID: RYG_EN0136

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User Name: sakharin_puangapa System ID: RYG_EN0136
 Hostname: ASRYGW7002 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 10:09:18 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Run Count: 3
July 7, 2022 10:10:28 AM	Audit	Test/Unlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Deviation filed for Run Count 3
July 7, 2022 10:10:28 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	None
July 7, 2022 10:10:55 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Data File Path: D:\Q0222\QFN_SH_F01.D
July 7, 2022 10:14:03 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Run Count: 4
July 7, 2022 10:14:54 AM	Audit	Test/Unlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Deviation filed for Run Count 4
July 7, 2022 10:14:54 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	None
July 7, 2022 10:15:15 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Data File Path: D:\Q0222\QFN_SH_F01.D

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Date: July 7, 2022 11:27:55 AM
 System ID: RYG_EN0136

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User Name: sakharin_puangapa System ID: RYG_EN0136
 Hostname: ASRYGW7002 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 10:15:27 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Run Count: 5
July 7, 2022 10:16:49 AM	Audit	Test/Unlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Deviation filed for Run Count 5
July 7, 2022 10:16:49 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	None
July 7, 2022 10:17:05 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Data File Path: D:\Q0222\QFN_SH_F01.D
July 7, 2022 10:17:14 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Run Count: 6
July 7, 2022 10:16:49 AM	End	Qualification	Session	OQ
July 7, 2022 10:18:49 AM	Start	Reporting	Session	None
July 7, 2022 10:21:10 AM	End	Reporting	Session	None
July 7, 2022 10:21:10 AM	Start	Qualification	Session	OQ
July 7, 2022 10:21:17 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	None
July 7, 2022 10:26:49 AM	End	Qualification	Session	OQ
July 7, 2022 10:28:49 AM	Start	Reporting	Session	None
July 7, 2022 10:27:28 AM	End	Reporting	Session	None

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Date: July 7, 2022 11:27:55 AM
 System ID: RYG_EN0136

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User Name: sakharin_puangapa System ID: RYG_EN0136
 Hostname: ASRYGW7002 Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0136 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 10:27:38 AM	Start	Qualification	Session	OQ
July 7, 2022 10:27:38 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	None
July 7, 2022 11:00:50 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: D:\Q0222\QFN_SH_F01.D
July 7, 2022 11:11:47 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	None
July 7, 2022 11:13:13 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Run Count: 1
July 7, 2022 11:14:29 AM	Audit	Test/Unlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 3 - L >= 1200	Deviation filed for Run Count 1
July 7, 2022 11:14:29 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 3 - L >= 1200	None
July 7, 2022 11:14:47 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 3 - L >= 1200	Data File Path: D:\Q0222\QFN_SH_F01.D
July 7, 2022 11:18:34 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 3 - L >= 1200	Run Count: 2

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Date: July 7, 2022 11:27:55 AM
 System ID: RYG_EN0136

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ROTA METER CALIBRATION RESULT JANUARY 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	03 Jan 23	$Y = 1.0259x - 0.6354$	0.9997
BKK_FS0579	05 Jan 23	$Y = 1.0005x + 0.2803$	1.0000
BKK_FS0583	05 Jan 23	$Y = 0.9976x + 1.2146$	1.0000
BKK_FS0584	03 Jan 23	$Y = 1.0104x - 0.3929$	1.0000
BKK_FS0586	05 Jan 23	$Y = 1.001x - 1.3619$	0.9999
BKK_FS0587	03 Jan 23	$Y = 1.0038x + 0.881$	1.0000
BKK_FS0588	05 Jan 23	$Y = 1.0015x - 0.6876$	0.9999
BKK_FS0590	05 Jan 23	$Y = 0.9958x + 1.7452$	1.0000
BKK_FS0591	03 Jan 23	$Y = 0.9677x + 64.54$	0.9951
BKK_FS0593	03 Jan 23	$Y = 0.9702x + 21.393$	0.9972
BKK_FS0594	03 Jan 23	$Y = 1.0455x - 43.344$	0.9976
BKK_FS0595	05 Jan 23	$Y = 0.9993x + 1.16$	1.0000
BKK_FS0597	05 Jan 23	$Y = 0.9788x + 22.286$	0.9971
BKK_FS1004	03 Jan 23	$Y = 0.9943x + 7.1619$	0.9996
BKK_FS1005	03 Jan 23	$Y = 1.0045x + 2.1167$	0.9998
BKK_FS1006	03 Jan 23	$Y = 1.0286x - 0.3852$	0.9999
BKK_FS1008	03 Jan 23	$Y = 1.0181x + 0.1282$	0.9998
BKK_FS1009	05 Jan 23	$Y = 1.0018x + 1.1293$	1.0000
BKK_FS1011	03 Jan 23	$Y = 1.0463x - 1.9344$	0.9985
BKK_FS1012	03 Jan 23	$Y = 1.0082x - 53.425$	0.9999
BKK_FS1013	03 Jan 23	$Y = 1.0058x - 9.701$	1.0000
BKK_FS1014	05 Jan 23	$Y = 0.9869x + 1.2643$	0.9995
BKK_FS1015	05 Jan 23	$Y = 1.004x - 0.7571$	0.9999
BKK_FS1016	05 Jan 23	$Y = 0.978x + 24.623$	0.9973
BKK_FS1017	17 Jan 23	$Y = 1.0022x + 0.4211$	1.0000
BKK_FS1018	17 Jan 23	$Y = 0.9893x + 5.8317$	1.0000
BKK_FS1019	17 Jan 23	$Y = 0.9859x - 11.574$	0.9996
BKK_FS1020	03 Jan 23	$Y = 1.0208x - 0.6221$	0.9998
BKK_FS1021	03 Jan 23	$Y = 0.902x - 44.509$	0.9997
BKK_FS1022	03 Jan 23	$Y = 1.0067x - 12.483$	0.9999
BKK_FS1023	03 Jan 23	$Y = 1.0013x + 0.5823$	0.9993
BKK_FS1024	03 Jan 23	$Y = 1.0036x - 50.787$	0.9999
BKK_FS1025	03 Jan 23	$Y = 0.974x + 27.034$	0.9999
BKK_FS1026	05 Jan 23	$Y = 0.9783x + 1.7075$	0.9991
BKK_FS1027	05 Jan 23	$Y = 1.145x - 90.325$	0.9797
BKK_FS1028	05 Jan 23	$Y = 0.9815x + 13.626$	0.9996
BKK_FS1029	03 Jan 23	$Y = 0.9706x + 3.6283$	0.9951
BKK_FS1030	03 Jan 23	$Y = 1.0197x - 52.982$	0.9999

User Name: kshanku_punagappa

System ID: RYG_EN0135

Host Name: ASRYG0702

Print Date: July 7, 2022 11:27:56 AM

ALS_RYG_EN0135 Transaction Log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
July 7, 2022 11:19:56 AM	Audit	Test Unlocked	Signal to Noise EI - Liquid Injection, Front SGL, SGL - Source: EI - Extractor using Filament 2 - L1 == 1200	Deviation filed for Run Count : 2
July 7, 2022 11:19:56 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SGL, SGL - Source: EI - Extractor using Filament 2 - L1 == 1200	None
July 7, 2022 11:20:13 AM	Audit	Done	Signal to Noise EI - Liquid Injection, Front SGL, SGL - Source: EI - Extractor using Filament 2 - L1 == 1200	Data Res Path : D:\002522\OPN_SH_F021.D
July 7, 2022 11:21:52 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SGL, SGL - Source: EI - Extractor using Filament 2 - L1 == 1200	Run Count: 3
July 7, 2022 11:22:49 AM	End	Qualification	Session	00
July 7, 2022 11:22:49 AM	Start	Reporting	Session	None
July 7, 2022 11:26:46 AM	Audit	Reporting	Session	Report Generated : Certificate

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Date: July 7, 2022 11:27:53 AM
System ID: RYG_EN0135

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ROTA METER CALIBRATION RESULT JANUARY 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS1031	03 Jan 23	$Y = 0.9995x - 0.1581$	1.0000
BKK_FS1039	03 Jan 23	$Y = 1.0242x - 4.3007$	0.9986
BKK_FS1040	03 Jan 23	$Y = 1.0035x + 1.0705$	0.9998
BKK_FS1041	03 Jan 23	$Y = 0.9791x + 0.252$	1.0000
BKK_FS1042	03 Jan 23	$Y = 1.0186x - 3.7429$	0.9999
BKK_FS1043	03 Jan 23	$Y = 1.0038x + 2.961$	0.9999
BKK_FS1044	03 Jan 23	$Y = 1.0189x + 0.2969$	1.0000
BKK_FS1163	18 Jan 23	$Y = 1.0127x + 0.8332$	0.9996
BKK_FS1164	18 Jan 23	$Y = 1.2176x + 4.7376$	0.9952
BKK_FS1165	18 Jan 23	$Y = 1.0005x - 47.04$	1.0000
BKK_FS1166	18 Jan 23	$Y = 1.0346x - 35.841$	0.9996
BKK_FS1200	03 Jan 23	$Y = 1.0168x + 0.4034$	0.9997
BKK_FS1201	03 Jan 23	$Y = 0.7655x + 60.985$	0.9986
BKK_FS1202	03 Jan 23	$Y = 0.9593x + 87.615$	0.9958
RYG_FS0197	03 Jan 23	$Y = 1.0305x - 64.849$	0.9991
RYG_FS0198	03 Jan 23	$Y = 1.0103x + 10.254$	0.9999
RYG_FS0199	03 Jan 23	$Y = 0.9897x + 0.098$	0.9983

Review By :

Wichan Choonharat
(Mr. Wichan Choonharat)
Enviro Field Services Manager

Approved By :

(Mr. Sarayuth Jitranon)
(Mr. Sarayuth Jitranon)
Assistant General Manager



ROTA METER CALIBRATION RESULT APRIL 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS0577	03 Apr 23	$Y = 1.0246x - 1.844$	0.9992
BKK_FS0579	03 Apr 23	$Y = 1.0313x - 0.8177$	0.9999
BKK_FS0583	03 Apr 23	$Y = 1.0023x - 0.0969$	0.9995
BKK_FS0584	03 Apr 23	$Y = 1.0025x + 2.25$	0.9999
BKK_FS0585	03 Apr 23	$Y = 0.9881x + 5.4452$	0.9993
BKK_FS0586	03 Apr 23	$Y = 0.9915x + 4.7452$	1.0000
BKK_FS0588	03 Apr 23	$Y = 1.0067x + 0.6738$	0.9998
BKK_FS0589	03 Apr 23	$Y = 0.9823x + 0.3286$	0.9936
BKK_FS0590	03 Apr 23	$Y = 0.9961x + 2.8785$	0.9999
BKK_FS0591	03 Apr 23	$Y = 0.9985x + 4.579$	1.0000
BKK_FS0592	03 Apr 23	$Y = 0.9975x + 3.6419$	1.0000
BKK_FS0593	03 Apr 23	$Y = 0.9966x + 16.005$	1.0000
BKK_FS0595	03 Apr 23	$Y = 0.9957x + 5.1368$	0.9999
BKK_FS0596	03 Apr 23	$Y = 1.017x - 14.044$	0.9967
BKK_FS0597	03 Apr 23	$Y = 1.0063x - 10.787$	1.0000
BKK_FS1004	01 Apr 23	$Y = 0.9943x + 7.1533$	0.9996
BKK_FS1005	01 Apr 23	$Y = 1.0035x + 3.1167$	0.9998
BKK_FS1006	01 Apr 23	$Y = 1.0273x - 0.4022$	0.9999
BKK_FS1007	03 Apr 23	$Y = 1.0452x - 1.5374$	0.9998
BKK_FS1009	03 Apr 23	$Y = 1.0351x - 1.3224$	0.9999
BKK_FS1010	03 Apr 23	$Y = 1.0108x - 0.0888$	1.0000
BKK_FS1011	03 Apr 23	$Y = 1.2046x - 6.6325$	0.9861
BKK_FS1012	03 Apr 23	$Y = 1.0976x - 27.969$	0.9996
BKK_FS1013	03 Apr 23	$Y = 1.0821x - 200.52$	0.9998
BKK_FS1017	03 Apr 23	$Y = 1.0333x + 7.0584$	0.9694
BKK_FS1018	03 Apr 23	$Y = 0.9551x - 18.832$	0.9997
BKK_FS1019	03 Apr 23	$Y = 1.0649x - 156.67$	0.9976
BKK_FS1020	03 Apr 23	$Y = 0.9911x + 0.0364$	0.9994
BKK_FS1021	03 Apr 23	$Y = 0.979x + 8.2333$	0.9992
BKK_FS1022	03 Apr 23	$Y = 0.9968x - 2.4905$	0.9997
BKK_FS1023	03 Apr 23	$Y = 1.0245x - 1.3878$	0.9996
BKK_FS1024	03 Apr 23	$Y = 0.7414x + 47.3$	0.9923
BKK_FS1025	03 Apr 23	$Y = 0.9997x + 5.4438$	1.0000
BKK_FS1026	03 Apr 23	$Y = 1.0172x - 0.9531$	1.0000
BKK_FS1027	03 Apr 23	$Y = 0.7331x + 49.317$	0.9921
BKK_FS1028	03 Apr 23	$Y = 0.9995x + 0.2124$	1.0000
BKK_FS1039	01 Apr 23	$Y = 1.025x - 3.795$	0.9994
BKK_FS1040	01 Apr 23	$Y = 1.0035x - 2.4285$	0.9998

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ALS Laboratory Group



ROTA METER CALIBRATION RESULT APRIL 2023

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R ²)
BKK_FS1041	01 Apr 23	$Y = 1.0320x - 0.6769$	0.9999
BKK_FS1042	01 Apr 23	$Y = 1.0144x + 1.94$	0.9997
BKK_FS1043	01 Apr 23	$Y = 1.0039x + 1.539$	0.9999
BKK_FS1044	01 Apr 23	$Y = 1.0273x - 1.6022$	0.9998
BKK_FS1164	03 Apr 23	$Y = 0.9913x + 0.8537$	0.9997
BKK_FS1165	03 Apr 23	$Y = 1.0005x + 2.0857$	1.0000
BKK_FS1166	03 Apr 23	$Y = 1.0842x - 169.6$	0.9987
BKK_FS1200	03 Apr 23	$Y = 0.9452x + 5.2959$	0.9981
BKK_FS1201	03 Apr 23	$Y = 1.0045x - 1.8786$	1.0000
BKK_FS1202	03 Apr 23	$Y = 0.9768x + 26.572$	0.9873
RYG_FS0187	01 Apr 23	$Y = 1.0042x + 15.442$	0.9999
RYG_FS0198	01 Apr 23	$Y = 1.0081x - 13.26$	0.9999
RYG_FS0199	01 Apr 23	$Y = 1.0255x - 1.2964$	0.9999

Review By :

(Mr. Wichan Choonharat)
Enviro Field Services Manager

Approved By :

(Mr. Sarayuth Jittranoi)
Assistant General Manager

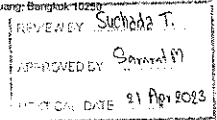
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Agilent CrossLab Compliance Services

Certificate of System Qualification

GC-CO

System ID: GC-6
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd
Organization Location: 104 Phatthanakan 40, Phatthanakan Rd., Suan Luang, Bangkok 10250
Date: October 21, 2021 10:05:40 AM
EQP Name: AgilentRecommended
EQP Revision: GC-02.50
Overall Qualification Status: Pass



System Inspection and Basic Safety and Operation

Name: 7890
Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 7890
Front: SSL
Setpoint Status: Pass
Pressure: 25.0 psi
Pressure Change: 0.0 psi /5 minutes
Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Front: SSL

Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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ALS Laboratory Group

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Agilent CrossLab Compliance Services

Setpoint Status: Pass
Setpoint: 25.0 psi
Actual: 24.9 psi
Accuracy: 0.1 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Decay

Name: 7890
Back: SSL
Setpoint Status: Pass
Pressure: 25.0 psi
Pressure Change: 0.0 psi /5 minutes
Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Back: SSL
Setpoint Status: Pass
Setpoint: 25.0 psi
Actual: 24.9 psi
Accuracy: 0.1 psi
Agilent Recommended: ≤ 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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Name: 7890
Front: FID
Setpoint Status: Pass
Flow Type: Fuel
Setpoint: 30.0 mL/min
Measured Flow: 30.5 mL/min
Accuracy: 0.5 mL/min
Agilent Recommended: ≤ 10.0 % setpoint (3.0 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest

Setpoint Status: Pass
Flow Type: Oxidizer
Setpoint: 400.0 mL/min
Measured Flow: 394.0 mL/min
Accuracy: 6.0 mL/min
Agilent Recommended: ≤ 10.0 % setpoint (40.0 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest

Setpoint Status: Pass
Flow Type: Makeup
Setpoint: 25.0 mL/min
Measured Flow: 24.2 mL/min
Accuracy: 0.8 mL/min
Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)
Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest

Overall Detector Flow Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Back: FID

Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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Setpoint Status: Pass

Flow Type: Fuel

Setpoint: 30.0 mL/min Measured Flow: 29.1 mL/min

Accuracy: 0.9 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (3.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest

Setpoint Status: Pass

Flow Type: Oxidizer

Setpoint: 400.0 mL/min Measured Flow: 397.3 mL/min

Accuracy: 2.7 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (40.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest

Setpoint Status: Pass

Flow Type: Makeup

Setpoint: 25.0 mL/min Measured Flow: 24.4 mL/min

Accuracy: 0.6 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest

Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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Setpoint Status: Pass

Zone: Oven

Setpoint/Actual: 230.0 / 231.5 °C

Temperature: 230.0 231.5 °C

Accuracy: 1.5 °C

Agilent Recommended: ≥ -1.0 % setpoint in K (-5.0 °C)

≤ 1.0 % setpoint in K (5.0 °C)

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual: 100.0 / 100.5 °C

Temperature: 100.0 100.5 °C

Accuracy: 0.5 °C

Agilent Recommended: ≥ -1.0 % setpoint in K (-3.7 °C)

≤ 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average: 100.0 / 100.4667 °C

Temperature: 100.0 100.4667 °C

Stability: 0.1 °C

Agilent Recommended: ≤ 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Scouting Run

Tested Combination1: Front SSL / Front FID

Injection Tower

Name: 7693A

Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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Setpoint Status: Completed

Injection Volume on Column: 1.0 µL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination1: Front SSL / Front FID

Name: 7890

Setpoint Status: Pass

Base Signal: 12.7 pA

ASTM Noise: 0.06 pA

Drift: 0.10 pA/hr

Agilent Recommended: ≤ 0.10 ≤ 2.50

Status: Pass Pass

Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination1: Front SSL / Front FID

Name: 7693A

Setpoint Status: Pass

Injection Volume on Column: 1.0 µL

Area RSD: 0.42 %

Retention Time RSD: 0.16 %

Agilent Recommended: ≤ 3.00 ≤ 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Date: October 21, 2021 10:05:40 AM
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Tested Combination1: Front SSL / Front FID

Injection Tower

Name: 7890

Setpoint Status: Pass

Signal to Noise: 1174861

Agilent Recommended: ≥ 300000

Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2: Back SSL / Back FID

Injection Tower

Name: 7693A

Setpoint Status: Completed

Injection Volume on Column: 1.0 µL

Overall Scouting Run Status

Completed

Noise and Drift

Tested Combination2: Back SSL / Back FID

Name: 7890

Setpoint Status: Pass

Base Signal: 10.4 pA

ASTM Noise: 0.05 pA

Drift: 0.00 pA/hr

Agilent Recommended: ≤ 0.10 ≤ 2.50

Status: Pass Pass

Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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Overall Noise and Drift Test Status

Pass

Injection Precision

Tested Combination2	Back	SSL	/ Back	FID
Name:	7693A			
Setpoint Status:	Pass			
Injection Volume on Column:	1.0	µL		
Area RSD:	1.16	%	Retention Time RSD	0.12 %
Agilent Recommended:	<= 3.00		<= 1.00	

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination2	Back	SSL	/ Back	FID
	Injection Tower			
Name:	7690			
Setpoint Status:	Pass			
Signal to Noise:	805466			
Agilent Recommended:	>= 300000			

Overall Signal to Noise Test Status

Pass

Date: October 21 2021 10:05:40 AM
System ID: GC-6

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Instrument Details

Purpose

This section describes the as found system configuration

Details

System	
System ID	GC-6
Manufacturer	Agilent Technologies
Name	7690
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging
Tested Combination1	
Injection Technique	Injection Tower
Sampler Identifier	Sampler 2
Inlet	Front
Detector	Front
LTM Included?	No
Tested Combination2	
Injection Technique	Injection Tower
Sampler Identifier	Sampler 3
Inlet	Back
Detector	Back
LTM Included?	No
Sampler 1	
Manufacturer	Agilent Technologies
Type	Trey
Name	7693A
Model Number	G4514A
Serial Number	CN15360030
Firmware Revision	A.11.01
Vali Hosts	Not installed

Date: October 21 2021 10:05:40 AM
System ID: GC-6

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Sampler 2	
Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN10340103
Firmware Revision	A.10.09
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10
Sampler 3	
Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN16280128
Firmware Revision	A.10.09
Usage	Sample Injection
Location	Back
Syringe Volume (µL)	10
Mainframe 1	
Manufacturer	Agilent Technologies
Name	7690
Model Number	G3440A
Serial Number	CN11461066
Firmware Revision	Version 4.27
Component ID/Asset No	GC-6
Oven Type	Standard

Date: October 21 2021 10:05:40 AM
System ID: GC-6

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Inlet 1	
Manufacturer	Agilent Technologies
Name	7690
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes
Inlet 2	
Manufacturer	Agilent Technologies
Name	7690
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes
Detector 1	
Manufacturer	Agilent Technologies
Name	7690
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen
Detector 2	
Manufacturer	Agilent Technologies
Name	7690
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Back
Makeup Gas	Nitrogen

Date: October 21 2021 10:05:40 AM
System ID: GC-6

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Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer: Suriya Thongkaew
Logged On User Name: suriya.thongkaew@hnon.agilent.com
Signature Creation Date: October 21, 2021
Reason for Signature: Executed protocol and published this original version of document

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User Name: suriya.thongkaew

Hostname: ASDKRW015

System ID: GC-6

Print Date: October 21, 2021 10:05:45 AM

GC GC ALS CH1451666 Transaction log

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 20, 2021 12:18:50 PM	Audio	Session Deleted	Session	None
October 20, 2021 12:18:50 PM	Start	Configuration	Session	None
October 20, 2021 12:18:50 PM	Audio	Entitlement	Licensing	User is Nonpaying and does not require an unlock code
October 20, 2021 12:24:57 PM	Audio	Exploited	Session	EQP details for primary technique (GC) - File path: (ProtocolPacka/GC/Configuration/GC151666/GC151666) EQP File Name: (GC151666) EQP Name: (Agilent/Recommended)
October 20, 2021 12:25:07 PM	End	Configuration	Session	None
October 20, 2021 12:25:09 PM	Start	Qualification	Session	QC
October 20, 2021 12:25:09 PM	Start	Execution	System Inspection and Basic Safety and Operation: 7890 Qualitative Test: No responses associated	None
October 20, 2021 12:30:25 PM	End	Execution	System Inspection and Basic Safety and Operation: 7890 Qualitative Test: No responses associated	Run Count: 1
October 20, 2021 12:56:29 PM	Start	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet: 5.25.0 psi - L: <= 2.0 psi and <= 0.5 psi	None

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Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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User Name: suriya.thongkaew Hostname: ASDKRW015			System ID: GC-6 Print Date: October 21, 2021 10:05:46 AM	
GC GC ALS CH1461666 Transaction log				
Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 20, 2021 1:02:16 PM	End	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet: 5.25.0 psi - L: <= 2.0 psi and <= 0.5 psi	Run Count: 1
October 20, 2021 1:02:19 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet: 5.25.0 psi - L: <= 1.2 psi	None
October 20, 2021 1:02:20 PM	End	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet: 5.25.0 psi - L: <= 1.2 psi	Run Count: 1
October 20, 2021 1:02:29 PM	Start	Execution	Inlet Pressure Decay - Back SSL - Pressure Controlled Inlet: 5.25.0 psi - L: <= 2.0 psi and <= 0.5 psi	None
October 20, 2021 1:04:21 PM	End	Execution	Inlet Pressure Decay - Back SSL - Pressure Controlled Inlet: 5.25.0 psi - L: <= 2.0 psi and <= 0.5 psi	Run Count: 1
October 20, 2021 1:07:53 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL - Pressure Controlled Inlet: 5.25.0 psi - L: <= 1.2 psi	None
October 20, 2021 1:08:11 PM	End	Execution	Inlet Pressure Accuracy - Back SSL - Pressure Controlled Inlet: 5.25.0 psi - L: <= 1.2 psi	Run Count: 1
October 20, 2021 1:08:18 PM	Start	Execution	Detector Flow Accuracy - Front FID - Type: Fuel: 5.30.0 mL/min - L: <= 10.0% response	None
October 20, 2021 1:10:23 PM	Audio	Data	Detector Flow Accuracy - Front FID - Type: Fuel: 5.30.0 mL/min - L: <= 10.0% response	Manual Data Entry
October 20, 2021 1:10:26 PM	End	Execution	Detector Flow Accuracy - Front FID - Type: Fuel: 5.30.0 mL/min - L: <= 10.0% response	Run Count: 1

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User Name: suriya.thongkaew
 HostName: ASDRW015

System ID: GC-6
 Print Date: October 21, 2021 10:05:46 AM

GC GC ALS CH1461666 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 20, 2021 1:10:29 PM	Start	Execution	Detector Flow Accuracy - Front FID - Type: Outlier: 5.400.0 mL/min - L: <= 10.0% response	None
October 20, 2021 1:10:37 PM	Audio	Data	Detector Flow Accuracy - Front FID - Type: Outlier: 5.400.0 mL/min - L: <= 10.0% response	Manual Data Entry
October 20, 2021 1:10:39 PM	End	Execution	Detector Flow Accuracy - Front FID - Type: Outlier: 5.400.0 mL/min - L: <= 10.0% response	Run Count: 1
October 20, 2021 1:10:31 PM	Start	Execution	Detector Flow Accuracy - Front FID - Type: Makeup: 5.25.0 mL/min - L: <= 10.0% response	None
October 20, 2021 1:10:40 PM	Audio	Data	Detector Flow Accuracy - Front FID - Type: Makeup: 5.25.0 mL/min - L: <= 10.0% response	Manual Data Entry
October 20, 2021 1:10:42 PM	End	Execution	Detector Flow Accuracy - Front FID - Type: Makeup: 5.25.0 mL/min - L: <= 10.0% response	Run Count: 1
October 20, 2021 1:10:46 PM	Start	Execution	Detector Flow Accuracy - Back FID - Type: Fuel: 5.30.0 mL/min - L: <= 10.0% response	None
October 20, 2021 1:10:50 PM	Audio	Data	Detector Flow Accuracy - Back FID - Type: Fuel: 5.30.0 mL/min - L: <= 10.0% response	Manual Data Entry
October 20, 2021 1:10:52 PM	End	Execution	Detector Flow Accuracy - Back FID - Type: Fuel: 5.30.0 mL/min - L: <= 10.0% response	Run Count: 1
October 20, 2021 1:10:54 PM	Start	Execution	Detector Flow Accuracy - Back FID - Type: Outlier: 5.400.0 mL/min - L: <= 10.0% response	None
October 20, 2021 1:14:13 PM	Audio	Data	Detector Flow Accuracy - Back FID - Type: Outlier: 5.400.0 mL/min - L: <= 10.0% response	Manual Data Entry

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System ID: GC-6

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Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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User Name: suriya.thongphiew

Hostname: ASDKNW7015

System ID: GC-6

Print Date: October 21, 2021 10:05:46 AM

GC GC ALS CH11461055 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 20, 2021 1:34:16 PM	End	Execution	Detector Flow Accuracy - Back FID - Type: Outflow - S: 420.0 mL/min - L: <= 10.0% setpoint	Run Count: 1
October 20, 2021 1:34:48 PM	Start	Execution	Detector Flow Accuracy - Back FID - Type: Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
October 20, 2021 1:36:33 PM	Audit	Data	Detector Flow Accuracy - Back FID - Type: Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
October 20, 2021 1:36:36 PM	End	Execution	Detector Flow Accuracy - Back FID - Type: Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	Run Count: 1
October 20, 2021 1:36:38 PM	Start	Execution	GC Oven Temperature Accuracy: 7850 - Temperature: Oven: 5: 230.0°C L: <= 1.0 AND <= 1.0 % setpoint in K	None
October 20, 2021 2:04:31 PM	Audit	Data	GC Oven Temperature Accuracy: 7850 - Temperature: Oven: 5: 230.0°C L: <= 1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
October 20, 2021 2:04:32 PM	End	Execution	GC Oven Temperature Accuracy: 7850 - Temperature: Oven: 5: 230.0°C L: <= 1.0 AND <= 1.0 % setpoint in K	Run Count: 1
October 20, 2021 2:04:34 PM	Start	Execution	GC Oven Temperature Accuracy: 7850 - Temperature: Oven: 5: 100.0°C L: <= 1.0 AND <= 1.0 % setpoint in K	None
October 20, 2021 2:10:47 PM	Audit	Data	GC Oven Temperature Accuracy: 7850 - Temperature: Oven: 5: 100.0°C L: <= 1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

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User Name: suriya.thongphiew

Hostname: ASDKNW7015

System ID: GC-6

Print Date: October 21, 2021 10:05:46 AM

GC QG ALS CH11461055 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 20, 2021 2:10:47 PM	End	Execution	GC Oven Temperature Accuracy: 7850 - Temperature: Oven: 5: 100.0°C L: <= 1.0 AND <= 1.0 % setpoint in K	Run Count: 1
October 20, 2021 2:10:51 PM	Start	Execution	GC Oven Temperature Stability: 7850 - Temperature: Oven: 5: 100.0°C L: <= 0.5°C	None
October 20, 2021 2:31:30 PM	Audit	Data	GC Oven Temperature Stability: 7850 - Temperature: Oven: 5: 100.0°C L: <= 0.5°C	Manual Data Entry
October 20, 2021 2:31:41 PM	End	Execution	GC Oven Temperature Stability: 7850 - Temperature: Oven: 5: 100.0°C L: <= 0.5°C	Run Count: 1
October 20, 2021 2:31:44 PM	Start	Execution	GC Scouting Run - Injection Tower: Front SSL, Front FID - Part of System Preparation - No limits associated	None
October 20, 2021 2:43:06 PM	Audit	AcqClosed	Session	None
October 21, 2021 9:18:59 AM	Audit	AcqRestarted	Session	None
October 21, 2021 9:19:02 AM	Audit	SessionAborted	Session	None
October 21, 2021 9:19:09 AM	Start	Qualification	Session	QC
October 21, 2021 9:19:09 AM	Start	Execution	GC Scouting Run - Injection Tower: Front SSL, Front FID - Part of System Preparation - No limits associated	None
October 21, 2021 9:19:41 AM	Audit	AcqClosed	Session	None

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Date: October 21, 2021 10:05:40 AM
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Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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User Name: suriya.thongphiew
 Hostname: ASDKNW7015

System ID: GC-6
 Print Date: October 21, 2021 10:05:46 AM

GC ALS CH11461055 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2021 9:20:08 AM	Audit	AcqRestarted	Session	None
October 21, 2021 9:20:10 AM	Audit	SessionAborted	Session	None
October 21, 2021 9:20:13 AM	Start	Qualification	Session	QC
October 21, 2021 9:20:13 AM	Start	Execution	GC Scouting Run - Injection Tower: Front SSL, Front FID - Part of System Preparation - No limits associated	None
October 21, 2021 9:29:40 AM	Audit	Data	GC Scouting Run - Injection Tower: Front SSL, Front FID - Part of System Preparation - No limits associated	Data File Path: C:\Chem321\DATA\OQPV20\21OQPV2021_F_2021 10 20 15:49:01\GC_OU1_F001.D\FID1A.ch
October 21, 2021 9:30:06 AM	End	Execution	GC Scouting Run - Injection Tower: Front SSL, Front FID - Part of System Preparation - No limits associated	Run Count: 1
October 21, 2021 9:30:08 AM	Start	Execution	Noise and Drift - Front FID - Detector FID: L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	None
October 21, 2021 9:30:41 AM	Audit	Data	Noise and Drift - Front FID - Detector FID: L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Data File Path: C:\Chem321\DATA\OQPV20\21OQPV2021_F_2021 10 20 15:49:01\GC_OU1_F001.D\FID1A.ch
October 21, 2021 9:31:10 AM	End	Execution	Noise and Drift - Front FID - Detector FID: L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour	Run Count: 1

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User Name: suriya.thongphiew Hostname: ASDKNW7015			System ID: GC-6 Print Date: October 21, 2021 10:05:46 AM	
GC ALS CH11461055 Transaction log:				
Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2021 9:31:42 AM	Start	Execution	Injection Precision - Injection Tower: Front SSL, Front FID - GC: L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	None
October 21, 2021 9:32:55 AM	Audit	Data	Injection Precision - Injection Tower: Front SSL, Front FID - GC: L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data File Path: C:\Chem321\DATA\OQPV20\21OQPV2021_F_2021 10 20 15:51:16\INJPREC_F002.D\FID1A.ch
October 21, 2021 9:32:56 AM	Audit	Data	Injection Precision - Injection Tower: Front SSL, Front FID - GC: L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data File Path: C:\Chem321\DATA\OQPV20\21OQPV2021_F_2021 10 20 15:51:16\INJPREC_F003.D\FID1A.ch
October 21, 2021 9:32:56 AM	Audit	Data	Injection Precision - Injection Tower: Front SSL, Front FID - GC: L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data File Path: C:\Chem321\DATA\OQPV20\21OQPV2021_F_2021 10 20 15:51:16\INJPREC_F004.D\FID1A.ch
October 21, 2021 9:32:56 AM	Audit	Data	Injection Precision - Injection Tower: Front SSL, Front FID - GC: L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data File Path: C:\Chem321\DATA\OQPV20\21OQPV2021_F_2021 10 20 15:51:16\INJPREC_F005.D\FID1A.ch
October 21, 2021 9:32:56 AM	Audit	Data	Injection Precision - Injection Tower: Front SSL, Front FID - GC: L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data File Path: C:\Chem321\DATA\OQPV20\21OQPV2021_F_2021 10 20 15:51:16\INJPREC_F006.D\FID1A.ch
October 21, 2021 9:32:56 AM	Audit	Data	Injection Precision - Injection Tower: Front SSL, Front FID - GC: L (Area): <= 3.00% - L (Ret. Time): <= 1.00%	Data File Path: C:\Chem321\DATA\OQPV20\21OQPV2021_F_2021 10 20 15:51:16\INJPREC_F007.D\FID1A.ch

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Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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User Name: surya.thongkham Hostname: ASBKKW7015			System ID: GC-6 Print Date: October 21, 2021 10:05:40 AM	
GC GC ALS CN11461066 Transaction Log				
Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2021 9:30:07 AM	End	Execution	Injection Precision - Injection Tower Front SSL, Front FID GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%	Run Count: 1
October 21, 2021 9:30:23 AM	Start	Execution	Signal to Noise - Injection Tower Front SSL, Front FID Detector FID - L >= 300000	None
October 21, 2021 9:34:01 AM	Audit	Data	Signal to Noise - Injection Tower Front SSL, Front FID Detector FID - L >= 300000	Data Files Path C:\Chem32\1\DATA\AQINQV20 21AQINQV201_F 2021-10-20 16:51:16\AQINQV20_F001.D\1 FID1A.ch
October 21, 2021 9:34:15 AM	End	Execution	Signal to Noise - Injection Tower Front SSL, Front FID Detector FID - L >= 300000	Run Count: 1
October 21, 2021 9:34:19 AM	Start	Execution	GC Scouting Run - Injection Tower Back SSL, Back FID Part of System Preparation - No limits associated	None
October 21, 2021 9:35:04 AM	Audit	Data	GC Scouting Run - Injection Tower Back SSL, Back FID Part of System Preparation - No limits associated	Data Files Path C:\Chem32\1\DATA\AQINQV20 21AQINQV201_B 2021-10-20 17:13:45\GCOUT_1\B001.D\1 D20.ch
October 21, 2021 9:38:27 AM	End	Execution	GC Scouting Run - Injection Tower Back SSL, Back FID Part of System Preparation - No limits associated	Run Count: 1
October 21, 2021 9:38:32 AM	Start	Execution	Noise and Drift - Back FID Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.50 pA/hour	None

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Date: October 21, 2021 10:05:40 AM
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User Name: surya.thongkham Hostname: ASBKKW7015		System ID: GC-6 Print Date: October 21, 2021 10:05:40 AM	
GC GC ALS CN11461066 Transaction Log			
Time	Transaction State	Activity Performed	Optional Information
October 21, 2021 9:38:06 AM	Audit	Data	Noise and Drift - Back FID Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.50 pA/hour Data Files Path: C:\Chem321\DATA\OQP\V20 21\OQP\V2021_B 2021-10-20 17:13:45\NUPREC_0001.D\FID20.ch
October 21, 2021 9:38:16 AM	End	Execution	Noise and Drift - Back FID Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.50 pA/hour Run Count: 1
October 21, 2021 9:38:20 AM	Start	Execution	Injection Precision - Injection Tower Back SSL, Back FID GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%
October 21, 2021 9:38:57 AM	Audit	Data	Injection Precision - Injection Tower Back SSL, Back FID GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00% Data Files Path: C:\Chem321\DATA\OQP\V20 21\OQP\V2021_B 2021-10-20 17:13:45\NUPREC_0002.D\FID20.ch
October 21, 2021 9:38:57 AM	Audit	Data	Injection Precision - Injection Tower Back SSL, Back FID GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00% Data Files Path: C:\Chem321\DATA\OQP\V20 21\OQP\V2021_B 2021-10-20 17:13:45\NUPREC_0003.D\FID20.ch
October 21, 2021 9:38:57 AM	Audit	Data	Injection Precision - Injection Tower Back SSL, Back FID GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00% Data Files Path: C:\Chem321\DATA\OQP\V20 21\OQP\V2021_B 2021-10-20 17:13:45\NUPREC_0004.D\FID20.ch
October 21, 2021 9:38:57 AM	Audit	Data	Injection Precision - Injection Tower Back SSL, Back FID GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00% Data Files Path: C:\Chem321\DATA\OQP\V20 21\OQP\V2021_B 2021-10-20 17:13:45\NUPREC_0005.D\FID20.ch

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Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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User Name: surya.thongkham Hostname: ASBKKW7015		System ID: GC-6 Print Date: October 21, 2021 10:05:40 AM	
GC GC ALS CN11461066 Transaction Log			
Time	Transaction State	Activity Performed	Optional Information
October 21, 2021 9:38:57 AM	Audit	Data	Injection Precision - Injection Tower Back SSL, Back FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%
October 21, 2021 9:38:57 AM	Audit	Data	Data Files Path Injection Precision - Injection Tower Back SSL, Back FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%
October 21, 2021 9:39:06 AM	End	Execution	Injection Precision - Injection Tower Back SSL, Back FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%
October 21, 2021 9:39:11 AM	Start	Execution	Signal to Noise - Injection Tower Back SSL, Back FID Detector FID - L >= 300000
October 21, 2021 9:39:28 AM	Audit	Data	Data Files Path Signal to Noise - Injection Tower Back SSL, Back FID Detector FID - L >= 300000
October 21, 2021 9:39:39 AM	End	Execution	Signal to Noise - Injection Tower Back SSL, Back FID Detector FID - L >= 300000
October 21, 2021 9:39:43 AM	End	Quiescence	Session
October 21, 2021 9:39:43 AM	Start	Reporting	Session
October 21, 2021 10:04:15 AM	Audit	Reporting	Report Generated Certificate

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Date: October 21, 2021 10:05:40 AM
System ID: GC-6

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Certificate of System Qualification
GC-00System ID: CN11461066
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Soi 40 Phattanaikan Rd, Khwang Suan Luang, Khiet Suan Luang, Bangkok 10250Date: April 21, 2023 3:26:38 PM
EQP Name: Agilent/Recommended
EQP Revision: GC 02.52
Overall Qualification Status: PassCDS Logon Verification - GC
Logon: Saengulthai TarakOverall CDS Logon Verification - GC Test Status
Pass

System Inspection and Basic Safety and Operation

Name: 7890
Setpoint Status: PassOverall System Inspection and Basic Safety and Operation Test Status
Pass

Inlet Pressure Decay

Name: 7890
From: SSL
Setpoint Status: Pass
Pressure: 25.0 psi
Pressure Change: -0.1 psi / 5 minutes
Agilent Recommended: >= -2.0 and <= 0.5Date: April 21, 2023 3:26:38 PM
System ID: CN11461066

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Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Front SSL

Setpoint Status: Pass

Inlet Pressure: Setpoint 25.0 psi Actual 25.2 psi

Accuracy: 0.2 psi

Agilent Recommended: ≤ 1.2 psi

Overall Inlet Pressure Accuracy Test Status

Pass

Inlet Pressure Decay

Name: 7890
Back SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: 0.0 psi /5 minutes

Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Back SSLDate: April 21, 2023 3:26:38 PM
System ID: CN11461066

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Setpoint Status: Pass

Inlet Pressure: Setpoint 25.0 psi Actual 24.8 psi

Accuracy: 0.2 psi

Agilent Recommended: ≤ 1.2 psi

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Front FID

Setpoint Status: Pass

Flow Type: Fuel
Setpoint: 30.0 mL/min Measured Flow: 28.9 mL/min

Accuracy: 1.1 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (3.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: Pass

Flow Type: Oxidizer
Setpoint: 400.0 mL/min Measured Flow: 400 mL/min

Accuracy: 0.0 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (40.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: Pass

Flow Type: Makeup
Setpoint: 25.0 mL/min Measured Flow: 24.9 mL/min

Accuracy: 0.1 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

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System ID: CN11461066

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Overall Detector Flow Accuracy Test Status

Pass

Detector Flow Accuracy

Name: 7890
Back FID

Setpoint Status: Pass

Flow Type: Fuel
Setpoint: 30.0 mL/min Measured Flow: 30.7 mL/min

Accuracy: 0.7 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (3.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: Pass

Flow Type: Oxidizer
Setpoint: 400.0 mL/min Measured Flow: 399 mL/min

Accuracy: 1.0 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (40.0 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status: Pass

Flow Type: Makeup
Setpoint: 25.0 mL/min Measured Flow: 24.6 mL/min

Accuracy: 0.4 mL/min

Agilent Recommended: ≤ 10.0 % setpoint (2.5 mL/min)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Date: April 21, 2023 3:26:38 PM
System ID: CN11461066

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Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 230.6 °C

Accuracy: 0.6 °C

Agilent Recommended: ≥ -1.0 % setpoint in K (-5.0 °C)

≤ 1.0 % setpoint in K (5.0 °C)

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 100.0 100.9 °C

Accuracy: 0.9 °C

Agilent Recommended: ≥ -1.0 % setpoint in K (-3.7 °C)

≤ 1.0 % setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 100.8833 °C

Stability: 0.1 °C

Agilent Recommended: ≤ 0.5 °C

Overall GC Oven Temperature Stability Test Status

Pass

Scouting Run

Tested Combination1 Front SSL / Front FID

Injection Tower

Name: 7693A

Date: April 21, 2023 3:26:38 PM
System ID: CN11461066

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Setpoint Status: **Completed**

Injection Volume on Column: **1.0** **uL**

Overall Scouting Run Status: **Completed**

Noise and Drift

Tested Combination1: **Front** **SSL** / **Front** **FID**

Name: **7690**

Setpoint Status: **Pass**

Base Signal: **22.7** **pA**

ASTM Noise		Drift	
pA		pA/hr	
0.06		0.05	
<= 0.10		<= 2.50	

Agilent Recommended: **Pass**

Status: **Pass**

Overall Noise and Drift Test Status: **Pass**

Injection Precision

Tested Combination1: **Front** **SSL** / **Front** **FID**

Name: **7693A**

Setpoint Status: **Pass**

Injection Volume on Column: **1.0** **uL**

Area RSD: **0.32** % Retention Time RSD: **0.97** %

Agilent Recommended: **<= 3.00** % **<= 1.00** %

Overall Injection Precision Test Status: **Pass**

Signal to Noise

Date: **April 21, 2023 3:26:36 PM**

System ID: **CN11461066**

Tested Combination1: **Front** **SSL** / **Front** **FID**

Injection Tower

Name: **7690**

Setpoint Status: **Pass**

Signal to Noise: **721755**

Agilent Recommended: **>= 300000**

Overall Signal to Noise Test Status: **Pass**

Scouting Run

Tested Combination2: **Back** **SSL** / **Back** **FID**

Injection Tower

Name: **7693A**

Setpoint Status: **Completed**

Injection Volume on Column: **1.0** **uL**

Overall Scouting Run Status: **Completed**

Noise and Drift

Tested Combination2: **Back** **SSL** / **Back** **FID**

Name: **7690**

Setpoint Status: **Pass**

Base Signal: **22.6** **pA**

ASTM Noise		Drift	
pA		pA/hr	
0.07		0.09	
<= 0.10		<= 2.50	

Agilent Recommended: **Pass**

Status: **Pass**

Date: **April 21, 2023 3:26:36 PM**

System ID: **CN11461066**

Overall Noise and Drift Test Status: **Pass**

Injection Precision

Tested Combination2: **Back** **SSL** / **Back** **FID**

Name: **7693A**

Setpoint Status: **Pass**

Injection Volume on Column: **1.0** **uL**

Area RSD: **1.28** % Retention Time RSD: **0.83** %

Agilent Recommended: **<= 3.00** % **<= 1.00** %

Overall Injection Precision Test Status: **Pass**

Signal to Noise

Tested Combination2: **Back** **SSL** / **Back** **FID**

Injection Tower

Name: **7690**

Setpoint Status: **Pass**

Signal to Noise: **2404368**

Agilent Recommended: **>= 300000**

Overall Signal to Noise Test Status: **Pass**

Date: **April 21, 2023 3:26:36 PM**

System ID: **CN11461066**

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	CN11461066
Manufacturer	Agilent Technologies
Name	7690
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination1

Injection Technique	Injection Tower
Sampler Identifier	Sampler 2
Inlet	Front
Detector	Front
LTM Included?	No

Tested Combination2

Injection Technique	Injection Tower
Sampler Identifier	Sampler 3
Inlet	Back
Detector	Back
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN15380030
Firmware Revision	A.11.01
Vial Heater	Not Installed

Sampler 2

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN16280128
Firmware Revision	A.10.09
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Sampler 3

Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN10349103
Firmware Revision	A.10.09
Usage	Sample Injection
Location	Back
Syringe Volume (µL)	10

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN11481066
Firmware Revision	Version 4.27
Oven Type	Standard

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System ID: CN11481066

Inlet 1

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Inlet 2

Manufacturer	Agilent Technologies
Name	7890
Type	SSL
Location	Back
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

Manufacturer	Agilent Technologies
Name	7890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

Detector 2

Manufacturer	Agilent Technologies
Name	7890
Type	FID
Adapter	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Back
Makeup Gas	Nitrogen

Date: April 21, 2023 3:26:38 PM
System ID: CN11481066

Electronic Signature

Purpose
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Details

Full Name of Signer:	Saenguthai Tarak
Logged On User Name:	saenguthai.tarak@non.agilent.com
Signature Creation Date:	April 21, 2023
Reason for Signature:	Executed protocol and published this original version of document

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Date: April 21, 2023 3:26:38 PM
System ID: CN11481066

User Name: saenguthai.tarak
Host Name: LAPTOP-CQ35XOMV
System ID: CN11481066
Print Date: April 21, 2023 3:26:46 PM

GC-4_RK_EH0197_ALS Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:21:00 AM	Audit	SessionCreated	Session	None
April 21, 2023 11:21:08 AM	Start	Configuration	Session	None
April 21, 2023 11:21:36 AM	Audit	Enrollment	Licensing	User is Monitoring and does not require an unlock code
April 21, 2023 11:22:04 AM	Audit	ExpLoaded	Session	ECP results for primary technique (GC) - File path: (ProtocolPacks\GC\Configurations\GC5.52\GC02.52.msp), ECP File Name: (GC02.52.msp), ECP Name: (AgilentRecommendedPhoto cal Revision) (GC02.52)
April 21, 2023 11:22:08 AM	End	Configuration	Session	None
April 21, 2023 11:22:14 AM	Start	Qualification	Session	QC
April 21, 2023 11:22:14 AM	Start	Execution	CDG Logon Verification - QC	None - Qualitative test
April 21, 2023 11:22:14 AM	End	Execution	CDG Logon Verification - QC	Run Count : 1 - Qualitative test
April 21, 2023 11:23:16 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No sample is associated	None
April 21, 2023 11:23:38 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No sample is associated	Run Count : 1
April 21, 2023 11:23:37 AM	Start	Execution	Initial Pressure Decay - Front SSL - Pressure Controlled Inlet - S: 28.0 psi - L: >= -2.0 psi and <= 0.8 psi	None

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System ID: CN11481066

User Name: saanguthalarak
Host Name: LAPTOP-CQ3SKOMV
System ID: CN11461066
Print Date: April 21, 2023 3:28:48 PM

GC-8_BKX_EN0127_ALS Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:24:01 AM	End	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet S: 25.0 psi - L: >= -2.0 psi and ≤ 0.5 psi	Run Count: 1
April 21, 2023 11:24:54 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet S: 25.0 psi - L: ≤ 1.2 psi	None
April 21, 2023 11:24:59 AM	End	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet S: 25.0 psi - L: ≤ 1.2 psi	Run Count: 1
April 21, 2023 11:24:11 AM	Start	Execution	Inlet Pressure Decay - Back SSL - Pressure Controlled Inlet S: 25.0 psi - L: >= -2.0 psi and ≤ 0.5 psi	None
April 21, 2023 11:24:43 AM	End	Execution	Inlet Pressure Decay - Back SSL - Pressure Controlled Inlet S: 25.0 psi - L: >= -2.0 psi and ≤ 0.5 psi	Run Count: 1
April 21, 2023 11:24:45 AM	Start	Execution	Inlet Pressure Accuracy - Back SSL - Pressure Controlled Inlet S: 25.0 psi - L: ≤ 1.2 psi	None
April 21, 2023 11:24:51 AM	End	Execution	Inlet Pressure Accuracy - Back SSL - Pressure Controlled Inlet S: 25.0 psi - L: ≤ 1.2 psi	Run Count: 1
April 21, 2023 11:24:53 AM	Start	Execution	Detector Flow Accuracy - Front FID - Type: Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	None
April 21, 2023 11:25:20 AM	Audit	Data	Detector Flow Accuracy - Front FID - Type: Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	Manual Data Entry
April 21, 2023 11:25:25 AM	End	Execution	Detector Flow Accuracy - Front FID - Type: Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	Run Count: 1

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User Name: saanguthalarak
Host Name: LAPTOP-CQ3SKOMV
System ID: CN11461066
Print Date: April 21, 2023 3:28:48 PM

GC-8_BKX_EN0127_ALS Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:25:25 AM	Start	Execution	Detector Flow Accuracy - Front FID - Type: Oxidizer - S: 450.0 mL/min - L: ≤ 10.0% setpoint	None
April 21, 2023 11:25:40 AM	Audit	Data	Detector Flow Accuracy - Front FID - Type: Oxidizer - S: 450.0 mL/min - L: ≤ 10.0% setpoint	Manual Data Entry
April 21, 2023 11:25:47 AM	End	Execution	Detector Flow Accuracy - Front FID - Type: Oxidizer - S: 450.0 mL/min - L: ≤ 10.0% setpoint	Run Count: 1
April 21, 2023 11:25:44 AM	Start	Execution	Detector Flow Accuracy - Front FID - Type: Makeup - S: 25.0 mL/min - L: ≤ 10.0% setpoint	None
April 21, 2023 11:26:01 AM	Audit	Data	Detector Flow Accuracy - Front FID - Type: Makeup - S: 25.0 mL/min - L: ≤ 10.0% setpoint	Manual Data Entry
April 21, 2023 11:26:04 AM	End	Execution	Detector Flow Accuracy - Front FID - Type: Makeup - S: 25.0 mL/min - L: ≤ 10.0% setpoint	Run Count: 1
April 21, 2023 11:26:05 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type: Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	None
April 21, 2023 11:26:19 AM	Audit	Data	Detector Flow Accuracy - Back FID - Type: Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	Manual Data Entry
April 21, 2023 11:26:22 AM	End	Execution	Detector Flow Accuracy - Back FID - Type: Fuel - S: 30.0 mL/min - L: ≤ 10.0% setpoint	Run Count: 1
April 21, 2023 11:26:24 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type: Oxidizer - S: 400.0 mL/min - L: ≤ 10.0% setpoint	None
April 21, 2023 11:26:36 AM	Audit	Data	Detector Flow Accuracy - Back FID - Type: Oxidizer - S: 400.0 mL/min - L: ≤ 10.0% setpoint	Manual Data Entry

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User Name: saanguthalarak
Host Name: LAPTOP-CQ3SKOMV
System ID: CN11461066
Print Date: April 21, 2023 3:28:48 PM

GC-8_BKX_EN0127_ALS Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:26:43 AM	End	Execution	Detector Flow Accuracy - Back FID - Type: Oxidizer - S: 450.0 mL/min - L: ≤ 10.0% setpoint	Run Count: 1
April 21, 2023 11:26:48 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type: Makeup - S: 25.0 mL/min - L: ≤ 10.0% setpoint	None
April 21, 2023 11:27:51 AM	Audit	Data	Detector Flow Accuracy - Back FID - Type: Makeup - S: 25.0 mL/min - L: ≤ 10.0% setpoint	Manual Data Entry
April 21, 2023 11:27:59 AM	End	Execution	Detector Flow Accuracy - Back FID - Type: Makeup - S: 25.0 mL/min - L: ≤ 10.0% setpoint	Run Count: 1
April 21, 2023 11:27:57 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 21, 2023 11:27:33 AM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
April 21, 2023 11:27:35 AM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count: 1
April 21, 2023 11:27:31 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
April 21, 2023 11:27:54 AM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

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Date: April 21, 2023 3:26:38 PM
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User Name: saanguthalarak
Host Name: LAPTOP-CQ3SKOMV
System ID: CN11461066
Print Date: April 21, 2023 3:28:48 PM

GC-8_BKX_EN0127_ALS Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:27:57 AM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count: 1
April 21, 2023 11:27:59 AM	Start	Execution	GC Oven Temperature Stability - 7890 - Temperature: Oven - S: 100.0°C - L: ≤ 0.5°C	None
April 21, 2023 11:28:07 AM	Audit	Data	GC Oven Temperature Stability - 7890 - Temperature: Oven - S: 100.0°C - L: ≤ 0.5°C	Manual Data Entry
April 21, 2023 11:28:10 AM	End	Execution	GC Oven Temperature Stability - 7890 - Temperature: Oven - S: 100.0°C - L: ≤ 0.5°C	Run Count: 1
April 21, 2023 11:28:12 AM	Start	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID - Part of System Preparation - No limits associated	None
April 21, 2023 11:30:27 AM	Audit	Data	GC Scouting Run - Injection Tower, Front SSL, Front FID - Part of System Preparation - No limits associated	Data File Path: C:\Users\Public\Documents\GC-8 _ALS_2023-04-20\GC-8 _2023-04-20 14-36-08F_5001.D\FID1A.c h
April 21, 2023 11:31:04 AM	End	Execution	GC Scouting Run - Injection Tower, Front SSL, Front FID - Part of System Preparation - No limits associated	Run Count: 1
April 21, 2023 11:31:07 AM	Start	Execution	Injection and DFT - Front FID - Detector FID - L (pHase) <= 8.10 pH - L (DFT) <= 2.50 pH/pH	None

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User Name: sengkulhalazak System ID: CN11461066
Hostname: LAPTOP-CQ35KDMY Print Date: April 21, 2023 3:26:43 PM

GC-4_BHX_ENR127_ALS Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:31:43 AM	Audit	Data	Noise and Drift - Front FID -> Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.50 pA/hour	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 1A.ch
April 21, 2023 11:32:00 AM	End	Execution	Noise and Drift - Front FID -> Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.50 pA/hour	Run Count: 1
April 21, 2023 11:32:03 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	None
April 21, 2023 11:32:22 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	None
April 21, 2023 11:33:55 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 1A.ch
April 21, 2023 11:33:55 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 1A.ch

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System ID: CN11461066

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User Name: sengkulhalazak System ID: CN11461066
Hostname: LAPTOP-CQ35KDMY Print Date: April 21, 2023 3:26:40 PM

GC-4_BHX_ENR127_ALS Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:33:55 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 1A.ch
April 21, 2023 11:33:55 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 1A.ch
April 21, 2023 11:33:59 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 1A.ch
April 21, 2023 11:33:59 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 1A.ch
April 21, 2023 11:35:00 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Run Count: 1
April 21, 2023 11:35:04 AM	Start	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID -> Detector FID - L -> 300000	None

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User Name: sengkulhalazak System ID: CN11461066
Hostname: LAPTOP-CQ35KDMY Print Date: April 21, 2023 3:26:49 PM

GC-4_BHX_ENR127_ALS Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:35:28 AM	Audit	Data	Signal to Noise - Injection Tower, Front SSL, Front FID -> Detector FID - L -> 300000	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 1A.ch
April 21, 2023 11:36:00 AM	End	Execution	Signal to Noise - Injection Tower, Front SSL, Front FID -> Detector FID - L -> 300000	Run Count: 1
April 21, 2023 11:36:09 AM	Start	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID -> Part of System Preparation - No limits associated	None
April 21, 2023 11:36:36 AM	Audit	Data	GC Scouting Run - Injection Tower, Back SSL, Back FID -> Part of System Preparation - No limits associated	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 1A.ch
April 21, 2023 11:37:00 AM	End	Execution	GC Scouting Run - Injection Tower, Back SSL, Back FID -> Part of System Preparation - No limits associated	Run Count: 1
April 21, 2023 11:37:02 AM	Start	Execution	Noise and Drift - Back FID -> Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.50 pA/hour	None

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Date: April 21, 2023 3:26:38 PM
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User Name: sengkulhalazak System ID: CN11461066
Hostname: LAPTOP-CQ35KDMY Print Date: April 21, 2023 3:26:43 PM

GC-4_BHX_ENR127_ALS Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:38:05 AM	Audit	Data	Noise and Drift - Back FID -> Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.50 pA/hour	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 2B.ch
April 21, 2023 11:38:23 AM	End	Execution	Noise and Drift - Back FID -> Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.50 pA/hour	Run Count: 1
April 21, 2023 11:38:32 AM	Start	Execution	Injection Precision - Injection Tower, Back SSL, Back FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	None
April 21, 2023 11:39:51 AM	Start	Execution	Injection Precision - Injection Tower, Back SSL, Back FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	None
April 21, 2023 11:40:17 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 2B.ch
April 21, 2023 11:42:17 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID -> GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation3\Data\GC-4_ALS_2023-04-20\GC-4_2023-04-20 14:36:06\Ph01-011F.D\FID 2B.ch

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System ID: CN11461066

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User Name: asengulhaJarak
Host Name: LAPTOP-C03SK0WVSystem ID: CH11461066
Print Date: April 21, 2023 3:36:40 PM

GC-6_BK0K_EN0127_ALS Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
Apr 21, 2023 11:42:17 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID - GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation\Data\GC-6_ALS_2023-04-20\GC-6_2023_Prs 2023-04-21 10:37:32\Prs11-0069.D\FID 28.ch
Apr 21, 2023 11:40:17 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID - GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation\Data\GC-6_ALS_2023-04-20\GC-6_2023_Prs 2023-04-21 10:37:32\Prs11-0070.D\FID 28.ch
Apr 21, 2023 11:40:21 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID - GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation\Data\GC-6_ALS_2023-04-20\GC-6_2023_Prs 2023-04-21 10:37:32\Prs11-0069.D\FID 28.ch
Apr 21, 2023 11:40:21 AM	Audit	Data	Injection Precision - Injection Tower, Back SSL, Back FID - GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Data File Path: C:\Users\Public\Documents\ChromStation\Data\GC-6_ALS_2023-04-20\GC-6_2023_Prs 2023-04-21 10:37:32\Prs11-0069.D\FID 28.ch
Apr 21, 2023 11:41:26 AM	End	Execution	Injection Precision - Injection Tower, Back SSL, Back FID - GC - L (Area) <= 3.00% - L (Rel. Time) <= 1.00%	Run Count: 1
Apr 21, 2023 11:41:23 AM	Start	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID - Detector FID - L >= 300000	None

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System ID: CH11461066

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User Name: asengulhaJarak
Host Name: LAPTOP-C03SK0WVSystem ID: CH11461066
Print Date: April 21, 2023 3:36:40 PM

GC-6_BK0K_EN0127_ALS Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
Apr 21, 2023 11:42:22 AM	Audit	Data	Signal to Noise - Injection Tower, Back SSL, Back FID - Detector FID - L >= 300000	Data File Path: C:\Users\Public\Documents\ChromStation\Data\GC-6_ALS_2023-04-20\GC-6_2023_Prs 2023-04-21 10:38:08\Prs11-0069.D\FID 28.ch
Apr 21, 2023 11:42:53 AM	End	Execution	Signal to Noise - Injection Tower, Back SSL, Back FID - Detector FID - L >= 300000	Run Count: 1
Apr 21, 2023 11:42:53 AM	Start	Qualification	Session	OQ
Apr 21, 2023 12:01:47 PM	Audit	Reporting	Session	None
Apr 21, 2023 3:18:07 PM	Audit	AccClosed	Session	None
Apr 21, 2023 3:18:10 PM	Audit	AccRestarted	Session	None
Apr 21, 2023 3:18:10 PM	Audit	SessionReloaded	Session	None
Apr 21, 2023 3:18:31 PM	Start	Qualification	Session	OQ
Apr 21, 2023 3:20:59 PM	Audit	AccRestarted	Session	None
Apr 21, 2023 3:21:09 PM	Audit	SessionReloaded	Session	None
Apr 21, 2023 3:21:07 PM	Start	Qualification	Session	OQ
Apr 21, 2023 3:23:45 PM	Audit	Reporting	Session	Report Generated: Certificate

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System ID: CH11461066

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Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor7 Rama4 Road
Siam Bangkok Bangkok Thailand 10503
Tel: 02-6324300 Fax: 02-6375466-7
www.barascientific.com

Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No. BSCC-UV-30722
Equipment UV/Vis Spectrophotometer
Model UV-1800
Manufacturer Shimadzu
Serial No. A11454908533CD
ID No. BKK_EN0016
Date of receipt 16 September 2022
Date of calibration 16 September 2022
Date of issue 23 September 2022

Customer name ALS Laboratory Group (Thailand) Co., Ltd.

Address 104 So. Phatthanakan 40, Phatthanakan Road, Phatthanakan, Suan Luang, Bangkok 10250

Temperature (22.1-23.3) °C (On site)
Humidity (56.6-63.2) %RH (On site)

Equipment condition Good Operation

Calibration Location Organic Prep

Calibration Procedure In-house method WI-UV-702-01 based on ASTM E275-01

Traceability Wavelength Accuracy is traceable to certificate No. 95917 and 95918
Photometric Accuracy is traceable to certificate No. 95924 and 95937
Stray Light is traceable to certificate No. 95908
The above certificate are traceable to SI unit through Starna Scientific Ltd.
(UKAS accredited calibration laboratory NO. 0659)

Calibrated by Mr Waruth Jangphung

REVIEW BY *Sulak P.*
APPROVED BY *Kw A.*
NEXT CAL. DATE *31/10/23*

Approved by

Mr. Kanchai Choolthep
Technical Manager

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced
except in full, without written approval of the Bara Scientific Co., Ltd

Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor7 Rama4 Road
Siam Bangkok Bangkok Thailand 10503
Tel: 02-6324300 Fax: 02-6375466-7
www.barascientific.com

Certificate of Calibration

Certificate No. BSCC-UV-30722

Number of Page(s) 2 of 3

Calibration Results:

1. Wavelength Accuracy


Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
241.70	241.65	-0.05	0.18
334.02	333.92	-0.10	0.18
418.53	418.46	-0.07	0.18
572.89	572.98	+0.09	0.18
879.41	879.17	-0.24	0.18

2. Photometric Accuracy (UV)



Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
235	0.0000	0.0000	0.0000	0.0075
	0.7467	0.7461	-0.0006	0.0075
257	0.0000	0.0000	0.0000	0.0075
	0.8662	0.8647	-0.0015	0.0075
313	0.0000	0.0000	0.0000	0.0075
	0.2904	0.2911	0.0007	0.0075
350	0.0000	0.0000	0.0000	0.0075
	0.6429	0.6420	-0.0009	0.0075

*CNR = Customer not request

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced
except in full, without written approval of the Bara Scientific Co., Ltd



Bara Scientific Co., Ltd.
958 U Chu Lang Building Floor7 Ramat Road
3/Fom Bangkok Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375456-7
www.barascientific.com

Certificate of Calibration

Certificate No. **BSCC-UV-307/22** Number of Page(s) **3 of 3**

Calibration Results:

3. Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (ΔA)
420.0	0.0000	0.0000	0.0000	0.0042
	0.5783	0.5777	-0.0006	0.0042
	0.7626	0.7635	0.0007	0.0046
	1.0206	1.0230	0.0024	0.0042
440.0	0.0000	0.0000	0.0000	0.0042
	0.5621	0.5618	-0.0003	0.0042
	0.7455	0.7460	0.0005	0.0048
	0.9985	1.0005	0.0020	0.0042
465.0	0.0000	0.0000	0.0000	0.0042
	0.5227	0.5219	-0.0008	0.0042
	0.6880	0.6884	0.0004	0.0051
	0.9487	0.9503	0.0016	0.0042
546.1	0.0000	0.0000	0.0000	0.0042
	0.5207	0.5199	-0.0008	0.0042
	0.6973	0.6971	-0.0002	0.0049
	0.9958	0.9964	0.0005	0.0042
590.0	0.0000	0.0000	0.0000	0.0042
	0.5544	0.5534	-0.0010	0.0042
	0.7253	0.7242	-0.0011	0.0050
	1.0942	1.0943	0.0001	0.0042
635.0	0.0000	0.0000	0.0000	0.0042
	0.5616	0.5606	-0.0010	0.0042
	0.6927	0.6921	-0.0006	0.0053
	1.0881	1.0885	0.0004	0.0042

*CNR = Customer not request

4. Stray Light*

Standard cut-off wavelength (nm)	Wavelength (nm)	Transmission (%)	Absorbance (A)
200.56±0.11nm	200.30	0.9505	2.0239

The stray light transmission reference is less than 1.0%T and stray light absorbance reference is greater than 2.00A


*Stray Light not NSC-ONSC Accredited.

The measurement uncertainty is base on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

*****End of Certificate*****

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate. Advertising the report / Certificate and publicity of the results are prohibited and also shall not be reproduced except in full, without written approval of the Bara Scientific Co., Ltd.

FORM MAY E 06-025 REVISION NO 1 ISSUE DATE 30-04-22



760
55.0
30.0

Barometric Pressure (mmHg)
Relative Humidity (%)
Temperature (C°)

Reference Dry Gas Meter Data

BKK-FS1122
A3003240
1.0160
05/27/23

Serial No.
Correction Factor (Y)
Next Calibration Date

Reference Dry Gas Meter ID
C-130123-BKK-FS0527
1508053
XS-572-V

Calibration No.
Dry Gas Meter ID
Serial No.
Model No.

Console Control Dry Gas Meter Calibration

ΔH (mm H ₂ O)	θ	Mnueics	Vr (Litres)			Tr (C°)			Vm (Litres)			Tm (C°)			Avg Tm (C°)	Dry Gas Meter Correction Factor (Y)	Order Calibration
			Final	Initial	Total	Final	Initial	Total	Final	Initial	Total	Final	Initial	Total			
15	12.65	15.00	0.00	150.00	150.00	31.0	31.0	31.0	39.025.0	149.25	149.25	32.0	32.0	32.0	32.0	1.0233	48.9542
25	9.56	150.00	0.00	150.00	150.00	30.0	30.0	30.0	39.4514.2	149.26	149.26	30.0	30.0	30.0	1.0190	46.5991	
50	6.65	150.00	0.00	150.00	150.00	30.0	30.0	30.0	39.4568.4	149.49	149.49	31.0	31.0	31.0	1.0254	44.9474	
60	5.18	150.00	0.00	150.00	150.00	31.0	31.0	31.0	39.627.6	149.60	149.60	31.0	31.0	31.0	1.0246	43.9240	
120	4.29	150.00	0.00	150.00	150.00	31.0	31.0	31.0	39.696.8	149.60	149.60	30.0	30.0	30.0	1.0310	43.1774	
																1.0347	45.5186

Ratio of (uncertainty of reference to dry gas meter) for individual values = 0.00 from average.

ΔH_{avg} = 0.0000

Pressure: 40 CFR 60 APP A METH SEC 5.3.8.7

Calibrated by: *Saksit Phasiraphisut* (Mr. Saksit Phasiraphisut) Field Scientist (4)

Approved by: *Nattapon Jengwareewong* (Mr. Nattapon Jengwareewong) Specialist (1)

FORM MAY E 06-025 REVISION NO 1 ISSUE DATE 30-04-22

Pitot Tube Calibration Data

Pitot Tube Identification Number **BKK_FS0531** Calibration Date **13 Jan 23**

Lab test duct Number **25B-1-13-01** Standard Pitot ID **BKK_FS0441**

Calibration Sheet No **C-130123-BKK_FS0531** Cp Standard **0.99**

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A/B	Standard pitot tube (ΔP, mm H ₂ O)	Type s pitot tube (ΔP, mm H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
			C _p	0.842	0.842

$$C_{P(S)} = C_P = \sqrt{\frac{\Delta P_{(std)}}{\Delta P_{(s)}}}$$

$$[C_{P(A)} - C_{P(B)}] \text{ must } BE \leq 0.01$$

$$\text{Average deviation(A or B)} = \frac{\sum [C_P(s) - C_{P(A \text{ or } B)}]}{3} \text{ must } BE \leq 0.01$$

Calibrated by: *Saksit Phasiraphisut* (Mr. Saksit Phasiraphisut) Field Scientist (4)

Approved by: *Nattapon Jengwareewong* (Mr. Nattapon Jengwareewong) Specialist (1)

Pitot Tube Calibration Data

Pitot Tube Identification Number **BKK_FS0532** Calibration Date **13 Jan 23**

Lab test duct Number **25B-1-13-01** Standard Pitot ID **BKK_FS0441**

Calibration Sheet No **C-130123-BKK_FS0532** Cp Standard **0.99**

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A/B	Standard pitot tube (ΔP, mm H ₂ O)	Type s pitot tube (ΔP, mm H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
			C _p	0.842	0.842

$$C_{P(S)} = C_P = \sqrt{\frac{\Delta P_{(std)}}{\Delta P_{(s)}}}$$

$$[C_{P(A)} - C_{P(B)}] \text{ must } BE \leq 0.01$$

$$\text{Average deviation(A or B)} = \frac{\sum [C_P(s) - C_{P(A \text{ or } B)}]}{3} \text{ must } BE \leq 0.01$$

Calibrated by: *Saksit Phasiraphisut* (Mr. Saksit Phasiraphisut) Field Scientist (4)

Approved by: *Nattapon Jengwareewong* (Mr. Nattapon Jengwareewong) Specialist (1)



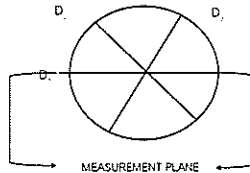
PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Date	13 Jan 23	Nozzle Set ID	BKK_FS0533
Calibration Sheet No.	C-130123-BKK_FS0533	Vernier Caliper ID	BKK_FS1123

Nozzle ID #	Nozzle Diameter (cm.)			H ₀ - L ₀	(D ₁ + D ₂ + D ₃) / 3
	D ₁	D ₂	D ₃	ΔD	D _{avg}
1	0.318	0.318	0.318	0.000	0.318
2	0.475	0.475	0.475	0.000	0.475
3	0.635	0.635	0.635	0.000	0.635
4	0.791	0.792	0.791	0.001	0.791
5	0.950	0.952	0.951	0.002	0.951
6	1.098	1.100	1.098	0.002	1.099
7	1.270	1.270	1.270	0.000	1.270
8	1.600	1.600	1.600	0.000	1.600

Where

- D₁, D₂, D₃ : There different nozzle diameters at 60 degrees to each other, each measured the nearest 0.025 mm
- ΔD : Maximum distance between any two diameters, must be ≤ 0.100 mm
- D_{avg} : (D₁ + D₂ + D₃) / 3



Calibrated by Saksit Phaisanphut Approved by Nattapon Jengwareewong
(Mr Saksit Phaisanphut) (Mr Nattapon Jengwareewong)
Field Scientist (4) Field Specialist (1)



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date	13/01/23	Ambient Temperature (°C)	30
Calibration sheet No.	C-130123-BKK_FS0528	Relative Humidity (%)	55
Digital Temperature ID	BKK_FS0528	Reference Temperature ID	BKK_FS0600
Console Serial No.	1503917	Sensor No.	7688004
Model	XC-572-V	Model	FLUKE 714
		Last Calibrate	1/28/22

Location	Reference Temperature °C	Digital Temperature °C	Error °C	Remark
Stack	0	1	1	
	25	24	-1	
	60	61	1	
	100	102	2	
	160	151	1	
	200	202	2	
	250	251	1	
	300	301	1	
Probe	500	501	1	
	1000	1001	1	
	1200	1202	2	
	100	101	1	
	120	121	1	
	140	142	2	
	100	101	1	
	120	121	1	
Filter	140	142	2	
	0	0	0	
Exit	10	10	0	
	20	20	0	
Motor	0	0	0	
	25	25	0	
AUX	60	60	0	
	0	0	0	
	25	25	0	
	50	50	0	

Calibrated by Saksit Phaisanphut Approved by Nattapon Jengwareewong
(Mr Saksit Phaisanphut) (Mr Nattapon Jengwareewong)
Field Scientist (4) Specialist (1)

FORM NO. F-00-027 RETIRED NO. 1 DATE DATE 2/3/22



CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Barometric Pressure (mmHg) 760
Relative Humidity (%) 55.0
Temperature (°C) 30.0

Reference Dry Gas Meter Data
Reference Dry Gas Meter ID A2003240
Serial No. 1.0160
Correction Factor (Y) 052723
Next Calibration Date

Calibration of Date 13-Jan-23
Next Cal. Date 13-Jul-23

Console Control Meter Data

Calibration No. C-130123-BKK_FS0463
Dry Gas Meter ID BKK_FS0468
Serial No. 1302005
Model No. XC-572-V

All	θ	Reference Dry Gas Meter Calibration				Console Control Dry Gas Meter				Dry Gas Meter Correction Factor (Y)	Orifice Calibration Factor (ΔH ₀)
		Final	Initial	Total	Tr (°C)	Final	Initial	Total	Tr (°C)		
15	12.50	150.00	0.00	150.00	32.0	131554.6	134410.0	154.60	31.0	0.9798	51.1334
25	9.65	150.00	0.00	150.00	32.0	131895.0	131735.0	155.00	32.0	0.9809	47.7040
50	6.73	150.00	0.00	150.00	32.0	132049.6	131895.0	154.60	32.0	0.9798	46.4321
80	5.21	150.00	0.00	150.00	32.0	132213.6	132060.0	153.60	32.0	0.9833	44.5895
120	4.20	150.00	0.00	150.00	32.0	132377.6	132225.0	152.60	32.0	0.9872	43.4568
									Avg.	0.9922	46.7474

Y : Rate of reading of reference to dry gas meter. In tolerance for meter dial values ± 0.02 from average.

ΔH₀ : Orifice pressure differential that equates to 71.24 in. of air @ 75 °C and 760 mm of mercury. mm-H₂O : In tolerance for individual values ± 5.08 from average.

Procedure: 40 CFR 80 APP A MET 1 SEC 5.3 & 7

Calibrated by Saksit Phaisanphut Approved by Nattapon Jengwareewong
(Mr Saksit Phaisanphut) (Mr Nattapon Jengwareewong)
Field Scientist (4) Field Specialist (1)

FORM NO. F-00-026 RETIRED NO. 1 DATE DATE 2/3/22



Pitot Tube Calibration Data

Pitot Tube Identification Number BKK_FS0472 Calibration Date 13 Jan 23
Lab test duct Number 258-1-13-01 Standard Pitot ID BKK_FS0441
Calibration Sheet No C-130123-BKK_FS0472 Cp Standard 0.99

Type S Pitot Tube Coefficient Data					
	Type S pitot tube Leg A,B	Standard pitot tube (ΔP, mm H ₂ O)	Type S pitot tube (ΔP, mm H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
			\bar{Cp}	0.842	0.842

$$Cp(s) = Cp = \sqrt{\frac{\Delta P(s)}{\Delta P(s)}}$$

$$[Cp(A) - Cp(B)] \text{ must BE } \leq 0.01$$

$$\text{Average deviation (A or B)} = \frac{\sum [Cp(s) - Cp(A \text{ or } B)]}{3} \text{ must BE } \leq 0.01$$

Calibrated by Saksit Phaisanphut Approved by Nattapon Jengwareewong
(Mr Saksit Phaisanphut) (Mr Nattapon Jengwareewong)
Field Scientist (4) Specialist (1)

FORM NO. F-00-025 RETIRED NO. 1 DATE DATE 2/3/22



17/121 So: Naamwongwong 47 Yook 48 Yookdonghong Laks Bangkok 10210 THAILAND Tel: 0-2770-8888 Callcenter@entech.co.th
Fax: 0-105536035591 www.entech.co.th



Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.498 % Vol	4219/21	Linde	30-Sep-25
Oxygen (O ₂) 10.04 % Vol	CG-0153-21	Nimt	18-Nov-26
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nimt	14-Feb-27
Carbon monoxide (CO) 309.9 ppm	2893/21	Linde	22-Jun-23
Carbon monoxide (CO) 1003 ppm	2583/22	Linde	09-Aug-24
Nitrogen Dioxide (NO ₂) 30.34 ppm	2703/22	Linde	22-Aug-24
Nitrogen Dioxide (NO ₂) 80.96 ppm	2041/22	Linde	26-Jun-24
Nitrogen Dioxide (NO ₂) 202.2 ppm	3239/21	Linde	20-Jul-23
Nitric Oxide (NO) 30.08 ppm	CG 0097-22	Nimt	13-Jun-24
Nitric Oxide (NO) 150.9 ppm	2857/21	Linde	27-Jun-23
Nitric Oxide (NO) 320.6 ppm	2944/21	Linde	02-Jul-23
Sulphur Dioxide (SO ₂) 50.04 ppm	3205/21	Linde	25-Jul-23
Sulphur Dioxide (SO ₂) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO ₂) 601.1 ppm	3204/21	Linde	20-Jul-23

Measured room conditions

Temperature : 22.8 °C Humidity : 58.5 %RH Pressure : 1013.5 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1,200 ml/min Gas pressure : 1021.4 mbar

Calibration Results Before Adjustment (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.498	2.45	-0.048	0.20
O ₂ (%Vol)	10.04	9.89	-0.15	0.40
O ₂ (%Vol)	21.02	21.16	0.14	0.80
CO (ppm)	80.14	82	1.86	3.0
CO (ppm)	309.9	313	3.1	6.0
CO (ppm)	1003	1014	11	12
NO ₂ (ppm)	30.34	21.9	-8.44	8.0
NO ₂ (ppm)	80.96	55.3	-25.66	8.0
NO ₂ (ppm)	202.2	154.8	-47.4	12
NO (ppm)	30.08	27	-3.08	8.0
NO (ppm)	150.9	145	-5.9	8.0
NO (ppm)	320.6	304	-16.6	12
SO ₂ (ppm)	50.04	50	-0.04	6.0
SO ₂ (ppm)	100.8	100	-0.8	6.0
SO ₂ (ppm)	601.1	598	-3.1	13

Calibration Results After Adjustment (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.498	2.45	-0.048	0.20
O ₂ (%Vol)	10.04	9.89	-0.15	0.40
O ₂ (%Vol)	21.02	21.16	0.14	0.80
CO (ppm)	80.14	82	1.86	3.0
CO (ppm)	309.9	313	3.1	6.0
CO (ppm)	1003	1014	11	12
NO ₂ (ppm)	30.34	21.2	-9.14	8.0
NO ₂ (ppm)	80.96	62.7	-18.26	8.0
NO ₂ (ppm)	202.2	205.6	3.4	12
NO (ppm)	30.08	32	1.90	8.0
NO (ppm)	150.9	153	2.1	8.0
NO (ppm)	320.6	322	1.4	12
SO ₂ (ppm)	50.04	50	-0.04	6.0
SO ₂ (ppm)	100.8	100	-0.8	6.0
SO ₂ (ppm)	601.1	598	-3.1	13

Remark : 1 cmol/mol = 1 %Vol , 1 μmol/mol = 1 ppm.

End of Report

Entech Industrial Solution Co., Ltd.

17/121 Soi Niamwongwan 47 Yek 48, Toongsonghong, Laks, Bangkok 10210 THAILAND Tel: 0-2770-8888 Calibration@entech.co.th
Fax: 0-105536035531 www.entech.co.th

Entech Industrial Solution Co., Ltd.

17/121 Soi Niamwongwan 47 Yek 48, Toongsonghong, Laks, Bangkok 10210 THAILAND Tel: 0-2770-8888 Calibration@entech.co.th
Fax: 0-105536035531 www.entech.co.th



Instrument description : Flux gas Analyzer
Instrument model : Testo 340
Instrument serial no. : 62150585
ID no. or control no. : RYG_F50465
Manufacturer : Testo SE & Co. KGaA
Probe description :
Probe model :
Probe serial :
Customer name : ALS LABORATORY GROUP (THAILAND) CO.,LTD
Customer address : 104 Phatthanakan 40, Phatthanakan Road, Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok, 10250 Thailand
Total pages of certificate : 2 Pages
Receiving no. : L-230166
Receiving date : 20-Jan-23
Parameter of calibration : Gas Calibration (Oxygen 2.498,10.04,21.02 %Vol, Carbon Monoxide 80.14,309.9,1003 ppm,
Nitric Oxide 30.08,150.9,320.6 ppm, Sulphur Dioxide 50.04,80.96,601.1 ppm)
Condition of UUC : Used
Ambient condition : All of the Measurement were carried out the stabilized laboratory
Temperature : 23 ± 0.5 °C
Humidity : 55 ± 15 %RH
Calibration place : 17/121 Soi Niamwongwan 47 Yek 48, Toongsonghong, Laks, Bangkok 10210
Calibration procedure no.: WI-CL-28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurement
Multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.
This certificate is applied only to item under test Environmental condition.
This Calibration Certificate may not be reproduced other than in full except with the permission of the issuing laboratory.
Calibration certificates without signature and seal not valid.
This calibration certificate documents are traceability to national standards, which realize measurement according to the
International System of Units (SI).
Date of calibration : 23-Jan-23

Mr. Sodsawat Nuesthong
Calibration Technician

Mr. Nongluck Wongsetee
Technical Manager

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.498 % Vol	4219/21	Linde	30-Sep-25
Oxygen (O ₂) 10.04 % Vol	CG-0153-21	Nimt	18-Nov-26
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nimt	14-Feb-27
Carbon monoxide (CO) 309.9 ppm	2893/21	Linde	22-Jun-23
Carbon monoxide (CO) 1003 ppm	2583/22	Linde	09-Aug-24
Nitric Oxide (NO) 30.08 ppm	SGS10668	Nimt	13-Jun-24
Nitric Oxide (NO) 150.9 ppm	2857/21	Linde	27-Jun-23
Nitric Oxide (NO) 320.6 ppm	2944/21	Linde	02-Jul-23
Sulphur Dioxide (SO ₂) 50.04 ppm	3205/21	Linde	25-Jul-23
Sulphur Dioxide (SO ₂) 100.8 ppm	3507/22	Linde	09-Nov-24
Sulphur Dioxide (SO ₂) 601.1 ppm	3204/21	Linde	20-Jul-23

Measured room conditions

Temperature : 22.6 °C Humidity : 57.8 %RH Pressure : 1015.3 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 600 ml/min Gas pressure : 1018.2 mbar

Calibration Results (before adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.498	2.46	-0.038	0.20
O ₂ (%Vol)	10.04	9.93	-0.11	0.40
O ₂ (%Vol)	21.02	21.18	0.16	0.80
CO (ppm)	80.14	81	0.86	3.0
CO (ppm)	309.9	326	16.1	6.0
CO (ppm)	1003	1061	58	12
NO (ppm)	30.08	27	-3.08	8.0
NO (ppm)	150.9	144	-6.9	8.0
NO (ppm)	320.6	309	-11.9	12
SO ₂ (ppm)	50.04	49	-1.04	6.0
SO ₂ (ppm)	100.8	99	-1.8	6.0
SO ₂ (ppm)	601.1	597	-4.1	13

Calibration Results (after adjustment) (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.498	2.46	-0.038	0.20
O ₂ (%Vol)	10.04	9.93	-0.11	0.40
O ₂ (%Vol)	21.02	21.18	0.16	0.80
CO (ppm)	80.14	81	0.86	3.0
CO (ppm)	309.9	309	-0.9	6.0
CO (ppm)	1003	1002	-1	12
NO (ppm)	30.08	30	-0.08	8.0
NO (ppm)	150.9	153	2.1	8.0
NO (ppm)	320.6	316	-4.6	12
SO ₂ (ppm)	50.04	49	-1.04	6.0
SO ₂ (ppm)	100.8	99	-1.8	6.0
SO ₂ (ppm)	601.1	597	-4.1	13

Remark : 1 cmol/mol = 1 %Vol , 1 μmol/mol = 1 ppm.

End of Report

Entech Industrial Solution Co., Ltd.

17/121 Soi Niamwongwan 47 Yek 48, Toongsonghong, Laks, Bangkok 10210 THAILAND Tel: 0-2770-8888 Calibration@entech.co.th
Fax: 0-105536035531 www.entech.co.th

Entech Industrial Solution Co., Ltd.

17/121 Soi Niamwongwan 47 Yek 48, Toongsonghong, Laks, Bangkok 10210 THAILAND Tel: 0-2770-8888 Calibration@entech.co.th
Fax: 0-105536035531 www.entech.co.th



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3069-24 FAX 0-2719-9484



Cert.No.: 21P3344
Page: 2 of 2

Certificate of Calibration

Certificate No.: 21P3344
Page: 1 of 2

Equipment: Vacuum Gauge

Manufacturer: QualityWell

Model: F221AVD

Serial No.: VG02

ID No.: RYG_FS0333

Condition As-Received: Used Item

Received Date: 01 October 2021

Calibration Date: 06 October 2021

Reference: 2110-0066WSC

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

Atmospheric Pressure: 1009 mbar

104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to in-house calibration procedure CP-P05, using * DKD-R 6-1 ; Calibration of Pressure Gauges, Edition 03/2014 * as a guidelines.

Condition of this result of calibration

1. Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Digital Pressure Gauge	15PSIXP2I	156670	21P2029	03 Sep 2022

2. This instrument was installed in vertical orientation and center of the dial was used as the reference level.

3. This result of calibration was made on requested at the point specified by customer.

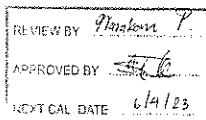
4. Scale and conversion factor is 1 kPa = 0.2953 inHg

5. This instrument was used clean air as pressure media.

6. The certificate is valid only to the item calibrated on date and place of calibration.

7. This Certificate is traceable to the International System of Unit maintained at:

-National Institute of Metrology Thailand (NIMT)



Calibrated by: Noppapat Phongam
Issue Date: 07 October 2021

Approved Signatory: Attapol P.
[] Phalinee Prabpaipal
[] Sura Suwannasri
[x] Attapol Panurach

B 0270821

Result of calibration: Without adjustment
Function: Vacuum Pressure Measurement

Range: 0 inHg to -30 inHg
Scale Interval: 0.5 inHg (The Fifth Estimate)

Applied Pressure (inHg)	0.00	-4.97	-9.97	-14.97	-19.99	-25.02
UUC* Indication (inHg)	0.0	-5.0	-10.0	-15.0	-20.0	-25.0
Error (inHg)	0.00	-0.03	-0.03	-0.03	-0.01	0.02

Applied Pressure (inHg)	-25.00	-19.97	-14.95	-9.95	-4.97	0.00
UUC* Indication (inHg)	-25.0	-20.0	-15.0	-10.0	-5.0	0.0
Error (inHg)	0.00	-0.03	-0.05	-0.04	-0.03	0.00

The uncertainty of measurement was ± 0.12 inHg

* UUC = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 %

-00-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3069-24 FAX 0-2719-9484



Cert.No.: 21P3175
Page: 2 of 2

Certificate of Calibration

Certificate No.: 21P3175
Page: 1 of 2

Equipment: Vacuum Gauge

Manufacturer: QualityWell

Model: F221AVD

Serial No.: VG01

ID No.: RYG_FS0332

Condition As-Received: Used Item

Received Date: 15 September 2021

Calibration Date: 21 September 2021

Reference: 2109-0560WSC

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

Atmospheric Pressure: 1009 mbar

104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to in-house calibration procedure CP-P05, using * DKD-R 6-1 ; Calibration of Pressure Gauges, Edition 03/2014 * as a guidelines.

Condition of this result of calibration

1. Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Digital Pressure Gauge	15PSIXP2I	156670	21P2929	03 Sep 2022

2. This instrument was installed in vertical orientation and center of the dial was used as the reference level.

3. This result of calibration was made on requested at the point specified by customer.

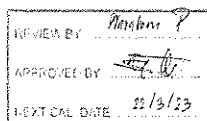
4. Scale and conversion factor is 1 kPa = 0.2953 inHg

5. This instrument was used clean air as pressure media.

6. The certificate is valid only to the item calibrated on date and place of calibration.

7. This Certificate is traceable to the International System of Unit maintained at:

-National Institute of Metrology Thailand (NIMT)



Calibrated by: Suksan Khankaew
Issue Date: 22 September 2021

Approved Signatory: Attapol P.
[] Phalinee Prabpaipal
[] Sura Suwannasri
[x] Attapol Panurach

B 0268462

Result of calibration: Without adjustment
Function: Vacuum Pressure Measurement

Range: 0 inHg to -30 inHg
Scale Interval: 0.5 inHg (The Fifth Estimate)

Applied Pressure (inHg)	0.00	-4.74	-9.77	-14.83	-19.74	-25.62
UUC* Indication (inHg)	0.0	-5.0	-10.0	-15.0	-20.0	-25.0
Error (inHg)	0.00	-0.26	-0.23	-0.17	-0.26	-0.38

Applied Pressure (inHg)	-25.64	-19.70	-14.76	-9.77	-4.73	0.00
UUC* Indication (inHg)	-26.0	-20.0	-15.0	-10.0	-5.0	0.0
Error (inHg)	-0.36	-0.30	-0.24	-0.23	-0.27	0.00

The uncertainty of measurement was ± 0.12 inHg

* UUC = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 %

-00-

Attapol P.

a 1068738



PENTA CALIBRATION CO., LTD.
66/124 The Connect 33 Village Kanchanaphisek Road
Dokmai, Prawet Bangkok 10250
Tel: +66 (0) 2069-9773
www.pentalab.com

Certificate of Calibration

Represent to Certificate of Calibration ,PTC/07/22099

Certificate No. PTC/07/22099 Page 1 of 2
Equipment Digital Balance Condition Normal
Manufacturer Sartorius Serial No 31709552
Model MSU2245-100-DJ ID No RYG_EN0003
Type of Balance Single interval



Customer: ALS Laboratory Group (Thailand) Co.,Ltd
610/10 Moo 5 T Maenamkoo, A Phukdaeng
Rayong 21140, Thailand

REVIEW BY *Thiraporn*
APPROVED BY *D*
NEXT CAL DATE 23/03/2023

Environment Condition Temperature 23.0 °C ± 0.3 °C
Humidity 58.1 %RH ± 4.4 %RH
Air density 1.17 kg/m³

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd.
610/10 Moo 5 T Maenamkoo A Phukdaeng,
Rayong 21140, Thailand

The Method used: In house method, PTC-WF-07 base on Eurimet eq. 18

Traceability This certificate is traceable to the SI Units through Thai Calibration Service Co. Ltd
NSC-ONSC Accreditation No. Calibration 0109

Date Received March 23 2022

Calibration Date March 23 2022

Issued Date March 25 2022

Calibration By: Mr Rungroj Metakul

Reviewed by
(Mr Krangsak Kalasin)

Approved By
(Mr Keatsak Kerato)

This certificate is issued based on the result of measurement of a single full intermediate set of data of 10-150 g. It provides traceability of measurement to international or national standards for other recognized national standards laboratories.

The measurement is based on the standard uncertainty, which is obtained from the standard uncertainty multiplied by the coverage factor (k = 2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM). This effect that the result inside only, to the item calibrated.

This calibration certificate shall not be reproduced except in full or in part without written approval from Penta Calibration Co., Ltd.



PENTA CALIBRATION CO., LTD.
66/124 The Connect 33 Village Kanchanaphisek Road
Dokmai, Prawet Bangkok 10250
Tel: +66 (0) 2069-9773
www.pentalab.com

Represent to Certificate of Calibration ,PTC/07/22099

Certificate No PTC/07/22099

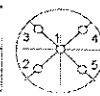
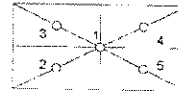
Page 2 of 2

Measurement Results:

Without Adjustment

Function Calibration Non Adjustment

Eccentric Error Weight to be 1/2 1/2 or of Maximum capacity



Eccentricity test 100 (g)				
Position (g)				
1	2	3	4	5
0.0000	0.0000	0.0001	0.0001	0.0001
Maximum deviation 0.0001				

Repeatability Test Weight to be 1/2 ≤ t ≤ Maximum capacity

Determination of the standard deviation of weighing balance Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
200	0.00007

Error of indication from nominal value Readability 0.0001 (g)

Nominal Value (g)	Conventional Mass (g)	Indication (g)	Correction of Balance (g)	Uncertainty (g)	k
0	0.00000	0.0000	0.0000	0.00020	2.65
0.01	0.01000	0.0099	0.0001	0.00020	2.43
0.1	0.10000	0.1000	0.0000	0.00020	2.43
0.5	0.50000	0.5000	0.0000	0.00020	2.43
1	1.00000	1.0000	0.0000	0.00020	2.43
5	5.00001	5.0000	0.0000	0.00020	2.43
10	10.00000	10.0000	0.0000	0.00020	2.43
20	20.00003	20.0000	0.0000	0.00020	2.43
50	50.00004	50.0000	0.0000	0.00021	2.32
100	100.00004	99.9999	0.0001	0.00022	2.17
200	200.00011	200.0000	0.0001	0.00027	2.05

Note Weight of adjust (g)

The End of Certificate

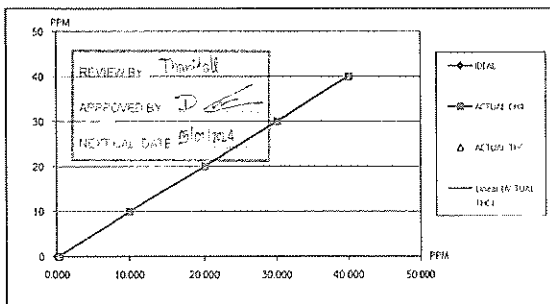


TEST REPORT

CUSTOMER NAME ALS Laboratory Group (Thailand) Co., Ltd (บริษัท แอลเอส กรุ๊ป (ประเทศไทย) จำกัด)			
EQUIPMENT NAME THC Analyzer			
MANUFACTURER HORIBA	MODEL ALPHA-370	SERIAL NO UA3NG4TH	
STANDARD GAS CONCENTRATION (PPM) 506.1 PPM		CYLINDER NO CCT34373	
CYLINDER PRESSURE (psig) 1,600 PSI		CERTIFIED DATE 12/05/2020	
CERTIFIED BY AIRGAS		EXPIRED DATE 12/05/2028	

TEST RESULTS

POINT NO	TEST RESULTS						
	IDEAL	ACTUAL CH4	ERROR CH4	MEAN CH4	ACTUAL THC	ERROR THC	MEAN THC
ZERO	0.000	0.210	0.210	0.200	0.200	0.200	0.200
1	10.000	10.050	0.050	0.50	10.050	0.050	0.50
2	20.000	20.120	0.120	0.60	20.150	0.150	0.75
3	30.000	30.110	0.110	0.37	30.050	0.050	0.17
4	40.000	40.030	0.030	0.08	40.030	0.030	0.03
AVERAGE (%)				0.39			0.37



CALIBRATED BY *DA*

CHECKED BY *DA*

DATE 25/1/16
NAC
PENTACALIBRATION CO., LTD.

สำหรับการใช้ข้อมูลทางเทคนิคนี้ กรุณาใช้ร่วมกับข้อมูลอื่น ๆ โทร 02-668-0812 หรือ 1516, E-Mail Engineer@pentalab.com
หรือ 63/14-15.67/35 25 ถนนพหลโยธิน แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10000 โทร 02-668-0812 โทรสาร 02-668-1859



CHECK LIST

CUSTOMER NAME	ALS Laboratory Group (Thailand) Co., Ltd (บริษัท แอลเอส กรุ๊ป (ประเทศไทย) จำกัด)		
EQUIPMENT NAME	THC Analyzer		
MANUFACTURER	HORIBA	MODEL	ALPHA-370
SERIAL NO.	UA3NG4TH		

TEST VALUES				
NO.	THC Analyzer (ALPHA - 370)	UNIT	BEFORE	AFTER
1	Signal (CH4)	mV	4.300	47.400
2	Signal (THC)	mV	3.200	64.400
3	Detector	Temp °C, Standard Value Ambient Temp (15°C to 15°C) Pressure kPa, Standard Value Ambient (1013x100 20x4kPa)	46.700 70.000	50.000 70.100
4	Ambient	kPa current atmospheric pressure	101.020	101.100
5	Fertilizer	°C, Standard Value 390 °C to 430 °C kPa, Normal value 8 kPa to 25 kPa	420.400 9.600	421.200 9.800
6	IMHC	°C, Standard Value 230 °C to 260 °C	244.600	245.100
7	OC 24 V	V, Standard Value 24 V ± 0.5 V	23.900	23.900
8	OC 5 V	V, Standard Value 5 V ± 0.5 V	5.000	5.000
9	Bypass (Optional)	L/min, Normal value 0.7 L/min ± 0.3 L/min		
10	Over Flow (Optional)	L/min, Standard Value 0.8 L/min or More		
11	CH4 Sampling Reading	PPM	3.530	2.330
12	IMHC Sampling Reading	PPM	4.285	1.150
13	THC Sampling Reading	PPM	8.810	3.480
14	Zero Gas CH4/THC	PPM	0.21/0.20	0.00/0.00
15	Span Gas	PPM	54.87/55.76	40.03/40.03
16	Gas H2	20 PSI	20	20

Remark Reference: EX-EN-017-56, Ambient THC Monitor ALPHA-370 Operation Manual Page #81

Remark (Ambient temperature = 5°C to 40°C)

รายการการตรวจ

Service Maintenance

รายการเอกสารดำเนินการ

ทำ Calibration Zero/Span, Multi-point

ผลการดำเนินการ

เรียบร้อยแล้ว หรือ จะดำเนินการตามรายการต่อไปตามปกติ

CALIBRATED BY *DA*

CHECKED BY *DA*

DATE 25/1/16
NAC
PENTACALIBRATION CO., LTD.

สำหรับการใช้ข้อมูลทางเทคนิคนี้ กรุณาใช้ร่วมกับข้อมูลอื่น ๆ โทร 02-668-0812 หรือ 1516, E-Mail Engineer@pentalab.com
หรือ 63/14-15.67/35 25 ถนนพหลโยธิน แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10000 โทร 02-668-0812 โทรสาร 02-668-1859

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Srinthorn Rd.,Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACC23009
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No. : 34178121
ID No. : RYG_FS0213

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 24 JANUARY 2023
Calibration Date : 26 JANUARY 2023
Date of Issue : 27 JANUARY 2023

Calibrated by : Nathakorn Pisulpaisan

Approved by :

T. Petchurai
(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

SITHIPORN / SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC23009
Job No. : VC66AC0031
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by based on IEC-60942-2003 Standard.

The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL-BP_04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL-BP_03/0265	09-Feb-23
Digital Multimeter	33461A	MY60024273	EEL-BP_05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23
Audio Analyzer	AVR-3360A	V744B6069	EF-0010-22	07-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

QF-TS12-04-04-020664

SITHIPORN / SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACC23009
Job No. : VC66AC0031
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	94.16	0.16	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1003.2	0.3	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
1.97	0.10	3.0

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %.

End of Calibration Certificate

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/1 Srinthorn Rd.,Bangbunru, Bangplud Bangkok 10700 THAILAND
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACC23048
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 01222724 / 143842 / 22771
ID No. : RYG_FS0023

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 JANUARY 2023
Calibration Date : 13-18 JANUARY 2023
Date of Issue : 19 JANUARY 2023

Calibrated by :

Nathakorn Pisulpaisan

Approved by :

T. Petchurai
(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

QF-TS12-04-04-020664

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23048
Job No. : VC66AC0024
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAJ	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL23048
Job No. : VC66AC0024
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-04-020664

P.T.A.

QF-TS12-04-04-020664

P.T.A.

Continuation of Calibration Certificate

Cert. No. : ACL23048
Job No. : VC66AC0024
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.4

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured Value (dB)
A - weight	11.2
C - weight	17.6
Flat	23.4

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-0.8	-0.8	-0.7	± 5.0

Continuation of Calibration Certificate

Cert. No. : ACL23048
Job No. : VC66AC0024
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

QF-TS12-04-04-020664

P.T.A.

QF-TS12-04-04-020664

P.T.A.

Continuation of Calibration Certificate

Cert. No. : ACL23048
Job No. : VC66AC0024
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	53.9	-0.1	±1.1
49.0	48.9	-0.1	±1.1
44.0	43.9	-0.1	±1.1
39.0	38.9	-0.1	±1.1
34.0	33.9	-0.1	±1.1
30.0	29.9	-0.1	±1.1
29.0	28.8	-0.2	±1.1
28.0	27.9	-0.1	±1.1
27.0	26.8	-0.2	±1.1
26.0	25.9	-0.1	±1.1
25.0	24.8	-0.2	±1.1

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T. Petchurai

Continuation of Calibration Certificate

Cert. No. : ACL23048
Job No. : VC66AC0024
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.8	-0.6	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

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T. Petchurai

Continuation of Calibration Certificate

Cert. No. : ACL23048
Job No. : VC66AC0024
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.7	0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

451-451/1 Sirinthorn Rd., Banghumnu, Bangplud Bangkok 10700 THAILAND
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL23194
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00597168 / 179117 / 87524
ID No.: RYG_FS0438

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 SEPTEMBER 2022
Calibration Date : 07-09 SEPTEMBER 2022
Date of Issue : 14 SEPTEMBER 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchurai
(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

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T. Petchurai

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22194
Job No. : VC65AC0081
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL22194
Job No. : VC65AC0081
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

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Continuation of Calibration Certificate

Cert. No. : ACL22194
Job No. : VC65AC0081
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	11.6
C - weight	18.1
Flat	23.8

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.1	0.2	0.2	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	1.7	1.8	1.8	±5.0

Continuation of Calibration Certificate

Cert. No. : ACL22194
Job No. : VC65AC0081
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighing network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.1	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.1	±2.0
4000	0.1	0.1	0.1	±3.0
8000	0.1	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.1	0.1	± 0.3

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Continuation of Calibration Certificate

Cert. No. : ACL22194
Job No. : VC65AC0081
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.1	0.1	±1.1
134.0	134.1	0.1	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.1	0.1	±1.1
114.0	114.1	0.1	±1.1
109.0	109.0	0.0	±1.1
104.0	104.1	0.1	±1.1
99.0	99.1	0.1	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	27.9	-0.1	±1.1
27.0	26.9	-0.1	±1.1
26.0	25.9	-0.1	±1.1
25.0	24.9	-0.1	±1.1

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Continuation of Calibration Certificate

Cert. No. : ACL22194
Job No. : VC65AC0081
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11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Weighting	137.0	137.0	0.0	±0.3
A-weight				

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Continuation of Calibration Certificate

Cert. No. : ACL22194
Job No. : VC65AC0081
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	116.9	-0.1	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.8	-0.2	1.5 ; -5.0
	2	8	108.0	107.9	-0.1	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

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T. Petchur

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Tel:0-2435-8800 Fax:0-2435-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL22195
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamp/plier NH-24
Serial No.: 00597169 / 180411 / 88181
ID No.: RYG_FS0439

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHUET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 SEPTEMBER 2022
Calibration Date : 07-09 SEPTEMBER 2022
Date of Issue : 14 SEPTEMBER 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchurai)

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T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22195
Job No. : VC65AC0081
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on JEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EP-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EP-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EP-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL22195
Job No. : VC65AC0081
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

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Continuation of Calibration Certificate

Cert. No. : ACL22195
Job No. : VC65AC0081
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	13.1
C - weight	19.3
Flat	24.8

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.1	0.1	0.1	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	1.2	1.3	1.2	±5.0

Continuation of Calibration Certificate

Cert. No. : ACL22195
Job No. : VC65AC0081
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

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Continuation of Calibration Certificate

Cert. No. : ACL22195
Job No. : VC65AC0081
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	53.9	-0.1	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.0	0.0	±1.1
25.0	25.0	0.0	±1.1

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T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22195
Job No. : VC65AC0081
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Continuation of Calibration Certificate

Cert. No. : ACL22195
Job No. : VC65AC0081
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

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T. Petchur

451-45171 Sindhorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND
Tel: 0-2433-8800 Fax: 0-2433-1679 e-mail: cal-center@sithiphorn.com http://www.sithiphorn.comCert. No. : ACL23040
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00709746 / 187332 / 01297
ID No.: RYG_FS0491

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
164 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHUWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 JANUARY 2023
Calibration Date : 13-18 JANUARY 2023
Date of Issue : 19 JANUARY 2023

Calibrated by : Nithakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchurai)

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QF-TS12-04-04-020664

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Continuation of Calibration Certificate

Calibration Procedure : CP-AC-01

Cert. No. : ACL23040
Job No. : VC66AC0024
Pages : 2 of 8

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL_BP_04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL_BP_03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL_BP_05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

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7. P. P. P.

Continuation of Calibration Certificate

Cert. No. : ACL23040
Job No. : VC66AC0024
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	12.5
C - weight	18.3
Flat	23.6

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.0	0.0	0.1	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	1.7	1.7	1.7	±5.0

Continuation of Calibration Certificate

Cert. No. : ACL23040
Job No. : VC66AC0024
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

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7. P. P. P.

Continuation of Calibration Certificate

Cert. No. : ACL23040
Job No. : VC66AC0024
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.2	-0.2	-0.2	±2.0
125	-0.1	-0.1	-0.1	±1.5
250	0.0	-0.1	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

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7. P. P. P.

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7. P. P. P.

Continuation of Calibration Certificate

Cert. No. : ACL23040
Job No. : VC66AC0024
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.1	0.1	±1.1
84.0	84.1	0.1	±1.1
79.0	79.1	0.1	±1.1
74.0	74.1	0.1	±1.1
69.0	69.1	0.1	±1.1
64.0	64.0	0.0	±1.1
59.0	59.1	0.1	±1.1
54.0	54.0	0.0	±1.1
49.0	49.1	0.1	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.1	0.1	±1.1
29.0	29.1	0.1	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.1	0.1	±1.1
25.0	25.1	0.1	±1.1

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T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL23040
Job No. : VC66AC0024
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k \approx 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Continuation of Calibration Certificate

Cert. No. : ACL23040
Job No. : VC66AC0024
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.9	-0.5	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

QT-TS12-04-04-020664

T. Petchur

451-451/1 Sirinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel: 0-2435-8800 Fax: 0-2433-1679 e-mail: cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL23008
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-42 / Preamplifier NH-24
Serial No. : 01122578 / 143486 / 22620
ID No. : RYG, FS0017

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 14 DECEMBER 2022
Calibration Date : 03-05 JANUARY 2023
Date of Issue : 06 JANUARY 2023

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchurai)

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QT-TS12-04-04-020664

T. Petchur

QT-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23008
Job No. : VC66AC0021
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anischoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-23	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-23	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP.04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP.03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP.05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAJ	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).
3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL23008
Job No. : VC66AC0021
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long-term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

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T. R. L.

QF-TS12-04-04-020664

T. R. L.

Continuation of Calibration Certificate

Cert. No. : ACL23008
Job No. : VC66AC0021
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
17.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)
A-weight	16.6
C-weight	22.6
Flat	28.1

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			Acceptance Limits
	Flat	C-weight	A-weight	
125	0.1	0.2	0.2	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	0.6	0.7	0.7	± 5.0

Continuation of Calibration Certificate

Cert. No. : ACL23008
Job No. : VC66AC0021
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	0.1	±2.0
125	-0.1	0.0	-0.1	±1.5
250	0.0	0.0	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	0.0	-
C-weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	± 0.3

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T. R. L.

QF-TS12-04-04-020664

T. R. L.

Continuation of Calibration Certificate

Cert. No. : ACL23008
Job No. : VC66AC0021
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	132.9	-0.1	±1.1
132.0	131.9	-0.1	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	28.9	-0.1	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.0	0.0	±1.1
25.0	25.0	0.0	±1.1

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL23008
Job No. : VC66AC0021
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 / -5.0
	2	8	117.0	117.0	0.0	1.0 / -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 / -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 / -5.0
SEL	2	8	108.0	108.0	0.0	1.0 / -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL23008
Job No. : VC66AC0021
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11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petch.

451-451/1 Sirinthorn Rd, Bangbunru, Bangkok 10700 THAILAND
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL23009
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/Microphone UC-52 / Preamplifier NH-24
Serial No.: 01122579 / 172172 / 74022
ID No.: RYG FS0018

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 14 DECEMBER 2022
Calibration Date : 03-05 JANUARY 2023
Date of Issue : 06 JANUARY 2023

Calibrated by : Piathakorn Pisutpaisan

Approved by :

T. Petch.
(Thanakul Petchurai)

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Continuation of Calibration Certificate

Cert. No. : ACL23009
Job No. : VC66AC0021
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP.04-02-65	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP.04-02-65	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP.04-02-65	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-1010-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL23009
Job No. : VC66AC0021
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

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Continuation of Calibration Certificate

Cert. No. : ACL23009
Job No. : VC66AC0021
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	12.0
C - weight	20.1
Flat	26.6

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.0	0.1	0.1	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	0.1	0.1	0.1	± 5.0

Continuation of Calibration Certificate

Cert. No. : ACL23009
Job No. : VC66AC0021
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.1	±2.0
4000	0.0	0.1	0.1	±3.0
8000	0.1	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	±0.2
Flat	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.1	0.1	± 0.3

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Continuation of Calibration Certificate

Cert. No. : ACL23009
Job No. : VC66AC0021
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.1	0.1	±1.1
134.0	134.1	0.1	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.1	0.1	±1.1
114.0	114.1	0.1	±1.1
109.0	109.0	0.0	±1.1
104.0	104.1	0.1	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	29.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1
28.0	27.9	-0.1	±1.1
27.0	26.9	-0.1	±1.1
26.0	25.9	-0.1	±1.1
25.0	24.8	-0.2	±1.1

QF-TS12-04-04-020664

P.T.A.

Continuation of Calibration Certificate

Cert. No. : ACL23009
Job No. : VC66AC0021
Pages : 8 of 8

11. Overload Indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	±1.5

12. High level stability

Frequency Weighting	S.L.M Display at initial (dB)	S.L.M Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Continuation of Calibration Certificate

Cert. No. : ACL23009
Job No. : VC66AC0021
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 / -5.0
	2	8	117.0	116.9	-0.1	1.0 / -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	107.9	-0.1	1.5 / -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.8	-0.2	1.5 / -5.0
	2	8	108.0	108.0	0.0	1.0 / -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

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P.T.A.

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Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL23046
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preampifier NH-24
Serial No.: 01122607 / 145554 / 34373
ID No.: RYG_FS0019

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHUWAENG PHATTHANAKAN, KHUET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 JANUARY 2023
Calibration Date : 13-18 JANUARY 2023
Date of Issue : 19 JANUARY 2023

Calibrated by :

Nathakorn Pisutpaisan

Approved by :

T. P.T.A.
(Thanakul Petchuraj)

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P.T.A.

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23046
Job No. : VC66AC0024
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3003-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL23046
Job No. : VC66AC0024
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

QI-TS12-04-04-020664

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Continuation of Calibration Certificate

Cert. No. : ACL23046
Job No. : VC66AC0024
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.7

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	9.9
C - weight	16.5
Flat	22.4

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.6	0.6	0.6	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	-2.3	-2.3	-2.3	±5.0

Continuation of Calibration Certificate

Cert. No. : ACL23046
Job No. : VC66AC0024
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	0.0	±2.0
125	0.0	0.1	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

QI-TS12-04-04-020664

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Continuation of Calibration Certificate

Cert. No. : ACL23046
Job No. : VC66AC0024
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.1	0.1	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	29.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1
28.0	27.9	-0.1	±1.1
27.0	27.0	0.0	±1.1
26.0	25.9	-0.1	±1.1
25.0	24.8	-0.2	±1.1

Continuation of Calibration Certificate

Cert. No. : ACL23046
Job No. : VC66AC0024
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	108.0	0.0	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.2	-0.2	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.1	0.1	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

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Continuation of Calibration Certificate

Cert. No. : ACL23046
Job No. : VC66AC0024
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11. Overload Indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.7	0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

451-451/1 Sirinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiphorn.com http://www.sithiphorn.comCert. No. : ACC23005
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-75
Serial No. : 35002736
ID No. : RYG_PS0496

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 JANUARY 2023
Calibration Date : 17 JANUARY 2023
Date of Issue : 19 JANUARY 2023

Calibrated by : Nattakorn Pisutpaivan

Approved by :

(Thanakul Petchurai)

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Continuation of Calibration Certificate

Cert. No. : ACC23005
Job No. : VC66AC0024
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by based on IEC-60942:2003 Standard.

The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	33461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23
Audio Analyzer	AVR-3360A	V744B6069	EF-0010-22	07-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACC23005
Job No. : VC66AC0024
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	93.98	-0.02	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1000.0	0.0	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
0.35	0.10	3.0

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation providing a level of confidence of approximately 95 %.

End of Calibration Certificate

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SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Sirinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL23077
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/Microphone UC-52 / Pre-amplifier NH-24
Serial No. : 00233184 / 144837 / 23232
ID No. : RYG_FS0025

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, KHET SUAN 1 UANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 24 JANUARY 2023
Calibration Date : 25-26 JANUARY 2023
Date of Issue : 27 JANUARY 2023

Calibrated by : Nithakorn Pisutpaisan

Approved by :

T. Petchurakul
(Thanakul Petchurakul)

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Continuation of Calibration Certificate

Cert. No. : ACL23077
Job No. : VC66AC0031
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

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Continuation of Calibration Certificate

Cert. No. : ACL23077
Job No. : VC66AC0031
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Continuation of Calibration Certificate

Cert. No. : ACL23077
Job No. : VC66AC0031
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Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.2

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	10.8
C - weight	17.1
Flat	22.8

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	-1.0	-0.9	-0.8	±5.0

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T. Rth.

Continuation of Calibration Certificate

Cert. No. : ACL23077
Job No. : VC66AC0031
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.1	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.1	±2.0
4000	0.0	0.1	0.1	±3.0
8000	0.1	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.1	0.1	± 0.3

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T. Rth.

Continuation of Calibration Certificate

Cert. No. : ACL23077
Job No. : VC66AC0031
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	34.0	0.0	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	29.0	0.0	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	27.0	0.0	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.9	-0.1	± 1.1

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T. Rth.

Continuation of Calibration Certificate

Cert. No. : ACL23077
Job No. : VC66AC0031
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8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	108.0	0.0	1.5; -5.0
	2	8	117.0	117.0	0.0	1.0; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5; -5.0
	2	8	108.0	108.0	0.0	1.0; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	132.9	-0.1	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

Continuation of Calibration Certificate

Cert. No. : ACL23077
Job No. : VC66AC0031
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	0.2	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petchur

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Siritthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND
Tel.0-2435-8800 Fax.0-2433-1679 e-mail:cal-center@sithiporn.com Http://www.sithiporn.comCert. No. : ACL23082
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00734220 / 145272 / 34370
ID No.: RYG_FS0026

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 24 JANUARY 2023
Calibration Date : 25-26 JANUARY 2023
Date of Issue : 27 JANUARY 2023

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchurai)

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T. Petchur

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associates CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No. : ACL23082
Job No. : VC66AC0031
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	ET-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	ET-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAJ	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL23082
Job No. : VC66AC0031
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Continuation of Calibration Certificate

Cert. No. : ACL23082
Job No. : VC66AC0031
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.6

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	12.0
C - weight	18.3
Flat	24.1

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-1.6	-1.5	-1.5	±5.0

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T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL23082
Job No. : VC66AC0031
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	±2.0
125	-0.1	0.0	-0.1	±1.5
250	0.0	-0.1	-0.1	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.0	0.0	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Lcq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.1	0.1	± 0.3

QF-TS12-04-04-020664

T. Petch.

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL23082
Job No. : VC66AC0031
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.1	0.1	± 1.1
134.0	134.1	0.1	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.1	0.1	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.1	0.1	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	39.0	0.0	± 1.1
34.0	33.9	-0.1	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.8	-0.2	± 1.1

QF-TS12-04-04-020664

T. Petch.

Continuation of Calibration Certificate

Cert. No. : ACL23082
Job No. : VC66AC0031
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 / -5.0
	2	8	117.0	116.9	-0.1	1.0 / -2.5
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	107.9	-0.1	1.5 / -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.8	-0.2	1.5 / -5.0
SEL	2	8	108.0	107.9	-0.1	1.0 / -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

Continuation of Calibration Certificate

Cert. No. : ACL23082
Job No. : VC66AC0031
Pages : 8 of 8

11. Overload Indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

QH-TS12-04-04-020664

QH-TS12-04-04-020664

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Sirinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL23041
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00734221 / 145286 / 34371
ID No.: RYG_FS0027

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 06 JANUARY 2023
Calibration Date : 13-18 JANUARY 2023
Date of Issue : 19 JANUARY 2023

Calibrated by : Nathakorn Pisunpaisan

Approved by :

T. Petchuraj
(Thanakul Petchuraj)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

QH-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23041
Job No. : VC66AC0024
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KA1	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QH-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL23041
Job No. : VC66AC0024
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Continuation of Calibration Certificate

Cert. No. : ACL23041
Job No. : VC66AC0024
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
17.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	13.4
C - weight	19.6
Flat	25.5

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.4	0.4	0.4	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	1.5	1.6	1.6	±5.0

QT-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23041
Job No. : VC66AC0024
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

QT-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23041
Job No. : VC66AC0024
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	± 1.1
136.0	136.0	0.0	± 1.1
135.0	135.0	0.0	± 1.1
134.0	134.0	0.0	± 1.1
133.0	133.0	0.0	± 1.1
132.0	132.0	0.0	± 1.1
131.0	131.0	0.0	± 1.1
129.0	129.0	0.0	± 1.1
124.0	124.0	0.0	± 1.1
119.0	119.0	0.0	± 1.1
114.0	114.0	0.0	± 1.1
109.0	109.0	0.0	± 1.1
104.0	104.0	0.0	± 1.1
99.0	99.0	0.0	± 1.1
94.0	94.0	0.0	± 1.1
89.0	89.0	0.0	± 1.1
84.0	84.0	0.0	± 1.1
79.0	79.0	0.0	± 1.1
74.0	74.0	0.0	± 1.1
69.0	69.0	0.0	± 1.1
64.0	64.0	0.0	± 1.1
59.0	59.0	0.0	± 1.1
54.0	54.0	0.0	± 1.1
49.0	49.0	0.0	± 1.1
44.0	44.0	0.0	± 1.1
39.0	38.9	-0.1	± 1.1
34.0	33.9	-0.1	± 1.1
30.0	29.9	-0.1	± 1.1
29.0	28.9	-0.1	± 1.1
28.0	27.9	-0.1	± 1.1
27.0	26.9	-0.1	± 1.1
26.0	25.9	-0.1	± 1.1
25.0	24.8	-0.2	± 1.1

QT-TS12-04-04-020664

T. Petch

QT-TS12-04-04-020664

T. Petch

Continuation of Calibration Certificate

Cert. No. : ACL23041
Job No. : VC66AC0024
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.0	-0.4	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QF-TS12-04-04-020664

63/14 15,67/35-36, Soi Petchkasem 7,7/1, Petchkasem Rd,
Walthapra, Bangkokhyat, Bangkok 10600 Thailand
Tel. (66) 02-8680812#13 Fax. (66) 02-8680860 www.jiranatee.com

Continuation of Calibration Certificate

Cert. No. : ACL23041
Job No. : VC66AC0024
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.6	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

QF-TS12-04-04-020664

63/14 15,67/35-36, Soi Petchkasem 7,7/1, Petchkasem Rd,
Walthapra, Bangkokhyat, Bangkok 10600 Thailand
Tel. (66) 02-8680812#13 Fax. (66) 02-8680860 www.jiranatee.com

CERTIFICATE OF CALIBRATION

Certificate No. CL 16245
Page 1 of 2Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32-2
Serial No: 15030244
ID No. RYC_FS0236Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakorn 40, Phatthanakorn Rd.,
Khwaeng Suan Luang, Khut Suan Luang, Bangkok
10250 ThailandReceived date: 15 Nov 2022
Calibration date: 21 Nov 2022
Issue date: 23 Nov 2022Reference Used During Calibration
1. Standard Temperature Probe Model: ST5-100-A500
Serial No. 66768208 Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: GTH-1000-AMR
Serial No. 671407-00591 Due date: 22 July 2023Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15) %Calibration Procedure
The temperature calibration was done by in House calibration method as WI-CL-001 according to companion method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.Traceability
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number TT-0934-22 Certificate number: ET-0092-22

Signature: *Markon P.*
Signature: *Mr. Jiraporn Lertsomphol*
Date: 21/11/23

Calibrated by
Mr. Sorawan Thachalad
Miss Jiraporn LertsompholApproved Signature
Mr. Pannisa Booncharoen
Calibration Department ManagerCertificate No. CL 16245
Page 2 of 2Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 - 40 °C

Function:

Table 1: This equipment was connected with wet bulb probe Model: HF-3201-2 S/N: 20030506
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.662	20.1	0.0	0.099
30	25.050	25.1	0.1	0.099
30	30.044	30.1	0.1	0.099
30	35.035	35.1	0.1	0.099
30	40.031	40.1	0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207-2 S/N: 15033223
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.664	20.1	0.0	0.099
70	25.049	24.9	0.1	0.099
70	30.042	29.7	0.3	0.099
70	35.035	34.5	0.5	0.099
0	40.032	39.4	0.6	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP327E-2 S/N: 17003684
Dimension: Diameter 8 mm, Length 110 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.664	20.0	0.1	0.099
110	25.050	25.0	0.1	0.099
110	30.042	30.0	0.0	0.099
110	35.034	35.0	0.0	0.099
110	40.031	40.0	0.0	0.099

UUC* Use Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %.

* End of Certificate *





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63/14-16,07/35-36, Soi Petchkasem 7,7/1, Petchkasem Rd.
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Certificate No. CL 057-05
Page 2 of 2

CERTIFICATE OF CALIBRATION

Certificate No.: CL-057-05
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15006716
ID No: RYG_FS0221

Customer
Name: ALS laboratory group (Thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand

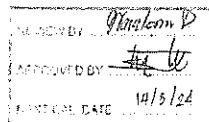
Received date: 01 Mar 2023
Calibration date: 14 Mar 2023
Issue date: 15 Mar 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No. 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±1) °C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by In House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TF-0034-22, Certificate number: ER-0092
22



Calibrated by
Mr. Soravit Thachalad
Mr. M-ss Jittaporn Lertsomphol



Approved Signatory:
Mr. Pannya Booncharoen
Calibration Department Manager

THIS CERTIFICATE MAY NOT BE REPRODUCED EXCEPT IN FULL, UNLESS PERMISSION FOR REPRODUCTION HAS
BEEN OBTAINED IN WRITING FROM THE LABORATORY

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment
Calibration Range: 20 - 40 °C
Function:

Table 1: This equipment was connected with wet bulb probe Model: HP3201.2 S/N: 18009587
Dimension: Diameter 14 mm Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.068	20.1	0.0	0.099
60	25.060	25.1	0.0	0.14
60	30.050	30.0	0.0	0.099
60	35.041	35.0	0.0	0.099
60	40.046	40.0	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TF3207.2 S/N: 15015492
Dimension: Diameter 14 mm Length 150 mm

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.068	20.3	0.2	0.099
70	25.060	25.1	0.0	0.099
70	30.050	30.0	0.0	0.099
70	35.041	34.9	0.1	0.099
70	40.046	39.8	-0.2	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15015967
Dimension: Diameter 8 mm Length 170 mm

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.068	20.0	0.1	0.099
110	25.061	25.0	0.1	0.099
110	30.050	30.0	0.0	0.099
110	35.041	35.0	0.0	0.099
110	40.046	40.0	0.0	0.099

UUC*: Unit Under Calibration
The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor $k=2$
providing a level of confidence of approximately 95%.

★ End of Certificate ★



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
5/4 PATTANAKARN ROAD SOI 18, ANULANG, SANGKAT BANGKOK 10250
TEL: 0-2917 9600 FAX: 0-2919 9844

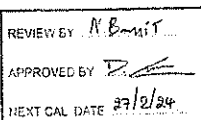


Cert.No.: 23CH275
Page.: 1 of 3

Certificate of Calibration

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: SevenCompact S220
Serial No.: C104059460
ID No.: RYG_EN0163
Condition As-Received: Used Item
Received Date: 24 February 2023
Calibration Date: 27 February 2023
Reference: 2302-0886DSC-2
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
(Rayong Branch)
616/10 Moo 5, T. Maenam Khu, A. Puakdaeng,
Rayong 21140, Thailand

Ambient Temperature: (25 ± 2.5) °C
Relative Humidity: (50 ± 15) %
Calibration Procedure:
- CP-CHS by direct measurement with standard
voltage calibrator and direct measurement with
certified reference material (CRM)
- CP-CHS by comparison with standard thermometer



Calibrated by: Walalak Sinthean

Approved by:
Approved Signatory

() Malee Buikruas
(✓) Sathip Meangmai
() Warakorn Lornagatrakul

Issue Date: 28 February 2023
The Uncertainties are for a confidence probability of approximately 95%.

Approved by the Laboratory: Equipment Calibration and Testing Services



Cert.No.: 23CH275
Page.: 2 of 3

Condition of this calibration result

- Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	22E2769	24 Aug 2023
2) Ref. Standard Thermometer	4982054	110RC044	22I1306	27 Oct 2023

This certification is traceable to the International System of Unit maintained at:
- Traceable to National Institute of Metrology (Thailand), NIMT
- Certified Reference Materials: The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1635

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	826588	09 July 2024
pH 6.987	CPA chem	826589	09 July 2023
pH 10.010	CPA chem	863835	28 Dec 2023

3 This certificate is valid only to the item calibrated on date and place of calibration

Calibration Results

Function: mV Measurement

Performing standard curve by Fluke at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
			mV	pH		
pH Meter	4.000	177.48	177.4	4.000	0.058	2.00
S/N: C104059460	7.000	0.00	-0.1	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.058	2.00

Sathip



Cert.No.: 23CH275
Page.: 3 of 3

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (\pm)	Coverage factor k
pH Electrode S/N.: 1453404	4.008 6.987 10.010	4.008 6.988 10.013	179.1 4.7 -172.4	0.0046 0.0084 0.0069	2.00 2.00 2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLabExpert Pro-ISM
- Serial No. : 1453404

Dimension of probe;

- Length : 120 mm.
- Diameter : 12 mm.
- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (\pm °C)	Coverage factor k
25.0	25.001	24.8	-0.201	0.13	2.00

Remark : - UUC* = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %

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Saitip

a 1149924

B 0309672



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Certificate of Calibration

Certificate No.: 23E753
Page.: 1 of 2

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : SevenCompact S220
Serial No.: C104059460
ID No.: RYG_EN0183
Condition As-Received: Used Item
Received Date: 24 February 2023
Calibration Date: 28 February 2023
Reference: 2302-0986DSC
Ambient Temperature: (23 \pm 2) °C
Relative Humidity: (50 \pm 10) %
Submitted by: ALS Laboratory Group (Thailand) Co. Ltd (Rayong Branch)
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng, Rayong 21140, Thailand
Procedure used: Calibration were conducted using In-house calibration Procedure CP-E17 According to direct measurement method with Multi-Product Calibrator

Condition of this result of calibration

1. Reference standards instruments

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multi-Product Calibrator	5509A	6440007	22E1670	18 May 2023

2. This result of calibration was made on requested at the point specified by customer

3. The certificate is valid only to the item calibrated on date and place of calibration

4. This Certification is traceable to the International System of Unit maintained at:

- National Institute of Metrology Thailand (NMT)

Calibrated by : Wutthareeorn Wongchutkarn
Issue Date : 02 March 2023
Approved Signatory :
[] Phaisree Prabpai
[x] Nuntawat Khanchai
[] Poomthippa Tameyskul



Cert. No.: 23E753
Page.: 2 of 2

Result of calibration:- (*) Without adjustment () After adjustment

Function: DC voltage measurement	Range: 2000 mV	Standard Value (mV)	UUC* Reading (mV)	Error (mV)	Uncertainty (\pm μ V)
		-200.0000	-200.0	0.0	72
		-150.0000	-150.0	0.0	69
		-100.0000	-100.0	0.0	65
		-50.0000	-50.0	0.0	62
		0.0000	0.0	0.0	58
		50.0000	50.0	0.0	62
		100.0000	99.9	-0.1	65
		150.0000	149.9	-0.1	69
		200.0000	199.9	-0.1	72

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 %

UUC* = Unit Under Calibration.

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Cert.No.: 22TW34
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-115V
Serial No.: 15E102796
ID No.: RYG_EN0032
Received Date : 11 February 2022
Test Date : 14 February 2022
Reference : 2202-0404DSC-4
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd (Rayong Branch)
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, Rayong 21140, Thailand
Laboratory Condition : Temperature (25 \pm 5) °C
Humidity (50 \pm 20) %
Test Procedure : In - house method CP-CH9
by Comparison Technique with Azide Modification Method
Tested by : Walalak Sirinthan
Approved by :
[] Malee Butkruea
[x] Saitip Meangmai
[] Warakorn Lengagtrakul
Issue Date : 18 February 2022

REVIEW BY	N. Banrit
APPROVED BY	D. Saitip
NEXT CAL DATE	15/12/22

Saitip
Approved Signatory

a 1150477

B 0201265



Cert.No.: 22TW34
Page.: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %

Dissolved Oxygen Probe No.: 15E100464

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.02	8.02	0.0084

This report was certified only for the instrument we tested. It is allowable to use for study the system efficiency, The environmental impact control and present to organization it may concerned. Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full without written approval of the laboratory.

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Saitip

a 1094744



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TEL. 0-2317-3000-27 FAX. 0-2316-6444



Cert. No.: 22LM12
Page.: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
618/10 Moo 5 T. Maenam Khu, A. Pluakdaeng,
Rayong 21140, Thailand
Location : TPA On Site Calibration Laboratory
Received Order : 11 February 2022
Calibrated Date : 21 February 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Kunchit Promrat
Approved by : *[Signature]*
Approved Signatory
() Pornthippa Tameyakul
(✓) Malee Bulkruea
() Suwit Imjai

Issue Date : 21 February 2022

The Uncertainties are for a confidence probability of approximately 95 %

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Approval of the head of Corporate Services : Equipment Calibration and Testing Services

A 0038008



Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2202-0404DSC-5
Procedure Used :-

Cert. No.: 22LM12
Page.: 2 of 2

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.
The temperature scale used was based on ITS-90

Condition of this result of calibration

1. Reference standard instrument -

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Digital Thermometer	1523	2188080	2111273	22 Nov 2022

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (°) Without Adjustment

Function : Temperature measurement

This instrument was connected with temperature sensor, S/N. 15E100464

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
20.00	45	20.001	19.98	-0.121	0.15	2.00

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %

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[Signature]

a 1095714



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TEL. 0-2317-3000-27 FAX. 0-2316-6444



Cert. No.: 22TM317
Page.: 1 of 3

Certificate of Calibration

Equipment : Low Temp. Incubator
Manufacturer : Memmert
Model : IPP750
Serial No. : V818.0084
ID No. : RYG_EN0154
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
(Rayong Branch)
618/10 Moo 5 T. Maenam Khu, A. Pluakdaeng, Rayong 21140, Thailand
Location : BOD Room
Received Order : 22 April 2022
Calibration Date : 22 April 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Man Pattanapongpaiboon
Approved by : *[Signature]*
Approved Signatory
() Pornthippa Tameyakul
(✓) Malee Bulkruea
() Suwit Imjai

Issue Date : 3 May 2022

The Uncertainties are for a confidence probability of approximately 95 %

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Approval of the head of Corporate Services : Equipment Calibration and Testing Services

A 0040735



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2204-0146OC-1

Cert. No.: 22TM317
Page.: 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44031769	21LM12	02 Sep 2022

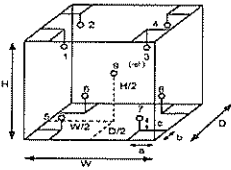
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (°) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Probe Installation Details :

Dimension of Chamber :	Value
a = 10 cm	D = 0.60 m
b = 10 cm	W = 1.0 m
c = 10 cm	H = 1.2 m
Capacity = 0.75 m ³	

Environment during calibration		
	Beginning	Finished
Temp (°C)	25	25
REL.Humid. (%)	54	58
AC Supply (Volt)	221	223

Position :	Ref. Std. ID No.:
1	9RTD-2/1
2	9RTD-2/2
3	9RTD-2/3
4	9RTD-2/4
5	9RTD-2/5
6	9RTD-2/6
7	9RTD-2/7
8	9RTD-2/8
9 (ref.)	9RTD-2/8



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2204-0146OC-1
Result of Calibration :- (°) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 22TM317
Page.: 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor
20.0	20.0	20.0	0.022	0.20	0.22	0.30	2

Calibration Point (°C)	Measured Temperature (°C)								
	1	2	3	4	5	6	7	8	9 (ref.)
20.0	20.209	20.174	20.199	20.110	20.075	20.062	20.027	20.069	20.030

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

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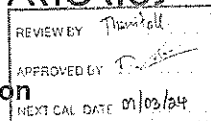
a 1106484

RYG_EN0002

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2543 8361-6 Fax: +66 2543 8367 e-mail: service.thailand@sartorius.com



SARTORIUS



Certificate of Calibration

Model Number	MSE224S-100-DU	Certificate No.	23BCI0112
Description	Analytical Balance	Issued Date	Friday, March 03, 2023
Serial Number	0026207038	Reference No.	204833
ID No	RYG_EN0002		
Manufacturer	Sartorius	Page No.	1 of 2

Customer Name ALS Laboratory Group (Thailand) Co. Ltd. (Rayong Branch)
615/10 Moo 5 T. Maenam Khu, A. Pluak Daeng, Rayong 21140, Thailand.

Calibrated Place ALS Laboratory Group (Thailand) Co. Ltd. (Balance Room)
615/10 Moo 5 T. Maenam Khu, A. Pluakdaeng, Rayong 21140, Thailand.

Calibrated By Mr Chonchai Inthana
Calibration Date Wednesday, March 01, 2023
Calibration Procedure No. This calibration was conducted by
Using in-house calibration procedure number (WI-003)
Based on UKAS LAB 14 2019

Metrological data:
Capacity 220 g Readability 0.0001 g
Ambients Conditions:
Temperature 23.6 °C ± 5.0 °C
Humidity 60.0 % RH ± 10.0 % RH
Pressure ±

Reasons for calibration
☐ New Installation ☐ Service / Required ☒ Recalibration/ Maintenance
Equipment Condition: ☒ Good Operate ☐ Fair

Measurement Method UKAS Publication Ref : Lab 14

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications

Traceability:

Model Number	Description	Traceability	Certificate No	Due Date
YCS011-522-00	Sartorius weight set 1mg - 5000g E2 YCS011-522-00	SPC-RT	C02212585	14-Sep-2023
MHB-382SD	Humidity/Balometer/Temp. Lutron MHB-382SD	DKSH	C19220444	5-Sep-2023

This certificate relate and apply this equipment only
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Sartorius (Thailand) Co. Ltd

Mr Chonchai Inthana (Technical Manager)



Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2543 8361-6 Fax: +66 2543 8367 e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number	MSE224S-100-DU	Certificate No	23BCI0112
Description	Analytical Balance	Issued Date	Friday, March 03, 2023
Serial Number	0026207038	Reference No	204833
ID No	RYG_EN0002		
Manufacturer	Sartorius	Page No	2 of 2

Calibration Results : Without Adjustment

Repeatability			Eccentricity (Off-center loading error)		
The repeatability is the ability of a weighing instrument to display nearly identical results under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.			The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/6 or 1/4 of maximum capacity, placed in the middle of the weighing pan and area between each of four additional measurement points (positions defined according to OIML R76).		
Nominal Value (Low Load)	20.0000 g	199.9999 g	Nominal value	100 g	
Tolerance	0.0001 g	199.9999 g	Tolerance	0.0004 g	
Nominal Value (High Load)	200.0000 g	199.9999 g			Difference
Tolerance	0.0001 g	199.9999 g			1 -
					2 -0.0001
					3 -0.0001
					4 0.0001
					5 0.0002
					6 -
Standard Deviation	0.00003	0.00005			

Linearity

The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance		0.0002 g		
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.01	0.0100	0.0100	0.0000	0.00014
0.05	0.0500	0.0500	0.0000	0.00014
0.1	0.1000	0.1000	0.0000	0.00014
0.5	0.5000	0.5000	0.0000	0.00014
1	1.0000	1.0000	0.0000	0.00014
5	5.0000	5.0000	0.0000	0.00014
10	10.0000	10.0000	0.0000	0.00014
20	20.0000	20.0000	0.0000	0.00014
50	50.0000	50.0000	0.0000	0.00014
100	100.0000	99.9999	-0.0001	0.00019
200	200.0000	200.0000	0.0000	0.00014

End of Report



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Cert. No.: 22TM1517
Page: 1 of 3

Certificate of Calibration

Equipment: Hot Air Oven
Manufacturer: Memmert
Model: UFE 500
Serial No.: G511.1572
ID No.: RYG_EN0010
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T. Maenam Khu,
A. Pluakdaeng,
Rayong 21140 Thailand
Location: Oven Room
Received Order: 20 October 2022
Calibration Date: 20 October 2022
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %
Calibrated by: Man Paltanapongpaiboon

REVIEW BY *Thantit*
APPROVED BY *P. J.*
NEXT CAL DATE 30/04/24

Approved by: *Malu*
Approved Signatory
() Pornthippa Tameyakul
(x) Malae Butkruea
() Suwit Imjai

Issue Date: 2 November 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the Head of Corporate Services & Equipment Calibration and Testing Services



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2210-03760C-2
Procedure Used:

Cert. No.: 22TM1517
Page: 2 of 3

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY49023932	22LM97	29 Jul 2023

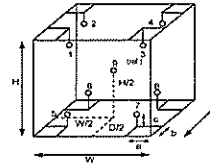
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration:

Function of UUC*: Temperature Source

Fresh air setting: Close



Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	25
REL.Humid. (%)	54	59
AC Supply (Volt)	223	225

Probe Installation Details: Dimension of Chamber:

a = 5.0 cm	D = 0.40 m
b = 5.0 cm	W = 0.56 m
c = 5.0 cm	H = 0.48 m
	Capacity = 0.11 m ³

Ref. Std. ID No.: @ Calibration Point		
Position:	(180) °C	(104) °C
1	21-16TC-01	20-16RTD-01
2	21-16TC-02	20-16RTD-02
3	21-16TC-03	20-16RTD-03
4	21-16TC-04	20-16RTD-04
5	21-16TC-05	22-16RTD-05
6	21-16TC-06	20-16RTD-06
7	21-16TC-07	20-16RTD-07
8	21-16TC-08	22-16RTD-08
9 (ref.)	21-16TC-09	22-16RTD-08

A 0046908

a 1132466

RYG_EN0006



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2210-03760C-2
Result of Calibration: (x) Without Adjustment
Function of UUC*: Temperature Source
Fresh air setting: Close

Cert. No.: 22TM1517
Page: 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
104.0	104.0	104.0	0.076	0.52	0.60	0.42	2
180.0	180.0	180.0	0.13	0.88	1.2	1.1	2

Calibration Point (°C)	Measured Temperature (°C)							
	Position							
	1	2	3	4	5	6	7	8
104.0	103.768	103.734	103.723	103.800	104.215	104.131	104.132	103.740
180.0	179.723	179.359	179.439	179.489	180.361	180.114	180.131	180.243

Average*: The average of 30 values in each position.

Temperature stability: One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity: The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation: The Difference of the maximum and minimum measured temperatures throughout observation.

UUC*: Unit Under Calibration

Note: The reported uncertainty of measurement was included stability and excluded uniformity.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k providing a level of confidence of approximately 95 %

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TEL: 0-2717 8692-7 FAX: 0-2719 9484



Cert. No.: 22TM1492
Page: 1 of 3

Certificate of Calibration

Equipment: Hot Air Oven
Manufacturer: Memmert
Model: UM 400
Serial No.: 6495.0899
ID No.: RYG_EN0006
Submitted by: ALS Laboratory Group (Thailand) Co. Ltd. (Rayong Branch)
616/10 Moo 5, T. Maenam Khu,
A. Pluakdaeng,
Rayong 21140, Thailand
Location: Oven Room
Received Order: 20 October 2022
Calibration Date: 20 October 2022
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %
Calibrated by: Preecha Hahib

REVIEW BY *Thantit*
APPROVED BY *P. J.*
NEXT CAL DATE 30/04/24

Approved by: *Malu*
Approved Signatory

() Pornthippa Tameyakul
(x) Malae Butkruea
() Suwit Imjai

Issue Date: 2 November 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the Head of Corporate Services & Equipment Calibration and Testing Services

a 1132465

A 0046905



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2210-0376OC-1
Procedure Used :-

Cert. No.: 22TM1482
Page : 2 of 3

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1 Reference standard instrument:-

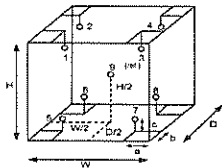
Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44035217	21LM30	23 Dec 2022

2 This certificate is valid only to the item calibrated on date and place of calibration.
3 This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Probe Installation Details :

Dimension of Chamber :
a = 50 cm
b = 50 cm
c = 50 cm
D = 0.33 m
W = 0.40 m
H = 0.40 m
Capacity = 0.053 m³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	28	29
REL Humid. (%)	43	47
AC Supply (Volt)	220	221

Position :	Ref. Std. ID No.:
1	18-10RTD-01
2	18-10RTD-02
3	18-10RTD-03
4	18-10RTD-04
5	18-10RTD-05
6	18-10RTD-06
7	18-10RTD-07
8	18-10RTD-08
9 (ref.)	18-10RTD-09



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2210-0376OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 22TM1492
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
70.0	70.0	70.0	0.079	0.47	0.77	0.42	2

Measured Temperature (°C)									
Calibration Point (°C)	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
70.0	70.262	69.995	70.079	70.177	70.564	70.039	70.688	70.149	70.328

Average* : The average of 30 values in each position.
Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.
Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity.
The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

-o0o-

a 1132473

RYG_EN0061

a 1132472



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
104-4 PATTANABADARN ROAD, SOI 18, JUNG JUNG, SIAM, BANGKOK 10500
TEL : 02-271-8661, 271-8662 FAX : 02-271-9454



Cert. No.: 22TM1491
Page : 1 of 3

Certificate of Calibration

Equipment : Water Bath

Manufacturer : Memmert

Model : WNB22

Serial No. : L513-0648

ID No. : RYG_EN0061

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5, T. Maenam Khu,
A. Pluakdaeng,
Rayong 21140, Thailand

Location : Wet Chemistry Lab

Received Order : 20 October 2022

Calibration Date : 20 October 2022

Ambient Temperature : (25 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Preecha Hiahb

Approved by :
Approved Signatory

() Pornthippa Tameyakul
(/) Malee Butkruea
() Suwit Imjai

Issue Date : 2 November 2022

The Uncertainties are for a confidence probability of approximately 95%.

The calibration was conducted by certified calibration staff in accordance with the metrological requirements of the International System of Unit.

Approved by the label of Competent Signatory : Preecha Hiahb and Preecha Hiahb



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2210-0376OC-4
Procedure Used :-

Cert. No.: 22TM1491
Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1 Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44035217	21LM30	23 Dec 2022

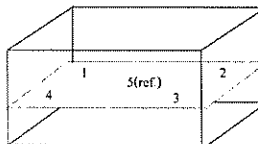
2 This certificate is valid only to the item calibrated on date and place of calibration.

3 This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply
	(°C)	(%R.H.)	(Volt)
Beginning of Calibration	24	53	222
Finished of Calibration	24	50	221



Front

Position :	Ref. Std. S/N.:
1	N37P300726
2	N37P300727
3	N37P300728
4	N37P300729
5 (ref.)	N37P300730

A 0046906

a 1132471



METTLER TOLEDO

Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2210-03760C-4
 Result of Calibration : (') Without Adjustment
 Function of UUC* : Temperature Source

Cert. No.: 22TM1491
 Page : 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)				
			1	2	3	4	5 (ref.)
85.0	85.0	85.0	84.527	84.563	84.628	84.516	84.580

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor k
85.0	0.12	0.081	0.16	2

Average* : The average of 30 values in each position

Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95 %.

-000-

Certificate Number CPH-0203-22

Calibration Certificate Seven2Go™ pH/mV meter S2

Customer

Company ALS LABORATORY GROUP (THAILAND) CO. LTD

Address E16/10 Moo 5, T. Muernakade, A. Phraklaeng

RAYONG 21140

Customer ID number 20180013

Customer representative

Instrument

Type Seven2Go™ pH/mV S2

Instrument Serial Number C32025569

Internal Identification

Firmware version 1.01

Technical specifications

Measuring Range -1500.0 1500.0 mV ± 70 pH

Resolution 1 mV

0.01 pH

Limit of Error ± 1 mV

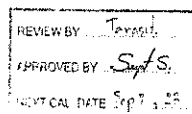
± 0.01 pH

Temperature range ATC 5 100 °C

Temperature range ATC 5 105 °C

Resolution 0.1 °C

Limit of Error ± 0.5 °C



Procedure Statement

METTLER TOLEDO Seven2Go Service Manual Section B (Doc. No. 30232219) will be used as referring documentation to adjust and certify the instrument included in the "Type" and "Serial number" section. The measurement results of this certification were obtained at ambient conditions.

Copy Meter Toledo No 0102 6

Fig. 1 of 3

Form is property of METTLER TOLEDO and is not to be reproduced without permission.

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METTLER TOLEDO

METTLER TOLEDO

Certificate Number CPH-0203-22

Certification Tools

Certified digital voltmeter Manufacturer ROVILET1 PAKKAND 344301A
 Type
 Serial number U330031151
 Certificate number E10252021
 Date of Certification September 7, 2022

Certified Temperature Resistor Manufacturer METTLER TOLEDO
 Type 51302410
 Serial number A227
 Certificate number 63873
 Date of Certification April 27, 2022

Designation	Nominal value	Certified value
NTC 30kΩ 0 °C	34.200 kΩ	34.5414 kΩ
NTC 30kΩ 25 °C	10.000 kΩ	10.0037 kΩ
NTC 30kΩ 50 °C	3.3465 kΩ	3.346531 kΩ
NTC 30kΩ 75 °C	1.425 kΩ	1.425284 kΩ
NTC 30kΩ 100 °C	0.670 kΩ	0.66835 kΩ

Certificate Number CPH-0203-22

Certification Measurements

pH/mV Sensor Input	Designation	Nominal value	Measured value	Max. Tolerance	Passed/Failed
pH/mV Sensor Input	1000 mV	1000.0 mV	999.0 mV	1 mV	Passed
	1000 mV	1000.0 mV	1000.0 mV	1 mV	Passed
	500 mV	500.0 mV	500.0 mV	1 mV	Passed
	100 mV	100.0 mV	100.0 mV	1 mV	Passed
	0 mV	0.0 mV	0 mV	1 mV	Passed
	-100 mV	-100.0 mV	-100 mV	1 mV	Passed
	-500 mV	-500.0 mV	-500 mV	1 mV	Passed
	-1000 mV	-1000.0 mV	-1000 mV	1 mV	Passed
	1000 mV	1000.0 mV	999.0 mV	1 mV	Passed
	1000 mV	1000.0 mV	1000.0 mV	1 mV	Passed

Temperature Sensor Input	Designation	Nominal value	Measured value	Max. Tolerance	Passed/Failed
Temperature Sensor Input	NTC 30kΩ 0 °C	0.0 °C	0.0 °C	0.5 °C	Passed
	NTC 30kΩ 25 °C	25.0 °C	25.1 °C	0.5 °C	Passed
	NTC 30kΩ 50 °C	50.0 °C	50.1 °C	0.5 °C	Passed
	NTC 30kΩ 75 °C	75.0 °C	75.1 °C	0.5 °C	Passed
	NTC 30kΩ 100 °C	100.0 °C	100.0 °C	0.5 °C	Passed

Summary of Certification

Certification of instrument

Passed

The instrument referred to in this certificate has fulfilled the criteria of this certification. This is indicated by the notation Passed in the column above.

Remarks Service Assignment ID: 020216323

Test high impedance at 1000.0 mV Results: 1500 mV

Difference = 0.0% Within MPE (0.1%)

Certification of the instrument was performed by

Name Watinee Thongud Functions Service Technician

Company METTLER TOLEDO

Date September 25, 2022

Signature Watinee T.

Performance Test

Attachment to Certificate No. CPH-0203-22

pH Electrode

Type InLab Expert Go-ISM SN 2295935

Certified standards used

Standard 1	Type	pH Buffer	Manufacturer	METTLER TOLEDO	Exp. date	Jun-24
	Nominal value:	pH (25.00 °C):	4.01	Lot No	1H156G	
Standard 2	Type	pH Buffer	Manufacturer	METTLER TOLEDO	Exp. date	Jun-24
	Nominal value:	pH (25.00 °C):	7.00	Lot No	1H013D	
Standard 3	Type	pH Buffer	Manufacturer	METTLER TOLEDO	Exp. date	May-24
	Nominal value:	pH (25.00 °C):	9.20	Lot No	1H139A	
Standard 4	Type	Redox Solution	Manufacturer	METTLER TOLEDO	Exp. date	-
	Nominal value:	pH (25.00 °C):	-	Lot No	-	

Adjustment

Set Calibration Buffer		B2 (25 °C) 2.00, 4.01, 7.00, 9.21, 11.00							
Select Calibration Mode		3-Point calibration		2-Point calibration		1-Point calibration			
3-Point Calibration		°C	pH	°C	pH	°C	pH		
Cal 1		ATC	25.9	4.01	ATC	25.0	-		
Cal 2		ATC	25.9	7.00	ATC	25.0	-		
Offset (mV)		10		-		-			
Slope % (for mV/pH)		98.4		-		-			
Cal 3		ATC	20.0	9.20					
Slope % (for mV/pH)		100							

Measurements

Before adjustment				After adjustment			
Buffer Values	Measured	Difference		Buffer Values	Measured	Difference	
pH	°C	pH	pH	pH	°C	pH	pH
4.01	25.9	ATC	3.99	4.01	20.1	ATC	4.00
7.00	26.0	ATC	6.96	7.00	26.0	ATC	7.01
9.19	25.9	ATC	9.18	9.19	20.1	ATC	9.19

Redox Measurement Result: mV

Note: The difference result of calibrated electrode should be within ± 0.05 pH

Remarks:

Place Chemical Laboratory Calibration Date September 26, 2022
Service Specialist Watinee Thongrod Signature Watinee T.

REVIEW BY	W. F. Sait
APPROVED BY	KL AI
NEXT CAL. DATE	01/12/23

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: GM-7
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Pathanakarn 40, Pathanakarn rd., Khwang Suan Luang, Khiet Suan Luang, Bangkok 10250Date: June 21, 2022 2:04:12 PM
EOP Name: AgilentRecommended, AgilentRecommended
EOP Revision: GC 02.50, GCMS 02.50
Overall Qualification Status: Pass

System Inspection and Basic Safety and Operation

Name: 7890
Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Front: SSL

Setpoint Status: Pass

Setpoint	Actual
Inlet Pressure: 25.0 psi	25.0 psi
Accuracy:	0.0 psi
Agilent Recommended	<= 1.2

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Date: June 21, 2022 2:04:12 PM
System ID: GM-7Setpoint Status: Pass
Zone: Oven
Setpoint/Actual: 230.0 °C
Temperature: 230.0 °C
Accuracy: 0.0 °C
Agilent Recommended: >= -1.0 °C setpoint in K (-5.0 °C)
<= 1.0 °C setpoint in K (5.0 °C)Setpoint Status: Pass
Zone: Oven
Setpoint/Actual: 100.0 °C
Temperature: 100.0 °C
Accuracy: 0.4 °C
Agilent Recommended: >= -1.0 °C setpoint in K (-3.7 °C)
<= 1.0 °C setpoint in K (3.7 °C)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name: 7890
Setpoint Status: Pass
Setpoint/Average: 100.0 °C
Temperature: 100.0 °C
Stability: 0.1 °C
Agilent Recommended: <= 0.5

Overall GC Oven Temperature Stability Test Status

Pass

Log Amp

Tested Combination: Front SSL / External SQ
Name: 5977A
Setpoint Status: Pass

Overall Log Amp Test Status

Pass

RFPA

Tested Combination: Front SSL / External SQ
Name: 5977A
Setpoint Status: Pass
Amu: 1050 m/z
Drift After Five Minutes: 22 mV
RFPA Voltage: 568 mV
Agilent Recommended: >= -100 and <= 100 <= 1190

Overall RFPA Test Status

Pass

Tune EI

Tested Combination: Front SSL / External SQ
Name: 5977A
Setpoint Status: Pass
Filament: 1
Setpoint Status: Pass
Filament: 2

Overall Tune EI Test Status

Pass

Signal to Noise EI

Tested Combination: Front SSL / External SQ
Name: 5977A

Source: EI - Extractor Filament: 1

Setpoint Status: Pass

Signal to Noise: 51283

Agilent Recommended: >= 1200

Source: EI - Extractor Filament: 2

Setpoint Status: Pass

Signal to Noise: 7088

Agilent Recommended: >= 1200

This test's 0 comment(s) and 1 deviation(s) are available in the Attachments section.

Overall Signal to Noise EI Test Status

Pass

Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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Instrument Details

Purpose

This section describes the as found system configuration.

Details

System	
System ID	GM-7
Manufacturer	Agilent Technologies
Name	7693
Tested Combination1	
Injection Technique	Manual Injection
Inlet	Front
Detector	External
LTM Included?	No
Sampler 1	
Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Syringe Volume (µL)	10
Mainframe 1	
Manufacturer	Agilent Technologies
Name	7690
Model Number	G3442B
Serial Number	CN14133181
Firmware Revision	B.02.03
Oven Type	Standard

Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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Inlet 1

Manufacturer	Agilent Technologies
Name	7690
Type	SSL
Location	Front
Carrier Gas	Helium
Control Type	Electronic Pressure Control (EPC)
Purged Inlet	Yes

Detector 1

Manufacturer	Agilent Technologies
Name	Mass Spectrometer
Type	Mass Spectrometer
Location	External

Mass Spectrometer 1

Manufacturer	Agilent Technologies
Type	SQ
Name	5977A
Serial Number	US1415M209
Firmware Revision	5977 B.00.21
High Vacuum System	Turbo Pump
Scouting Run Standard	OFN Std

MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Extractor
Number of Filaments	2

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer:	Supasak Nimsongtham
Logged On User Name:	supasak.nimsongtham@agilent.com
Signature Creation Date:	June 21, 2022
Reason for Signature:	Executed protocol and published this original version of document

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Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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User Name: supasak.nimsongtham
Hostname: SC01151HG
System ID: GM-7
Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 10:25:03 AM	Audit	SessionCreated	Session	None
June 21, 2022 10:25:03 AM	Start	Configuration	Session	None
June 21, 2022 10:25:05 AM	Audit	Enrollment	Unlocking	User is FieldEngineer and does not require an unlock code
June 21, 2022 10:25:20 AM	Audit	ExpLoaded	Session	EOP details for primary technique (SQ) - File path: [ProtocolPacks\GetConf\gmslons02.60\Gc.02.60.exp] EOP File Name: [Gc.02.60.exp] EOP Name: [AgilentRecommended] EOP details for hyphenated technique (SQH) - File path: [ProtocolPacks\GetConf\gmslons02.60\Gc.02.60.h.exp] EOP File Name: [Gc.02.60.h.exp] EOP Name: [AgilentRecommended]
June 21, 2022 10:25:39 AM	End	Configuration	Session	None
June 21, 2022 10:25:43 AM	Start	Qualification	Session	DQ
June 21, 2022 10:25:43 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	None
June 21, 2022 10:25:54 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	Run Count: 1

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Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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User Name: supasak.nimsongtham
Hostname: SC01151HG
System ID: GM-7
Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 10:29:30 AM	Start	Execution	Inlet Pressure Accuracy - Front SSI - Pressure Controlled Inlet - 6.25.0 psi - L: <= 1.0 psi	None
June 21, 2022 10:29:10 AM	End	Execution	Inlet Pressure Accuracy - Front SSI - Pressure Controlled Inlet - 9.25.0 psi - L: <= 1.0 psi	Run Count: 1
June 21, 2022 10:29:12 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature - Oven - S: 220.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
June 21, 2022 10:34:09 AM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature - Oven - S: 220.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
June 21, 2022 10:34:10 AM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature - Oven - S: 220.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count: 1
June 21, 2022 10:34:11 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature - Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
June 21, 2022 10:34:42 AM	Audit	Data	GC Oven Temperature Accuracy - 7890 - Temperature - Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
June 21, 2022 10:34:44 AM	End	Execution	GC Oven Temperature Accuracy - 7890 - Temperature - Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count: 1
June 21, 2022 10:35:45 AM	Start	Execution	GC Oven Temperature Stability - 7890 - Temperature - Oven - S: 100.0°C - L: <= 0.5°C	None

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Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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User Name: supasak.nimsongtham
Hostname: SC01151HG
System ID: GM-7
Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 11:01:00 AM	Audit	AcqClosed	Session	None
June 21, 2022 11:01:47 AM	Audit	AcqRestarted	Session	None
June 21, 2022 11:01:48 AM	Audit	SessionReloading	Session	None
June 21, 2022 11:01:51 AM	Start	Qualification	Session	DQ
June 21, 2022 11:01:51 AM	Start	Execution	GC Oven Temperature Stability - 7890 - Temperature - Oven - S: 100.0°C - L: <= 0.5°C	None
June 21, 2022 11:03:14 AM	Audit	Data	DataManager	DataManager was in a data verification state but the user chose to start over.
June 21, 2022 11:04:19 AM	Audit	Data	GC Oven Temperature Stability - 7890 - Temperature - Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
June 21, 2022 11:04:22 AM	End	Execution	GC Oven Temperature Stability - 7890 - Temperature - Oven - S: 100.0°C - L: <= 0.5°C	Run Count: 1
June 21, 2022 11:04:24 AM	Start	Execution	Log Amp - 5977A SQ - Source: EI - Extractor	None
June 21, 2022 11:04:34 AM	End	Execution	Log Amp - 5977A SQ - Source: EI - Extractor	Run Count: 1
June 21, 2022 11:04:37 AM	Start	Execution	RPFA - 5977A SQ - Source: EI - None - Extractor	None
June 21, 2022 11:07:49 AM	End	Execution	RPFA - 5977A SQ - Source: EI - None - Extractor	Run Count: 1
June 21, 2022 11:07:53 AM	Start	Execution	Tune EI - 5977A SQ - Source: EI - Extractor	None

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Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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User Name: supasak.nimsongtham
Hostname: SC01151HG
System ID: GM-7
Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 11:08:35 AM	End	Execution	Tune EI - 5977A SQ - Source: EI - Extractor	Run Count: 1
June 21, 2022 11:14:59 AM	Start	Execution	Tune EI - 5977A SQ - Source: EI - Extractor	None
June 21, 2022 11:16:45 AM	End	Execution	Tune EI - 5977A SQ - Source: EI - Extractor	Run Count: 1
June 21, 2022 11:16:48 AM	Start	Execution	Signal to Inject EI - Liquid Injection, Front SSI, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	None
June 21, 2022 11:17:05 AM	Start	Execution	Signal to Inject EI - Liquid Injection, Front SSI, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	None
June 21, 2022 11:17:10 AM	Start	Execution	Signal to Inject EI - Liquid Injection, Front SSI, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	None
June 21, 2022 11:20:09 AM	Audit	AcqClosed	Session	None
June 21, 2022 12:30:29 PM	Audit	AcqRestarted	Session	None
June 21, 2022 12:30:32 PM	Audit	SessionReloading	Session	None
June 21, 2022 12:30:36 PM	Start	Qualification	Session	DQ
June 21, 2022 12:30:36 PM	Start	Execution	Signal to Inject EI - Liquid Injection, Front SSI, EQ - Source: EI - Extractor using Filament 1 - L: >= 1200	None

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Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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User Name: supasakulnongsitham
Host Name: SC011519HC
System ID: GM-7
Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 12:37:07 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	None
June 21, 2022 12:37:08 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	None
June 21, 2022 12:38:54 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Data File Path: EVALSGMT_2022GMF1_001.D
June 21, 2022 12:39:24 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Data File Path: EVALSGMT_2022GMF1_001.D
June 21, 2022 12:40:03 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Data File Path: EVALSGMT_2022GMF1_001.D
June 21, 2022 12:42:04 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Data File Path: EVALSGMT_2022GMF1_001.D
June 21, 2022 12:42:17 PM	Audit	AcqClosed	Session	None
June 21, 2022 12:53:21 PM	Audit	AcqRestarted	Session	None
June 21, 2022 12:53:33 PM	Audit	SessionReloaded	Session	None
June 21, 2022 12:53:37 PM	Start	Qualification	Session	DQ
June 21, 2022 12:53:37 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	None

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Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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User Name: supasakulnongsitham
Host Name: SC011519HC
System ID: GM-7
Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 12:54:44 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Data File Path: EVALSGMT_2022GMF1_001.D
June 21, 2022 12:55:26 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L >= 1200	Run Count: 1
June 21, 2022 12:57:11 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	None
June 21, 2022 12:58:16 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: EVALSGMT_2022GMF2_001.D
June 21, 2022 12:58:50 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: EVALSGMT_2022GMF2_001.D
June 21, 2022 12:58:45 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: EVALSGMT_2022GMF2_001.D
June 21, 2022 12:59:00 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: EVALSGMT_2022GMF2_001.D
June 21, 2022 12:59:14 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: EVALSGMT_2022GMF2_001.D

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Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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User Name: supasakulnongsitham
Host Name: SC011519HC
System ID: GM-7
Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 12:59:45 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: EVALSGMT_2022GMF2_001.D
June 21, 2022 12:40:16 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: EVALSGMT_2022GMF2_001.D
June 21, 2022 12:40:40 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: EVALSGMT_2022GMF2_001.D
June 21, 2022 12:41:09 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: EVALSGMT_2022GMF2_001.D
June 21, 2022 12:41:29 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Run Count: 1
June 21, 2022 12:42:30 PM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Deviation filed for Run Count: 1
June 21, 2022 12:42:30 PM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	None
June 21, 2022 12:42:35 PM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Data File Path: EVALSGMT_2022GMF2_001.D

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Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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User Name: supasakulnongsitham
Host Name: SC011519HC
System ID: GM-7
Print Date: June 21, 2022 2:04:17 PM

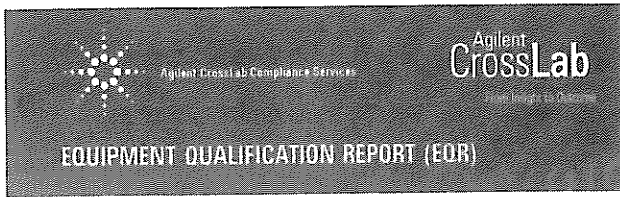
ALS-GM7-2022 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 21, 2022 12:42:43 PM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L >= 1200	Run Count: 2
June 21, 2022 12:42:50 PM	End	Qualification	Session	DQ
June 21, 2022 12:42:50 PM	Start	Reporting	Session	None
June 21, 2022 12:45:17 PM	Audit	AcqClosed	Session	None
June 21, 2022 1:37:47 PM	Audit	AcqRestarted	Session	None
June 21, 2022 1:37:53 PM	Audit	SessionReloaded	Session	None
June 21, 2022 1:37:58 PM	Start	Qualification	Session	DQ
June 21, 2022 2:02:42 PM	Audit	Reporting	Session	Report Generated: Certificate

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Date: June 21, 2022 2:04:12 PM
System ID: GM-7

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Agilent CrossLab Compliance

Qualification Type ICPMS-OQ

System ID: JP12091612

EQP Name: Agilent Recommended

EQP Revision: ICPMS 02.50

EQP Publish Date: March 2020

Date: June 14, 2022 10:32:16 AM

Report Type: Report

Org. Name: ALS Laboratory Group (Thailand) Co., Ltd.

Org. Location: 104 Phatthanakarn 40, Suan Luang, Bangkok 10250 Thailand

REVIEW BY: Tathana C.

APPROVED BY: Sate N

NEXT CAL. DATE: 12/12/22

Date: June 14, 2022 10:32:16 AM

System ID: JP12091612

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Integrated Sample Introduction System (ISIS) Check : ISIS2	9
Autotune : G3281A	10
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Date: June 14, 2022 10:32:16 AM

System ID: JP12091612

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Test Summary

Purpose

This section includes a status for each scheduled test and the overall qualification. For each test that is run, (1) the status is automatically determined based on pre-defined limits, and (2) the total number of times the test was run is displayed. For detailed results and specifications for a test, refer to the test results in this EQR.

Details

Test	Status	Runs
Autosampler Check : ASX-520	Pass	1
Integrated Sample Introduction System (ISIS) Check : ISIS2	Pass	1
Autotune : G3281A	Pass	1
Background (No Gas Mode) : G3281A	Pass	1
Background (Gas Modes) : G3281A	Pass	1
20-Minute Stability (No Gas Mode) : G3281A	Pass	1

Overall Qualification Status

Pass

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System ID: JP12091612

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Service Details

Purpose

This section includes local contact and delivery details for this service.

General Details

Service Order No./Request: 6005218484

EQP Name: Agilent Recommended

EQP Revision: ICPMS 02.50

Report Type: Report

Organization Details

Name: ALS Laboratory Group (Thailand) Co., Ltd.

Location: 104 Phatthanakarn 40, Suan Luang, Bangkok 10250 Thailand.

Local Contact Details

Name: Khan Chetchanal

Job Title: Lab Manager

Qualification Location: Spectro Room

Operator Details

Name: Panthep Kurasathain

Job Title: Field Service Engineer

Data Acquisition Details

Acquisition Software Name: MassHunter

Acquisition Software Revision: D.01.01

Customer Data System (CDS):

icpMs: MassHunter

Date: June 14, 2022 10:32:16 AM

System ID: JP12091612

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Instrument Details

Purpose

This section describes the as found system configuration.

Details

ICP-MS 1

Manufacturer	Agilent Technologies
Name	7700x
Model Number	G3281A
Detector Type	SQ
Nebulizer	Mira Mist (G3181)
Spray Chamber	Quartz
Torch	Quartz
Sampling Cone	Ni
Skimmer Cone	Ni
Serial Number	JP12091812
Firmware Revision	D.01.01

ISIS 1

Manufacturer	Agilent Technologies
Name	ISIS2
Model Number	G4911A
Installed Options	#D03: 2 pumps, 1 valve, auto dilution and discrete sampling
Type	Peristaltic pump system

Autosampler 1

Manufacturer	Agilent Technologies
Name	ASX-620
Model Number	G3286A
Serial Number	031403A520

Chiller 1

Manufacturer	Agilent Technologies
Name	Chiller
Model Number	G3282A
Serial Number	4N1220700

Calculation Formulas

Purpose

This section includes calculation formulas for all available tests. Depending upon which tests are scheduled, all or some apply to your qualification.

For a description of calculations for ICP-MS tests performed by the MassHunter software, refer to the MassHunter application and documentation.

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System ID: JP12091812

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Protocol Details

Purpose

This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
ICPMS.02.50	20-Minute Stability (No Gas Mode)
ICPMS.02.50	Autosampler Check
ICPMS.02.50	Autotune
ICPMS.02.50	Background (Gas Modes)
ICPMS.02.50	Background (No Gas Mode)
ICPMS.02.50	Integrated Sample Introduction System (ISIS) Check

Autosampler Check

Purpose

This test demonstrates that the autosampler module is correctly installed and connected. It does not test module performance.

Setpoint

Results	Criteria	Observed Result	Expected Result	Status
After the self test, is probe in the home position?		Yes	Yes	Pass
As commanded, is the probe positioned at vial 2?		Yes	Yes	Pass

Setpoint Status: Pass

Runs: 1

Overall Autosampler Check Test Status

Pass

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System ID: JP12091812

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Integrated Sample Introduction System (ISIS) Check

Purpose

This test demonstrates that the ISIS module is correctly installed and connected. It does not test module performance.

Setpoint

Results	Criteria	Observed Result	Expected Result	Status
As commanded, does the pump rotate?		Yes	Yes	Pass
As commanded, do the valves load and inject?		Yes	Yes	Pass
Setpoint Status:	Pass	Runs: 1		
Overall Integrated Sample Introduction System (ISIS) Check Test Status				
Pass				

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Autotune

Purpose

This test uses traceable checkout standards to run a software-executed autotune in all modes. The tune report provides values for peak width, mass axis, sensitivity, oxide species, and doubly-charged species tests.

Setpoint

Results			
Peakwidth Mass 7	0.735	AMU	
Agilent Recommended:	0.65		
Status:	0.80		
	Pass		
Peakwidth Mass 89	0.732	AMU	
Agilent Recommended:	0.65		
Status:	0.80		
	Pass		
Peakwidth Mass 205	0.746	AMU	
Agilent Recommended:	0.65		
Status:	0.80		
	Pass		
Mass Axis 7	7.00	AMU	
Agilent Recommended:	6.9		
Status:	7.1		
	Pass		
Mass Axis 89	89.00	AMU	
Agilent Recommended:	89.9		
Status:	89.1		
	Pass		
Mass Axis 205	205.00	AMU	
Agilent Recommended:	204.9		
Status:	205.1		
	Pass		

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System ID: JP12091612

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Mass 7 Sensitivity No Gas	81.18	Mcps/ppm
Agilent Recommended:	25.5	
Status:	Pass	
Mass 89 Sensitivity No Gas	247.81	Mcps/ppm
Agilent Recommended:	85	
Status:	Pass	
Mass 205 Sensitivity No Gas	184.87	Mcps/ppm
Agilent Recommended:	51	
Status:	Pass	
Mass 59 Sensitivity He	84.86	Mcps/ppm
Agilent Recommended:	20.4	
Status:	Pass	
Oxide Ratio 158/140	1.119	%
Agilent Recommended:	1.38	
Status:	Pass	
Doubly Charged Species Ratio 70/140	1.140	%
Agilent Recommended:	2.3	
Status:	Pass	
Setpoint Status:	Pass	Runs: 1
Overall Autotune Test Status		
Pass		

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Background (No Gas Mode)

Purpose

This test examines the background of the ICP-MS in no gas mode by monitoring ions during a blank run.

Setpoint

Conditions

Masses:	7	AMU
	89	AMU
	205	AMU

Measurements and Results

Masses (AMU):	7	89	205
Measured Value:	4,900	7,100	18,400
Agilent Recommended:	≤ 10	≤ 10	≤ 30
Status:	Pass	Pass	Pass

Setpoint Status: Pass

Runs: 1

Overall Background (No Gas Mode) Test Status

Pass

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Background (Gas Mode)

Purpose

This test examines the background of the ICP-MS in the various gas modes by monitoring ions during a blank run.

Setpoint	Gas Mode:	Helium
Conditions		
Mass:	78	AMU
Integration Time:	1.0	sec
Cycles:	20	
Measurements and Results		
Mass (AMU):	78	
Measured Value:	21.000	cps
Agilent Recommended:	≤ 1460	
Status:	Pass	
Setpoint Status:	Pass	Runs: 1
Overall Background (Gas Mode) Test Status		
Pass		

20-Minute Stability (No Gas Mode)

Purpose

This test monitors the abundance of ions present in the checkout standard over a 20-minute period to verify that the signal is stable. The %RSD of the abundance of given ions is calculated internally by the software and compared to the limit.

Setpoint	
Conditions	
Mode:	Spectrum
Masses:	7, 8, 89, 89, 140, 205
Integration Time:	9.99 sec
Peak Pattern:	3 points/peak
Repetitions:	20
Sweeps/Replicates:	100
Measurements and Results	
Masses (AMU):	7, 8, 89, 89, 140, 205
Stability RSD:	0.2, 0.6, 0.6, 0.6, 0.6, 0.6
Agilent Recommended:	≤ 3.45, ≤ 3.45, ≤ 3.45, ≤ 3.45, ≤ 3.45
Status:	Pass, Pass, Pass, Pass, Pass, Pass
Setpoint Status:	Pass
Runs:	1
Overall 20-Minute Stability (No Gas Mode) Test Status	
Pass	

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Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an evergreen status. The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation process. Any changes to the analytical or computer hardware or software must be clearly specified. A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented, together with details of completed tests and their results. Note: Hardware/software configuration management is the customer's responsibility.

Attachments

Training requirements note: The delivery engineer attaches an ACE technique-specific training certificate to the Equipment Qualification Report (EQR). Obtaining ACE technique-specific certification includes pre-requisite trainings for Data Integrity, General Compliance topics (GMP, GLP, ALCOA, etc.), instrument hardware and software components, and the ACE technique itself. The one certificate encompasses all pre-requisite trainings as documented in the Agilent Learning Management System called Success Factors.

Location	Category	Document Name	Page
EQR	General	Certificate of System Qualification	17
EQR	General	Operator's training certificate and qualifications	18
EQR	General	Certificate of Qualification for ACE	19
EQR	General	Certificate of Qualification for ACE	20
EQR	General	Tune reports	21
EQR	General	Test Report	24
EQR	General	Test Report	26

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General

Document Name: Certificate of System Qualification

 Agilent Technologies

Agilent Compliance Engine Self Qualification

Date: September 14, 2021 4:58:15 PM
Drive Serial #: ACAD25CB Platform Revision: ACE 3.11

Individual self qualification reports for each specific technique installed are also available upon request. They provide additional details on the general report from the concise summary and are structured by the actual algorithm challenges during the process. There is not a one-to-one relationship between algorithms and OQ program tests because some algorithms are used by several tests and across multiple similar hardware components of the qualified systems.

Technique Type	Tests Completed	Result
Atomic Absorption	7	Conforms
Capillary Electrophoresis	10	Conforms
Dissolution	5	Conforms
Emission Spectroscopy	3	Conforms
Gas Chromatography - GC/MS	17	Conforms
Gas Chromatography	20	Conforms
Gas Permeation Chromatography	9	Conforms
ICP-MS	6	Conforms
Infrared Spectroscopy	7	Conforms
Liquid Chromatography	17	Conforms
Liquid Chromatography - LC/MS	8	Conforms
Monofluores	10	Conforms
Sample Preparation - Gas Chromatography	9	Conforms
Sample Preparation - Liquid Chromatography	5	Conforms
Supercritical Fluid Chromatography	15	Conforms
Software	8	Conforms
UV-Vis Spectrophotometer	13	Conforms
Overall Qualification Status		Conforms

Date: June 14, 2022 10:32:16 AM
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General

Document Name: Operator's training certificate and qualifications

 Agilent Technologies

Certificate of Completion

Learner Name: Pasihop Kurashain

Title Of Course: AN-CE-ICPMS-2-617-B-7700x/7700s ICP-MS Intro. - Oper./M/W S/W & OQ/IV

Completion Date: November 22, 2012

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, internal technical updates, update training, course documentation, technical support, course parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Certificate of Qualification for ACE

 Agilent Technologies

Certificate of Completion

Learner Name: Pasihop Kurashain

Title Of Course: AN-CE-GB-11-430-A-1 ACE 3.1X User Update Training

Completion Date: July 7, 2020

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, internal technical updates, update training, course documentation, technical support, course parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

Date: June 14, 2022 10:32:16 AM
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General

Document Name: Certificate of Qualification for ACE

 Agilent Technologies

Certificate of Completion

Learner Name: Pasihop Kurashain

Title Of Course: AN-CE-ICPMS-2-635-B- CrossLab Compliance Hardware Specific Delivery for Agilent ICP-MS Systems

Completion Date: October 31, 2020

Certified By Company: Learning at Agilent

All Service and Support training certificates have the following specific limitations.

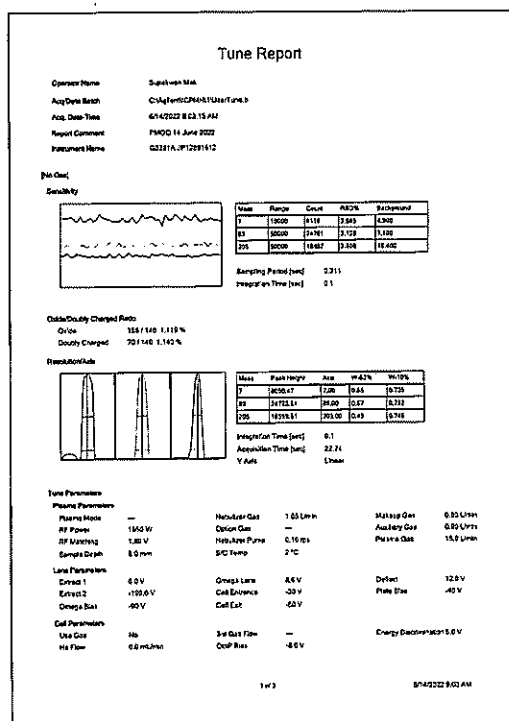
A certificate for Service and Support training is only valid while employed by Agilent Technologies or while working as an Agilent-authorized service provider, through which the service employee has ongoing access to Agilent's Safety Alerts, Service Notes, internal technical updates, update training, course documentation, technical support, course parts, and parts updates. Completion of training alone, without being employed by Agilent Technologies, does not qualify an individual to safely install, service or maintain Agilent products.

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General

Document Name: Tune reports

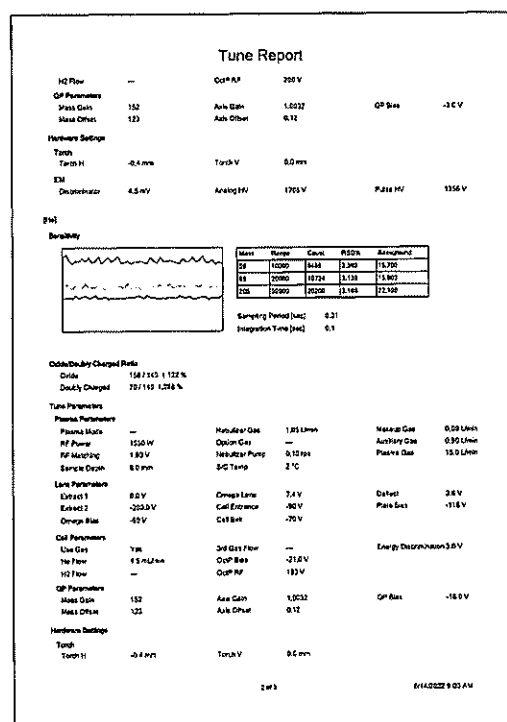


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Document Name:

Tune reports

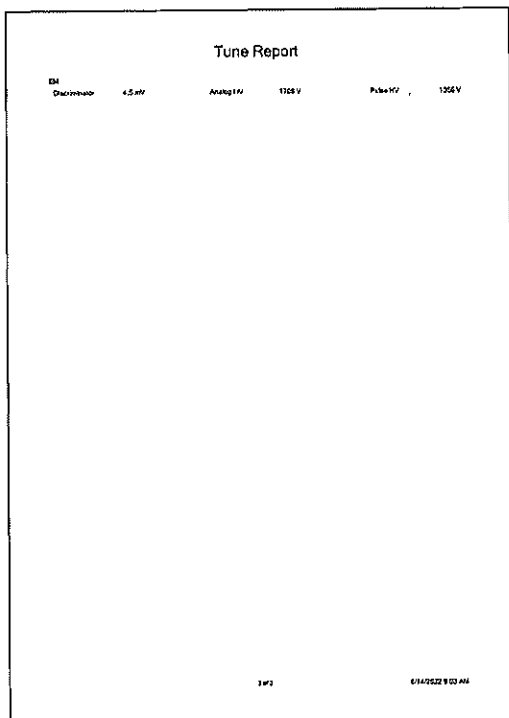


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Document Name:

Tune reports



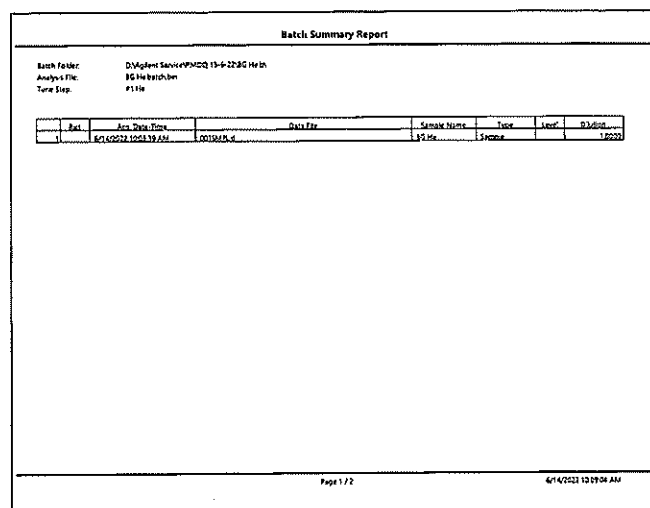
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General

Document Name:

Test Report



Date: June 14, 2022 10:32:16 AM
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Document Name: Test Report

Batch Summary Report			
Analysis Table			
Sample Name	75	75	75
1 85.156	21.1055	21.1055	21.1055

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6/14/2022 10:09:04 AM

General

Document Name: Test Report

Batch Summary Report			
Batch Folder: C:\Agilent\Software\MSD\13-4-20\0020\MSD			
Analysis File: 0020-MSD-001.D			
Time: 13:00			
Run	Run Description	Sample Name	Time
1	85.156	21.1055	21.1055

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6/14/2022 8:55:58 AM

Date: June 14, 2022 10:32:16 AM
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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Document Name: Test Report

Batch Summary Report			
Analysis Table			
Sample Name	75	75	75
1 85.156	21.1055	21.1055	21.1055

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6/14/2022 8:55:58 AM

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer: Panthep Kuraseethin
Logged On User Name: panthep_kuraseethin@agilent.com
Signature Creation Date: June 14, 2022
Reason for Signature: Executed protocol and published this original version of document

Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

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Date: June 14, 2022 10:32:16 AM
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User Name: panthep_hanasathai Host Name: ASDKRW1313		System ID: JP12091612 Print Date: June 14, 2022 10:32:29 AM	
ALS QGRW 7705 14Jun2022 Transaction log:			
Time	Transaction State	Activity Performed	Optional Information
June 14, 2022 10:14:43 AM	Audit	SessionCreated	Session None
June 14, 2022 10:14:43 AM	Start	Configuration	Session None
June 14, 2022 10:14:43 AM	Audit	Enrollment	User is Field Engineer and does not require an unlock code
June 14, 2022 10:19:19 AM	Audit	EqLoaded	Session EQP details for primary technique (ICP-MS): File path: (P:\msd\Pack\Hptms\Conf\usashn\02.50\eqp\02.50.eqp) EQP File Name: (EqMn 02.50.eqp), EQP Name: (AgilentRecommended)
June 14, 2022 10:19:29 AM	End	Configuration	Session None
June 14, 2022 10:19:24 AM	Start	Qualification	Session OO
June 14, 2022 10:19:24 AM	Start	Execution	Autosampler Check: ASX-520: None Autosampler Check
June 14, 2022 10:19:42 AM	End	Execution	Autosampler Check: ASX-520: Run Count: 1 Autosampler Check
June 14, 2022 10:19:43 AM	Start	Execution	Integrated Sample Introduction System (ISIS) Check: (ISIS): Integrated Sample Introduction System (ISIS) Check
June 14, 2022 10:19:47 AM	End	Execution	Integrated Sample Introduction System (ISIS) Check: (ISIS): Integrated Sample Introduction System (ISIS) Check
June 14, 2022 10:19:50 AM	Start	Execution	Autotune: G3281A: Autotune 1: None
June 14, 2022 10:22:22 AM	End	Execution	Autotune: G3281A: Autotune 1: Run Count: 1

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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User Name: panthep_hanasathai Host Name: ASDKRW1313		System ID: JP12091612 Print Date: June 14, 2022 10:32:29 AM		
ALS QGRW 7705 14Jun2022 Transaction log:				
Time	Transaction State	Activity Performed	Optional Information	
June 14, 2022 10:22:24 AM	Start	Execution	Background (No Gas Mode): G3281A: No Gas Mode Background 1	None
June 14, 2022 10:22:48 AM	End	Execution	Background (No Gas Mode): G3281A: No Gas Mode Background 1	Run Count: 1
June 14, 2022 10:22:48 AM	Start	Execution	Background (Gas Mode): G3281A: Gas Mode Background: Helium	None
June 14, 2022 10:23:35 AM	End	Execution	Background (Gas Mode): G3281A: Gas Mode Background: Helium	Run Count: 1
June 14, 2022 10:23:37 AM	Start	Execution	20-Minute Stability (No Gas Mode): G3281A: 20-Minute Stability (No Gas Mode) 1	None
June 14, 2022 10:24:08 AM	End	Execution	20-Minute Stability (No Gas Mode): G3281A: 20-Minute Stability (No Gas Mode) 1	Run Count: 1
June 14, 2022 10:24:08 AM	End	Qualification	Session	QC
June 14, 2022 10:24:08 AM	Start	Reporting	Session	None
June 14, 2022 10:30:25 AM	Audit	Reporting	Session	Report Generated: Certificate
June 14, 2022 10:30:38 AM	Audit	Reporting	Session	Report Generated: Report

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Certificate of System Qualification

ICPMS-OQ

System ID: JP12091612
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Phatthanakarn 40, Suan Luang, Bangkok 10250 Thailand.Date: June 14, 2022 10:32:51 AM
EQP Name: AgilentRecommended
EQP Revision: ICPMS.02.50
Overall Qualification Status: Pass

Autosampler Check

Overall Autosampler Check Test Status
Pass

Integrated Sample Introduction System (ISIS) Check

Overall Integrated Sample Introduction System (ISIS) Check Test Status
Pass

Autotune

Peakwidth Mass 7: Pass
Peakwidth Mass 88: Pass
Peakwidth Mass 205: Pass
Mass Axis 7: Pass
Mass Axis 88: Pass
Mass Axis 205: Pass
Mass 7 Sensitivity No Gas: Pass
Mass 88 Sensitivity No Gas: Pass
Mass 205 Sensitivity No Gas: Pass
Mass 59 Sensitivity He: Pass
Oxide Ratio 159/140: Pass
Doubly Charged Species Ratio 70/140: PassOverall Autotune Test Status
PassDate: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Background (No Gas Mode)

Setpoint Status: Pass

Masses (AMU):
Measured Value:
Agilent Recommended:
Status:

7	189	205
14,800	7,100	18,400
cps		
10	10	30
cps		
Pass	Pass	Pass

Overall Background (No Gas Mode) Test Status

Pass

Background (Gas Mode)

Gas Mode: Helium

Setpoint Status: Pass

Mass (AMU):
Measured Value:
Agilent Recommended:
Status:

7	189	205
21,100		
cps		
460		
cps		
Pass		

Overall Background (Gas Mode) Test Status

Pass

20-Minute Stability (No Gas Mode)

Masses (AMU):
Stability RSD:
Agilent Recommended:
Status:

7	189	205
0.2	0.6	0.6
%		
3.45	3.45	3.45
%		
Pass	Pass	Pass

Overall 20-Minute Stability (No Gas Mode) Test Status

Pass

Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Instrument Details

Purpose

This section describes the as found system configuration.

Details

ICP-MS 1

Manufacturer	Agilent Technologies
Name	7700x
Model Number	G3201A
Detector Type	SD
Nebulizer	Mira Mist (G3161)
Spray Chamber	Quartz
Torch	Quartz
Sampling Cone	Ni
Skimmer Cone	Ni
Serial Number	JP12091612
Firmware Revision	D.01.01

ISIS 1

Manufacturer	Agilent Technologies
Name	ISIS2
Model Number	G4911A
Installed Options	#003: 2 pumps, 1 valve, auto dilution and discrete sampling
Type	Peristaltic pump system

Autosampler 1

Manufacturer	Agilent Technologies
Name	ASX-520
Model Number	G3286A
Serial Number	031403A620

Chiller 1

Manufacturer	Agilent Technologies
Name	Chiller
Model Number	G3292A
Serial Number	4N1220700

Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and login to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

Full Name of Signer: Panthep Kurussathain
Logged On User Name: panthep_kurussathain@agilent.com
Signature Creation Date: June 14, 2022
Reason for Signature: Executed protocol and published this original version of document

Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not ensure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

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Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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System ID: JP12091612
Print Date: June 14, 2022 10:32:52 AM

User Name: panthep_kurussathain
Host Name: ASBKKW0313

ALS OQHW 7700 14Jun2022 Transaction log:

Time	Transaction State	Activity Performed	Optional Information
June 14, 2022 10:14:43 AM Audit	SessionCreated	Session	None
June 14, 2022 10:14:43 AM Start	Configuration	Session	None
June 14, 2022 10:14:43 AM Audit	EndSession	Licensing	User is Field Engineer and does not require an unlock code
June 14, 2022 10:19:18 AM Audit	ExpLoaded	Session	EOP details for primary technique (icpMg). File path: [ProtocolPack\icpMg\Config\unions02.50\icpMg 02.50.a op]. EOP File Name: [icpMg 02.50 op]. EOP Name: [AgilentRecommended]
June 14, 2022 10:19:30 AM End	Configuration	Session	None
June 14, 2022 10:19:24 AM Start	Qualification	Session	OQ
June 14, 2022 10:19:24 AM Start	Execution	Autosampler Check : ASX-520	None
June 14, 2022 10:19:42 AM End	Execution	Autosampler Check	Autosampler Check : ASX-520 Run Count: 1
June 14, 2022 10:19:43 AM Start	Execution	Integrated Sample Introduction System (SIS) Check : ISIS2	None
June 14, 2022 10:19:43 AM Start	Execution	Integrated Sample Introduction System (SIS) Check	Integrated Sample Introduction System (SIS) Check
June 14, 2022 10:19:47 AM End	Execution	Integrated Sample Introduction System (SIS) Check : ISIS2	Run Count: 1
June 14, 2022 10:19:50 AM Start	Execution	Autotune : G3281A: Autotune 1	None
June 14, 2022 10:22:22 AM End	Execution	Autotune : G3281A: Autotune 1	Run Count: 1

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User Name: panthep_kurussathain Host Name: ASBKKW0313		System ID: JP12091612 Print Date: June 14, 2022 10:32:52 AM	
ALS OQHW 7700 14Jun2022 Transaction log:			
Time	Transaction State	Activity Performed	Optional Information
June 14, 2022 10:22:24 AM Start	Execution	Background (No Gas Mode) : G3281A: No Gas Mode Background 1	None
June 14, 2022 10:22:48 AM End	Execution	Background (No Gas Mode) : G3281A: No Gas Mode Background 1	Run Count: 1
June 14, 2022 10:22:49 AM Start	Execution	Background (Gas Modes) : G3281A: Gas Mode Background Helium	None
June 14, 2022 10:23:36 AM End	Execution	Background (Gas Modes) : G3281A: Gas Mode Background Helium	Run Count: 1
June 14, 2022 10:23:37 AM Start	Execution	20-Minute Stability (No Gas Mode) : G3281A: 20-Minute Stability (No Gas Mode) 1	None
June 14, 2022 10:24:08 AM End	Execution	20-Minute Stability (No Gas Mode) : G3281A: 20-Minute Stability (No Gas Mode) 1	Run Count: 1
June 14, 2022 10:24:08 AM End	Qualification	Session	OQ
June 14, 2022 10:24:08 AM Start	Reporting	Session	None
June 14, 2022 10:50:26 AM Audit	Reporting	Session	Report Generated: Certificate
June 14, 2022 10:50:39 AM Audit	Reporting	Session	Report Generated: Report

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Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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User Name: panchap_nurashahin
Host Name: ASBKKW313
System ID: JP12091612
Print Date: June 14, 2022 10:32:51 AM

ALS OQHW 7186 14Jun2022 Transaction log:

Date	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:32:28 AM	Asst	Reporting	Session	Report Signed: Report PDF Name: ALS OQHW 7186 14Jun2022_20220614_OQ Report_1.pdf User Name: panchap_nurashahin@agilent.com Full Name of Signer: Panchap Nurashahin Reason for signature: Executed protocol and published this original version of document

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Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhohi, Saraburi 18110

Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T220730

Page 1 of 6

Certificate of Calibration

Equipment : HEATING BLOCK

Manufacturer : Environmental Express

Model : SC 196

Serial No. : 6974CECW3285

Customer Code : BKK_EL0054

ID No. : T5306A3

Customer : ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250

Customer Location : Acid Digestion Lab

Date of Receipt : 30 March 2022

Calibrated By : Watcharapon Sangtong (Technician)

Approved By : / Sujjar Naknred (Site Calibration Manager)

Date of Issue : 17 APR 2022

REVIEW BY:

APPROVED BY:

NEXT CAL DATE: 7/10/23

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-113 109 30-05-57

Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhohi, Saraburi 18110

Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Metrological Center

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Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T220730

Page 2 of 6

Calibration Report

Equipment : HEATING BLOCK

Date of Calibration : 7 April 2022

Environment : Temperature : 21.8-23.1 °C

Line Voltage : 221.6-226.3 V

Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber, the other one standard thermocouples type T use for ambient temperature measurement. The calibration was done in according to WI-T20

All data show below were final values and the initial data from customer request. The temperature scale used was based on ITS - 90

2. Reference Standard Instruments

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN221-TN230	T210008	08 June 2022
TC	TYPE T	TN231-TN240	T210008	08 June 2022
DATA LOGGER	34970A	T149	T210008	08 June 2022

3. This certificate is traceable to

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description

Time Constant : 2 Hour 25 Minute At 95 °C
Fresh Air Damper : ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment

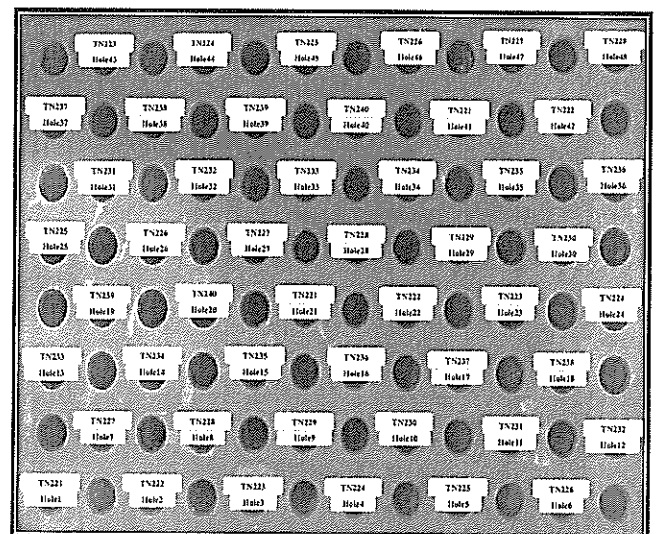
() without adjustment (X) after adjustment

Approved By:

Certificate No. T220730

Page 3 of 6

Calibration Report



FRONT CONTROL

Approved By:

Certificate No. T220730

Page 4 of 6

Calibration Report

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)					
R1 Hole1-Hole6	TN221	TN222	TN223	TN224	TN225	TN226
CAL POINT	Max	93.60	93.82	94.05	94.20	94.36
	Min	93.07	93.26	93.51	93.66	93.82
	Average	93.33	93.54	93.78	93.93	94.09
R2 Hole7-Hole12	TN227	TN228	TN229	TN230	TN231	TN232
	Max	94.59	94.79	94.63	94.55	94.82
	Min	94.05	94.25	94.08	93.97	94.26
	Average	94.32	94.52	94.36	94.26	94.54
R3 Hole13-Hole18	TN233	TN234	TN235	TN236	TN237	TN238
	Max	95.03	94.54	94.78	94.84	95.06
	Min	94.46	93.98	94.26	94.28	94.49
	Average	94.74	94.26	94.52	94.56	94.78
R4 Hole19-Hole24	TN239	TN240	TN221	TN222	TN223	TN224
	Max	94.89	94.82	95.73	95.85	95.73
	Min	94.33	94.26	95.51	95.62	95.51
	Average	94.61	94.54	95.62	95.73	95.62
R5 Hole25-Hole30	TN225	TN226	TN227	TN228	TN229	TN230
	Max	96.28	96.39	96.37	96.54	96.19
	Min	96.01	96.10	96.02	96.20	95.89
	Average	96.15	96.24	96.20	96.37	96.04
R6 Hole31-Hole36	TN231	TN232	TN233	TN234	TN235	TN236
	Max	96.84	96.97	97.03	96.48	96.33
	Min	96.53	96.65	96.71	96.08	95.98
	Average	96.68	96.81	96.87	96.28	96.16
R7 Hole37-Hole42	TN237	TN238	TN239	TN240	TN221	TN222
	Max	96.46	96.13	96.19	96.06	96.95
	Min	96.13	95.84	95.85	95.72	96.64
	Average	96.30	95.99	96.02	95.89	96.80
R8 Hole43-Hole48	TN223	TN224	TN225	TN226	TN227	TN228
	Max	96.91	96.88	96.13	96.19	96.34
	Min	96.45	96.21	95.80	95.87	95.03
	Average	96.73	96.40	95.96	96.03	96.63

Approved By.

FM-L14 108 30-05-57

Certificate No. T220730

Page 5 of 6

Calibration Report

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)					
R1 Hole1-Hole6	TN221	TN222	TN223	TN224	TN225	TN226
CAL POINT	Max	104.47	104.65	104.79	105.31	105.47
	Min	104.15	104.27	104.45	104.98	105.14
	Average	104.31	104.46	104.62	105.15	105.31
R2 Hole7-Hole12	TN227	TN228	TN229	TN230	TN231	TN232
	Max	105.55	105.73	105.65	105.84	105.97
	Min	105.28	105.43	105.35	105.52	105.68
	Average	105.42	105.58	105.50	105.68	105.83
R3 Hole13-Hole18	TN233	TN234	TN235	TN236	TN237	TN238
	Max	106.14	106.66	105.81	106.05	105.81
	Min	105.85	105.81	105.55	105.80	105.53
	Average	106.00	106.24	105.68	105.92	105.67
R4 Hole19-Hole24	TN239	TN240	TN221	TN222	TN223	TN224
	Max	105.86	105.60	104.44	104.51	104.78
	Min	105.61	105.37	104.27	104.35	104.12
	Average	105.74	105.48	104.35	104.43	104.45
R5 Hole25-Hole30	TN225	TN226	TN227	TN228	TN229	TN230
	Max	104.94	104.93	104.97	105.08	104.65
	Min	104.77	104.75	104.76	104.90	104.49
	Average	104.85	104.84	104.86	104.99	104.57
R6 Hole31-Hole36	TN231	TN232	TN233	TN234	TN235	TN236
	Max	105.44	105.45	105.61	104.95	104.84
	Min	105.27	105.27	105.44	104.76	104.66
	Average	105.36	105.36	105.53	104.86	104.75
R7 Hole37-Hole42	TN237	TN238	TN239	TN240	TN221	TN222
	Max	105.17	104.70	104.59	104.51	105.22
	Min	105.00	104.53	104.41	104.35	105.04
	Average	105.08	104.62	104.50	104.43	105.13
R8 Hole43-Hole48	TN223	TN224	TN225	TN226	TN227	TN228
	Max	105.61	105.45	105.10	104.77	104.87
	Min	105.44	105.28	104.92	104.60	104.70
	Average	105.53	105.37	105.01	104.69	104.79

Approved By.

FM-L14 108 30-05-57

Certificate No. T220730

Page 5 of 6

Calibration Report

Measurement Results:

HEATING BLOCK			Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (±°C)	Uncertainty (±°C)
	Min, Max	Average		
100.0	100.0, 100.4	100.1	0.29	0.83
105.0	105.0, 105.4	105.1	0.20	0.79

* The quoted uncertainty excludes "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 %

Approved By.

Certificate No. T221644

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cold Room)

Manufacturer : KOLDTECH

Model : KM 320

Serial No. : TBN-1012061/05

Customer Code : BKK_EN0167

ID No. : T2463A3

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Environmental Laboratory

Date of Receipt : 27 June 2022

Calibrated By : Sujjar Naknakred (Site Calibration Manager)

Approved By :  / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 04 JUL 2022

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L14 108 30-05-57

FM-L14 117/01-02-64

Calibration Report

Equipment : Chamber (Cold Room)
Date of Calibration : 30 June - 1 July 2022
Environment : Temperature : 18.9-23.7 °C
Line Voltage : 222.9-226.5 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).
All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN161-TN170	T210009	30 July 2022
TC	TYPE T	TN171-TN180	T210009	30 July 2022
DATA LOGGER	34970A	T149	T210009	30 July 2022

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 3 Hour - Minute At 3 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

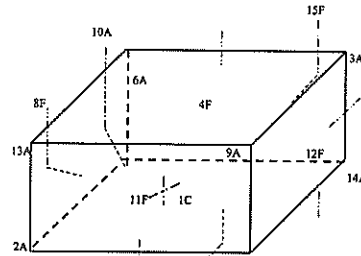
5. Adjustment :

() without adjustment (X) after adjustment

Approved By:

FM-L15 11/7/15-05-63

Calibration Report



C = Centre, F = Centre of Face, A = Corner, E = Centre of Edge

1C	=	TN161
2A	=	TN162
3A	=	TN163
4F	=	TN164
5A	=	TN165
6A	=	TN166
7F	=	TN167
8F	=	TN168
9A	=	TN169
10A	=	TN170

11F	=	TN171
12F	=	TN172
13A	=	TN173
14A	=	TN174
15F	=	TN175
16E	=	TN176

Approved By:

FM-L15 11/7/15-05-63

Calibration Report

Measurement Results:

Calibration Point	Average Standard Reading at each position (°C)									
	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169	TN170
3	2.71	2.82	2.75	2.89	2.95	3.03	3.02	2.96	3.03	2.85
	TN171	TN172	TN173	TN174	TN175	TN176				
	2.97	3.02	2.89	3.04	2.97	3.33				

Chamber (Cold Room)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min, Max	Average					
3.0	2.9, 4.0	3.2	2.99	1.05	1.30	1.65	2.00

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By:

FM-L15 11/7/15-05-63

BKK_EL0023

analytikjena

REVIEW BY	
APPROVED BY	
NEXT ON DATE	24.05.14

Maintenance Protocol

Atomic Fluorescence Spectrometer
mercur DUO /
mercur DUO plus

Serial-No.: K170A0143 Customer-No.:
Date: 24 May 2023 Carried out by: Srichai Fak-on

Maintenance with following Operational Qualification (OQ) ☐
(requires a separate OQ protocol)

Company	บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด
User	
Department	ห้องแล็บปฏิบัติการ
Street	104 ซอย 40 ถนนพัฒนาการ แขวงสวนหลวง เขตสวนหลวง
Zip Code, City	กรุงเทพมหานคร 10250
Country	ประเทศไทย
Phone	
Fax	
E-mail	

[illegible]

Maintenance works basic unit

- lightness visual check inside the Mercur
- visual check if gold-traps are broken
- visual check if spectrometer is contaminated
- visual check of the fluorescence cell
- visual check of the absorption cell, incl. window
- reactor cleaning
- check pump-hose, if necessary change it
- check swivel drive (SEV)
- check drying-hose, output gas-liquid-separator
- test Bubble-Sensor
- check gas flows
- check volume flows, reagents
- recording stray light values
- measurement with 30 ng/l

Maintenance works Autosampler

Serial No.: 701 739

- lubricate the dosing-winding (Teflon-grease-spray)
- clean the dosing cylinder, if necessary exchange it
- lubricate the winding system of the height drive with some drops of oil
- check the toothed belt
- check the position of the mechanical stopper (height 13mm)
- check the pump rate of mixing pump (<14s AS52, typ 7s/>20s AS52S, typ.10s)
- check the pump rate of washing cup
- check the electrical hose connections for good contact
- check the connectors of the magnetic valves
- check the dosing hose for buckling, if necessary exchange it

\mathbb{R}^n 上的函数 $f(x)$ 在 x_0 处可微，则 $f(x)$ 在 x_0 处连续。

Device parameter	nominal value	actual value
visual check general tightness inside the Mercur	o.k. <input checked="" type="checkbox"/>	changed. <input type="checkbox"/>
visual check Goldtraps	o.k. <input checked="" type="checkbox"/>	changed. <input type="checkbox"/>
visual check spectrometer		
Fluorescence cell	o.k. <input checked="" type="checkbox"/>	changed. <input type="checkbox"/>
Absorption cell, incl. window	o.k. <input checked="" type="checkbox"/>	changed. <input type="checkbox"/>
lens	o.k. <input checked="" type="checkbox"/>	changed. <input type="checkbox"/>
Swivel drive (SEV)	o.k. <input checked="" type="checkbox"/>	changed. <input type="checkbox"/>
check pump hoses	o.k. <input checked="" type="checkbox"/>	changed. <input type="checkbox"/>
check hoses and hose connectors	o.k. <input checked="" type="checkbox"/>	changed. <input type="checkbox"/>
check and clean reactor	o.k. <input checked="" type="checkbox"/>	changed. <input type="checkbox"/>
check drying hose output Gas-liquid-separator	o.k. <input checked="" type="checkbox"/>	changed. <input type="checkbox"/>
check bubble-sensor	o.k. <input checked="" type="checkbox"/>	not o.k. <input type="checkbox"/>
Check gasflow		
Argon pressure valve 4	1.2 – 1.5 bar	1.5 bar
Valve 1	10 NL/h or 0.166 NL/min	0.163 NL/min
Valve 2	50 NL/h or 0.833 NL/min	0.403 NL/min
Valve 3	5 NL/h or 0.083 NL/min	0.140 NL/min
Valve 4	10 NL/h or 0.166 NL/min	0.108 NL/min
Check liquidflow		
Acid	2.5ml/min ± 1 ml	2.5 ml/min
Red -agent	2.5ml/min ± 1 ml	2.5 ml/min
Sample	10ml/min ± 2 ml	10 ml/min
Adventitious light - values		
(V)	from file	
100	0	0
200	0	0
300	0	0
350	0	0
400	0	0
450	2	2
500	5	5
550	10	10
575	15	14
600	20	20

$$\begin{aligned} \text{Erg. 1.} \quad & \text{a) } 1 + 2 + 3 + \dots + 100 = 5050 \quad \text{b) } 1 + 2 + 3 + \dots + 1000 = 500500 \\ & \text{c) } 1 + 2 + 3 + \dots + 10000 = 50505000 \quad \text{d) } 1 + 2 + 3 + \dots + 100000 = 5050505000 \end{aligned}$$

Device parameter	nominal value	actual value
Analytical parameters Fluorescence cell		
Conditions..max.conc. 10µg/L PMT-voltage ...360.....V		
Blank-solution		Int. 0.00024...
without enrichment / FBR 30 ng/L	Int > 0.0015 RSD < 3 %	Int. 0.00172... RSD 0.45 ... %
Conditions..max conc. 1.7µg/L PMT-voltage ...352.....V		
Blank-solution		Int. 0.00370...
with enrichment / FBR 30 ng/L	Int > 0.008 RSD < 3 %	Int. 0.01060... RSD 2.38 ... %
Fok.-factor (Int ₂ / Int ₁)	> 3.5	6.16
Analytical parameters Absorption cell		
Blank-solution		Ext. 0.00093
without enrichment / FBR 100 ng/L	Ext. > 0.0012 RSD < 5 %	Ext. 0.00449... RSD 2.58 ... %
Comments		

$$\begin{aligned} \mathbb{E}[\mathcal{L}_{\text{train}}] &= \mathbb{E}[\mathcal{L}_{\text{train}}(\theta^*)] + \mathbb{E}[\mathcal{L}_{\text{train}}(\theta) - \mathcal{L}_{\text{train}}(\theta^*)] \\ &= \mathbb{E}[\mathcal{L}_{\text{train}}(\theta^*)] + \mathbb{E}[\mathcal{L}_{\text{train}}(\theta) - \mathcal{L}_{\text{train}}(\theta^*)] \\ &= \mathbb{E}[\mathcal{L}_{\text{train}}(\theta^*)] + \mathbb{E}[\mathcal{L}_{\text{train}}(\theta) - \mathcal{L}_{\text{train}}(\theta^*)] \end{aligned}$$

analytikjena

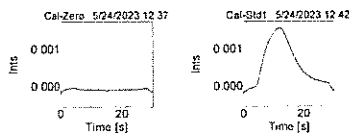
An Endress+Hauser Company

35 May 5, 145 Road, Khlong Nhai, Pak Kret
Nonthaburi 11120 Thailand
Phone: +662 10237012
Fax: +662 10237011
www.analytikjena.com

Service Report

Customer's address		Customer's Ref. No.	
35 May 5, 145 Road, Khlong Nhai, Pak Kret		Nonthaburi 11120 Thailand	
Tel: +662 10237012		Fax: +662 10237011	
www.analytikjena.com			
Email		Phone	
Job No. 230522 PM		User	
Instrument model: Mercury		Serial No. K170A0143	
Software Version No. 4.7.10.0		Date 24/5/2023 Page 1/1	
<input type="checkbox"/> Repair (RE) <input checked="" type="checkbox"/> Maintenance (PM) <input type="checkbox"/> Installation (IN) <input type="checkbox"/> Warranty <input type="checkbox"/> Application (AP) <input type="checkbox"/> Site Prep (SP) <input type="checkbox"/> Visit (Vi)		<input checked="" type="checkbox"/> Analytik Jena Instruments (Thailand) Ltd <input type="checkbox"/> Analytik Jena Far East (Thailand) Ltd	
Fault / Claim		Error Code	
- problem: Mercury instrument No. 230522 PM (TMM2302-037)		- problem: PM Contact Year 2023 (1 Time / Year 2023)	
Action taken		- Maintenance: Not Basic Unit - Check device parameter - Check gas flow - Check liquid flow - Check Absorbent light - values - Test run Analytik parameter Fluorescence cell - Test run Analytik parameter Absorption cell	
Action Pending / Recommendation		- Test run Analytik parameter Fluorescence cell - Test run Analytik parameter Absorption cell	
<input type="checkbox"/> Spare Part <input type="checkbox"/> Instrument Configuration			
Item No.		Name	
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Peak plots



Hg

Mercur

Report file C:\WinAAS\TMP\2023\May\Pro_033
 Program version 4.7.10.0 Printed on 5/24/2023 14:01
 Recording started on 5/24/2023 13:37 GMT+7:0
 Operator PSU.OTA
 Laboratory ALS-BKK
 Code Hg095_2023

Remarks
 Food,water

Method parameters

Method Enrichment / FER 30ng/L PM_24052023
 Created on 5/24/2023 Time 13:36
 Program ---

Parameters Mercur Technique: Hg fluorescence

Line	253.7 nm		
Lamp type	Hg-LP		
Integr. mode	Peak height	Integr. time	40 s
PMT	352 V		
AZ time	5 s	Peak smoothing	12/11
Delay	0 s		
Working mode	Enr w/o reload	System cleaning	Off
FBR technique	off	Wash time acid	10 s
Pump speed	3	Soaking time	20 s
Sample load time	10 s	Gas load time	10 NL/h
Reaction time	10 s		
Waiting time AZ	10 s	Gas AZ wait	10 NL/h
Purge time1	30 s		
Purge time2	15 s	Gas wash time2	5 NL/h
Purge time3	20 s		
Heat.time coll 1	20 s	Cool time coll 1	30 s

Hg

Mercur

Mercur

QC parameters

QC type	Conc. check	QC check samp 2	Conc.
QC check samp 1	---	QC check samp 2	---
Conc.	---	Conc.	---
Error limit	---	Error limit	---
Rep. measurement	off	Reaction	flag + continue
QC std 1 no.	1(30.000 ng/L)	QC std 2 no.	1(30.000 ng/L)
QC std 1 limit	± 50.00%	QC std 2 limit	± 50.00%
QC std act	flag + continue		
Expect blank abs	0.0100± 0.0100	Reaction	flag + continue
QC precision	off	Reaction	off
		QC Recal factor	Off

Calibration settings

Calib. meth	Standard calib	Calibr. unit	ng/L
No. standards	1	Conversion fac	1000000
Type of standards	---	Standard prep	Premixed
		Blank correct	---
		Recalib. std. no.	---
Output unit	µg/L	Conversion fac	1000
Calib. stat	Mean	Meas. cycles	3
		Blind cycles	1
Stock sol. 1	---	Stock sol. 2	---
Stock sol. 3	---	Stock sol. 4	---
Type of cal. curve	linear	Intercept	calculated
Weighted cal	off	Grubbs stat	off
Check of cal. curve	no outlier test		

Sample statistics

Stat. mode	off	Meas. cycles	1
Confid. level	95.4 %	Blind cycles	1
Grubbs stat	---		

Calibration standards

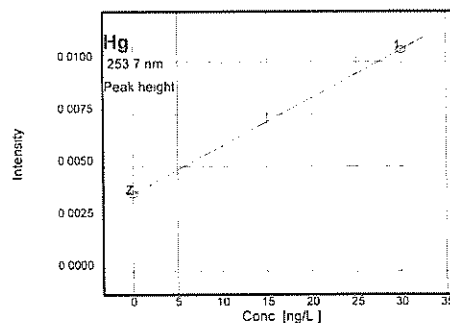
No.	Name	State	Pos.	Conc. / ng/L	Ints	SD	RSD/%
1	Cal-Zero	(--)	##	0.000	H: 0.003700 A: 0.02531	0.000081 0.000153	2.192 0.607
2	Cal-Std1	(--)	##	30.000	H: 0.01060 A: 0.06689	0.000293 0.002766	2.386 4.136

Hg

Calibration function 1

5/24/2023 14:00 Calibration (Peak height)

Ints=k1+k2*conc			
k1=0.003700	k2=0.000230	Recal factor	---
Slope	0.00023 Ints/(ng/L)	R2-adjusted	1.0000
sc0	1.00000 ng/L		
Lower limit	0 ng/L	Upper limit	33.0 ng/L
Detection limit	---	Deter. limit	---



Measurements and events (sorted by time)

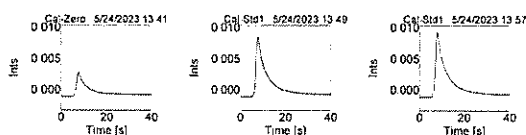
Hg	Enrichment / FER 30ng/L PM_24052023					5/24/2023	13:37
ID	Conc.	Ints	BG	SD	RSD/%	Int. type	Time
Cal-Zero		0.003792				PkH	13:41
		0.003666					13:43
		0.003640					13:44
	0ng/L	0.003700		0.000081090	2.192		13:44
Cal-Std1		0.008498				PkH	13:49
		0.008333					13:50
		0.008561					13:52
	30.00ng/L	0.008931		0.0005830	6.528		13:52
Cal-Std1		0.01031				PkH	13:57
		0.01074					13:58
		0.01076					14:00
	30.00ng/L	0.01060		0.0002630	2.366		14:00
Calibration	Calibration function 01						14:00

Mercur

Mercur

Peak plots

Hg



Mercur

Report file: C:\WinAAS\TMP\2023May\Pro_034
 Program version: 4.7.10.0 Printed on: 5/24/2023 14:33
 Recording started on: 5/24/2023 14:19 GMT+7.0
 Operator: PSU,OTA
 Laboratory: ALS-BKK
 Code: II_Hg095_2023
 Remarks:
 Food,water

Method parameters

Hg

Method: Without enrichment / Abs / FBR 100ng/L_PM 24052023
 Created on: 5/24/2023 Time: 14:18
 Program: ---

Parameters Mercur Technique: Hg absorption

Line	253.7 nm		
Lamp type	Hg-LP		
Integr. mode	Peak height	Integr. time	55 s
PMT	225 V		
AZ time	5 s	Peak smoothing	2/5
Delay	8 s		
Working mode	w/o enrich	System cleaning	Acid
FBR technique	on	Wash time acid	15 s
Pump speed	4	Soaking time	20 s
Sample load time	8 s	Gas load time	5 NL/h
Reaction time	12 s		
Waiting time AZ	15 s		
Delay	10 s		
Purge time1	50 s		
Purge time2	10 s	Gas wash time2	10 NL/h

Mercur

Mercur

QC parameters

QC type	Conc check	QC check samp 2	---
QC check samp 1	---	Conc	---
Conc	---	Error limit	---
Error limit	---	Reaction	flag + continue
Rep measurement	off	QC std 2 no.	1(100.00 ng/L)
QC std 1 no.	1(100.00 ng/L)	QC std 2 limit	± 0.00%
QC std 1 limit	± 50.00%	Reaction	flag + continue
QC std act	flag + continue	Reaction	flag + continue
Expect blank abs.	0.0100 ± 0.0100	QC Recal factor	Off
QC precision	off		

Calibration settings

Calib meth	Standard calib	Calibr unit	ng/L
No standards	1	Conversion fac.	1000000
Type of standards	---	Standard prep.	Premixed
		Blank correct	---
		Recalib std. no.	---
Output unit	µg/L	Conversion fac.	1000
Calib stat	Mean	Meas. cycles	3
		Blind cycles	1
Stock sol 1	---	Stock sol 2	---
Stock sol 3	---	Stock sol 4	---
Type of cal. curve	linear	Intercept	calculated
Weighted cal.	off	Grubbs stat	off
Check of cal. curve	no outlier test		

Sample statistics

Sial mode	Mean	Meas. cycles	2
Confd. level	95.4 %	Blind cycles	1
Grubbs stat	---		

Calibration standards

Hg

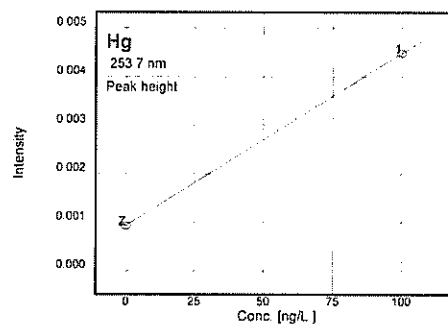
No	Name	State	Pes	Conc / ng/L	Abs	SD	RSD/%
1	Cal-Zero	(--)	##	0.00	H 0.000932 A 0.035926	0.000138 0.000208	14.88 17.28
2	Cal-Std1	(--)	##	100.00	H 0.004494 A 0.061286	0.000116 0.001275	2.686 2.082

Calibration function 1

5/24/2023 14:33 Calibration (Peak height)

Abs=k1+k2*conc
 k1=0.000932 k2=0.000036 Recal. factor: ---

Slope	0.00004 Abs/(ng/L)	R2-adjusted	1.0000
sc0	1.00000 ng/L	Charact. conc	122.411 (ng/L)/1%
Lower limit	0 ng/L	Upper limit	110 ng/L
Detection limit	---	Deter. limit	---



Measurements and events (sorted by time)

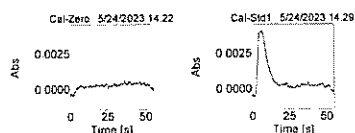
Hg	Without enrichment / Abs / FBR 100ng/L_PM 24052023	5/24/2023	14:19
ID	Conc.	Abs	Int. type
Cal-Zero		0.001038	PkH
		0.000775	
		0.000981	
	0ng/L	0.000932	
Cal-Std1		0.004528	PkH
		0.004364	
		0.004589	
	100.ng/L	0.004494	
Calibration	Calibration function: 01	0.00011623	2.586

Mercur

Mercur

Peak plots

Hg


**Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist**

Agilent Preventive Maintenance provides factory recommended service for your analytical systems to assure reliable operation and the accuracy of your results. Delivered by highly-trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak.

For more information about Agilent Technologies services please visit our web site using the following URL: <http://www.agilent.com/en-us/services/analytical-instrument-services>

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- For customers using HF applications, the instrument should be returned to its standard sample introduction system.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of additional or special procedures and/or parts for the instrument service, then these must be ordered separately and charged as a repair, which may incur additional

Service Engineer's Responsibilities

- Only complete/printout pages that relate to the system being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using a "X" or tick mark "✓" in the checkbox.
- Complete Not Applicable check boxes to indicate services not delivered, as needed.
- Complete the PM service in the order of the tasks listed.
- Complete the Service Review section together with the customer.

REVIEW BY	<i>[Signature]</i>
APPROVED BY	<i>[Signature]</i>
NEXT CAL DATE	...

Issued: 3 February 2017, Revision: 1.1

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Page 1 of 8

Agilent Technologies

**Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist**
System Information

Instrument system name and ID	ICP 5100 / G 8010A
Instrument system site and location	ALS / Laboratory 2 nd Floor
List system component product numbers	List the serial numbers of each component
1. G 8010A	1. MY 16010005
2. G 8410A	2. AU 15440764
3. G 3232	3. A038-00153
4.	4.
5.	5.
6.	6.
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9.	9.
10.	10.

ICP-OES Configuration table	Circle the type or write in the type if other
Nebulizer Type	SeaSpray OneNeb other
Spray Chamber	Cyclonic Single Pass Cyclonic Double Pass other
Torch	Radial (Dual View) other
Injector Diameter	2.4mm 1.8mm 1.4mm 0.8mm other
Injector Material	Quartz Ceramic other

Issued: 3 February 2017, Revision: 1.1

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Page 2 of 8

Agilent Technologies

**Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist**
General Preparation

- ☒ Discuss any specific questions or issues with the customer prior to starting.
- ☒ Review the instrument logbook.
- ☒ Perform general external inspection of system for cleanliness.
- ☒ Check for proper installation of safety-related parts, assemblies, sensors etc.
- ☒ Check for required firmware/software updates and verify with customers if they would like it installed.
- ☒ For HF application systems, if standard sample introduction system was not installed, ask the customer to install it. N/A
- ☒ Run Instrument Performance test and record results in Instrument Performance Test Results Table - Pre PM.

Inspect and clean the system

- ☒ Look for any obvious external damage or problems.
- ☒ Inspect water cooling hoses, gas lines and power cord for excessive wear or damage.
- ☒ Perform a general internal inspection of the system for excessive dust accumulation, clean if necessary.
- ☒ Inspect sample introduction components and record any required maintenance in the Service Engineer Comments and notify the customer as the required actions required.
- ☒ Record the instrument operating conditions in the ICP-OES Status Results Table.
- ☒ Replace the polychromator purge filter.
- ☒ Replace the radial pre-optics window
- ☒ Replace the axial pre-optics window for SVDV and VDV instruments
- ☒ Check exhaust flow for the correct positive extraction at the exhaust duct to insure they meet minimum specifications.
- ☒ Replace air inlet dust filter.
- ☒ Replace high capacity air inlet dust filter element if installed. N/A
- ☒ Remove and clean instrument water inlet filter.

G8481A Cooling water system

- ☐ Section NOT Applicable
- ☒ Drain cooling fluid and remove any particles from the chiller reservoir
- ☒ Remove, clean and reinstall water inlet metal mesh filter
- ☒ Re fill with Polyclear cooling fluid.
- ☒ Clean the cooling system Air filter and the condenser by compressed air or vacuum cleaner.

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Agilent 5110 and 5100 ICP-OES
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SPS 3 Auto Sampler

- ☒ Section NOT Applicable
- ☐ Power cycle the autosampler and verify successful initialization.
- ☐ Inspect X and Z axis belts for wear. Replace is necessary.
- ☐ Clean X and Z axis slide shafts.
- ☐ Using customer's racks and the Agilent software move the sample probe to the 4 outermost corners and rinse port, ensure that the probe is approximately centered in the vial.

SPS 4 Auto Sampler

- ☐ Section NOT Applicable
- ☒ Clean the spill tray, rack location mat, end frames and chassis with a damp soft cloth and diluted mild detergent.
- ☒ Clean the auto sampler cover panels, if cover kit is installed, with domestic window cleaner
- ☒ Check the X-axis and Z-axis drive belts for cracks, splits, damaged teeth, excessive fraying, color changes or degradation from fumes.
- ☒ Check the X-axis, Theta-axis and Z-axis FFC cables for cracks, incorrect positioning, damaged edges or damaged connectors.
- ☒ Pump Tubing Replacement. Replace peristaltic pump tubing. Replace all tubing that goes from the rinse station to the pump and from the pump to the waste/rinse bottles

AVS 4, 6, 7 (AVS 8)

- ☐ Section NOT Applicable
- ☒ Replace valve rotor seal cleaned into seal
- ☒ Check fittings for signs of leaks
- ☒ Check tubing including autosampler tubing for kinks or excessive wear
- ☒ Check high flow pump for signs of leaks

Instrument Adjustment

- ☒ Check position of Zn peak, adjust if required
- ☒ Check Argon Ratio, adjust to specified value if required.
- ☒ Perform Detector Calibration.
- ☒ Perform Instrument Calibration.
- ☒ Run Instrument Performance Test and record results in Instrument Performance Test Results Table - Post PM.
- ☒ For systems using ICP Expert version 7.3 and above run the following Instrument tests and record the result in the Instrument Test Results Table
 - ☒ Subsystem Communications Test
 - ☒ Air Flow

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- ☒ Water Flow
- ☒ Gas Flows
- ☒ RF Generator
- ☒ Camera Test
- ☒ Optics Test
- ☒ Nebulizer Test

Instrument Performance Test Results Table

Note: These measurements do not form part of any specification and are for reference only.

	Pre PM Sensitivity Check		Post PM Sensitivity Check	
	Radial	Axial *	Radial	Axial *
Zn 213.857 nm SRBR	3499.3	7519.6	4638.5	9248.3
Mn 257.610 nm SRBR	10549.1	82751.3	15474.9	86056.4
Al 396.152 nm SBR	7.2	14.2	14.5	18.0
K 766.491 nm SBR	3.8	30.8	6.6	35.6

* Axial result is not applicable for G8016AA, G8012AA Radial View Instruments.

Instrument Test Results Table

Note: The Instrument Test results are for systems using ICP Expert version 7.3 and above only.

Instrument Test	Result
Subsystem Communications Test	Pass
Air Flow	Pass
Water Flow	Pass
Gas Flows	Pass
RF Generator	Pass
Camera Test	Pass
Optics Test	Pass
Nebulizer test	Pass

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Preventive Maintenance Checklist

ICP-OES Status Results Table

Note: These measurements do not form part of any specification and are for reference only.

Measurement	Standby Mode		Plasma On	
Mains Voltage	213.5	VAC	213.5	VAC
Mains Current	0.00	A	0.114	A
Instrument Temperature	25.0	°C	25.0	°C
RF Air Flow (sensor speed)	9.0	Hz	17.0	Hz
Plasma Exhaust Temperature	No measurement		71.2	°C
Water Flow Oscillator	No measurement		1.37	L/min
Water Flow Detector	1.31	L/min	1.88	L/min
Water Inlet Temperature	18.8	°C	18.8	°C
Polychromator Temperature	35.0	°C	35.0	°C
CCD Temperature	-39.9	°C	-39.9	°C
Thermal Stabilizer	35.0	°C	35.0	°C
Argon Supply Pressure	630.51	kPa	584.30	kPa
Purge Gas Supply Pressure*1	670.70	kPa	615.13	kPa
Option Gas Supply Pressure*1	8.23	kPa	8.22	kPa
Nebulizer Flow	No measurement		0.65	L/min
Nebulizer Back Pressure	No measurement		873	kPa
Plasma Gas Flow	No measurement		11.93	L/min
Auxiliary Gas Flow	No measurement		1.00	L/min
RF Power	No measurement		1237	W
RF Supply Current	No measurement		8.49	A
RF Supply Voltage	No measurement		204	V

*1 If option installed

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Preventive Maintenance Checklist

ICP-OES Parts List Table

Part description	Part Number	Product / Model # where used	Quantity Consumed
Axial Pre-Optic Window	G8010-88014	G8010A, G8011A, G8014A/G8016A	1
Radial Pre-Optic Window	G8010-88015	All	1
Polyclear Cooling Fluid	G3292-80010	G8481A	
Purge Gas Filter	G8010-80136	All	1
Air Inlet Filter	G8000-88002	All	1
High Capacity Air Filter	G8010-80189	Optional	
Rotor seal for 6-7 port valve for AVS6/7	G8494-60002	G8404A/G8405	
Rotor seal for 4 port valve for AVS4	G8493-60002	G8493A	
Rinse solution to rinse station 2.5mm Id x 1m	G8410-80123	SPS 4	
Barb connector 2.5mm-1.5mm ID	G8410-80124	SPS 4	
PVC waste tubing, 8mm od x 6mm id, 2m	G8410-80122	SPS 4	
Additional Parts may be required from engineers stock:			
X axis drive belt	6410047600	SPS 3	
Z axis drive belt	6410047400	SPS 3	
Peristaltic pump tubing, PVC solvaFlex, 3 bridged,	3710049000	SPS 4	

Restore system

For HF applications, ask the customer to reinstall their sample introduction system.

Leave system in an Idle state: on and purging.

Guidance: If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Service Review

- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section below if there are additional comments.

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**Agilent 5110 and 5100 ICP-OES
Preventive Maintenance Checklist**

- ☐ Review the service and any test results with the customer.
- ☒ If the Instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

Other Important Customer Web Links

How to get information on your product:

☒ Literature Library - <http://www.agilent.com/en-us/products/icp-oes/icp-oes-systems/5110-icp-oes#literature>

☒ Need to know more? - <http://www.agilent.com/crosslab/university/>

☒ Need technical support, FAQs? - <http://www.agilent.com/en-us/support/landing/icp-oes>

☒ Need supplies? - www.agilent.com/chem/supplies

Service Completion

Service request number 600494409 Date service completed 3 MAR 2021

Agilent signature Wahid T. Customer signature Wahid T.

Document part number: G8014-90076

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Report Summary

Instrument Model Agilent 5100/5110 SVDV ICP-OES
Instrument ID G8010A/G8014A
Instrument Serial Number MY16010005
Software Version 7.3.0.6799
Firmware Version 3354
Tested By Khunphol Test
Test Completed On 2/20/2020 1:54:10 PM

Result Summary

Subsystem Communications Test Pass
Air Flow Test Pass
Water Flow Test Pass
Gas Flows Test Pass
RF Generator Test Pass
Camera Test Pass
Optics Test Pass
Advanced Valve System Test Skipped
Resolution Test Pass
Sensitivity Test Pass
Precision Test Pass

Subsystem Communications Test Pass

Air Flow Test Pass

30% Air Flow (relative speed)	75% Air Flow (relative speed)
12.00	17.00

Water Flow Test Pass

IRF Water Flow (L/min)	Camera Water Flow (L/min)	Water Inlet Temperature (°C)
1.37	1.23	16.56

Gas Flows Test

Pass

Nebulizer Target Flow	Actual Flow	Back Pressure	Auxiliary Target Flow	Actual Flow	Back Pressure
0.70	0.71	268.83	2.00	1.99	129.22

Makeup Target Flow	Actual Flow	Back Pressure	Plasma Target Flow	Actual Flow	Back Pressure
2.00	1.99	129.75	18.00	17.89	25.93

RF Generator Test

Pass

RF Power Supply Test	Passed
RF Power Supply (V)	147.047
RF Oscillator Test	Passed
RF Oscillator Frequency (MHz)	25.739
Work Coil Current (A)	45.707
RF Power Supply Current (A)	2.000

Camera Test

Pass

	Integration Time (ms)	Standard Deviation	Status
Electronic Offset Test	1000	6.826	Passed
Dark Current Test	8000	0.907	Passed
Array Test	5	0.021	Passed
Linearity Test		0.019	Passed

Optics Test

Pass

	Radial	Axial	SVDV
Intensity	2511179	3116480	2781652
Wavelength	737.212	737.212	737.212

Resolution Test

Pass

Element Wavelength	Specification	Width
N (174.213 nm)	≤ 9.40	7.81
As (188.980 nm)	≤ 6.20	5.43
C (193.027 nm)	≤ 11.50	8.80
Mo (202.032 nm)	≤ 6.20	6.57
Cr (208.158 nm)	≤ 13.40	10.30
Zn (213.857 nm)	≤ 8.70	7.30
Pb (220.353 nm)	≤ 9.50	7.46
Co (228.615 nm)	≤ 17.20	12.45
Ba (230.424 nm)	≤ 8.40	7.60
Mn (257.610 nm)	≤ 13.30	9.84
Mn (260.568 nm)	≤ 20.30	14.96
Cr (267.716 nm)	≤ 11.00	8.59
Cu (324.754 nm)	≤ 25.00	18.91
Cu (327.395 nm)	≤ 14.20	11.71
Sr (398.071 nm)	≤ 33.50	24.92
Ba (455.403 nm)	≤ 44.00	33.50
Sr (460.733 nm)	≤ 36.00	22.33
Ba (463.408 nm)	≤ 36.00	25.84
Ba (614.171 nm)	≤ 42.00	26.46
Ar (675.283 nm)	≤ 74.00	52.28
K (766.491 nm)	≤ 80.00	62.92

Sensitivity Test					
Pass					
Radial					
Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 46.0	SRBR	140.3	1345.0	81.1
Se (196.026 nm)	≥ 41.0	SRBR	93.8	1002.9	94.0
Zn (213.857 nm)	≥ 1421.0	SRBR	3088.3	41760.0	181.3
Pb (220.353 nm)	≥ 46.0	SRBR	152.2	1912.7	136.2
Mn (257.610 nm)	≥ 3518.0	SRBR	8845.4	176791.9	321.3
Al (396.152 nm)	≥ 3.4	SBR	11.6	28224.8	2241.9
Ba (493.408 nm)	≥ 34.0	SBR	174.8	1519375.4	8640.4
K (766.491 nm)	≥ 1.8	SBR	5.5	77052.1	11800.3
Axial					
Element Wavelength	Specification	Method	Ratio	Standard	Blank
As (188.980 nm)	≥ 208.0	SRBR	414.4	7602.5	309.7
Se (196.026 nm)	≥ 159.0	SRBR	283.9	5928.0	359.1
Zn (206.200 nm)	≥ 234.0	SRBR	1170.3	17869.8	227.3
Zn (213.857 nm)	≥ 1743.0	SRBR	6593.5	185102.7	781.5
Cd (214.439 nm)	≥ 4227.0	SRBR	5666.0	118353.0	433.1
Pb (220.353 nm)	≥ 320.0	SRBR	405.7	10163.0	557.8
Mn (257.610 nm)	≥ 10625.0	SRBR	21673.9	775712.2	1280.0
Cr (267.716 nm)	≥ 1048.0	SRBR	4367.7	186495.1	1772.4
Cu (324.754 nm)	≥ 19.0	SBR	44.6	208221.0	4563.9
Al (396.152 nm)	≥ 6.0	SBR	18.2	181098.8	8401.5
Ba (493.408 nm)	≥ 50.0	SBR	216.7	7047159.1	32365.9
K (766.491 nm)	≥ 24.0	SBR	43.4	1686217.0	35725.8

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Precision Test			
Pass			
Radial			
Element Wavelength	Specification	Measured Value	% RSD
As (188.980 nm)	≤ 2.60	0.67	
Se (196.026 nm)	≤ 2.60	0.62	
Zn (213.857 nm)	≤ 1.50	0.45	
Pb (220.353 nm)	≤ 2.60	0.76	
Mn (257.610 nm)	≤ 1.50	0.49	
Al (396.152 nm)	≤ 1.50	0.38	
Ba (493.408 nm)	≤ 1.50	0.66	
K (766.491 nm)	≤ 1.50	0.38	
Axial			
Element Wavelength	Specification	Measured Value	% RSD
As (188.980 nm)	≤ 1.50	0.36	
Se (196.026 nm)	≤ 1.50	0.53	
Zn (206.200 nm)	≤ 1.50	0.30	
Zn (213.857 nm)	≤ 1.50	0.55	
Cd (214.439 nm)	≤ 1.50	0.54	
Pb (220.353 nm)	≤ 1.50	0.53	
Mn (257.610 nm)	≤ 1.50	0.83	
Cr (267.716 nm)	≤ 1.50	0.59	
Cu (324.754 nm)	≤ 1.50	0.52	
Al (396.152 nm)	≤ 1.50	0.50	
Ba (493.408 nm)	≤ 1.50	1.04	
K (766.491 nm)	≤ 1.50	1.21	

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Certificate No. T202398

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Certificate of Calibration

Equipment : Hot Block
 Manufacturer : Environmental Express
 Model : SC 196
 Serial No. : 6974CECW3285
 Customer Code : BKK_EL0054
 ID No. : T5306A3
 Customer : ALS Laboratory Group (Thailand) Co.,Ltd.
 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
 Khet Suan Luang, Bangkok 10250
 Customer Location : Acid Digestion Lab
 Date of Receipt : 12 November 2020
 Calibrated By : Watcharapong Songthong (Technician)
 Approved By : Boonchai Suriyawong (Site Calibration Manager)
 Date of Issue : 17 NOV 2020

REVIEW BY : Chanak 2.
 APPROVED BY : Sawitri
 NEXT CAL DATE : 18/05/21

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

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Certificate No. T202398

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Calibration Report

Equipment : Hot Block
 Date of Calibration : 17 November 2020
 Environment : Temperature 20.0-20.3 °C
 Line Voltage 224.2-227.8 V

Condition of this results of test :

1. This instrument was calibrated by insert 20 standard thermocouples type T into its chamber and test according to WI-T20. All data show below were final values and the initial data may be obtained upon request.
 The temperature scale used was based on ITS - 90.

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN21-TN30	T202319	30 October 2021
TC	TYPE T	TN31-TN40	T202319	30 October 2021
DATA LOGGER	34970A	T151	T202319	30 October 2021

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

UUC Description :

Time Constant : 1 Hour 30 Minute At 95 °C
 Fresh Air Damper : ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Result of test :

(X) without adjustment () after adjustment

Approved By : Sawitri

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Calibration Report

43	44	45	46	47	48	49
37	38	39	40	41	42	43
31	32	33	34	35	36	37
25	26	27	28	29	30	31
19	20	21	22	23	24	25
13	14	15	16	17	18	19
7	8	9	10	11	12	13
1	2	3	4	5	6	7

○ STANDARD THERMOCOUPLE TYPE T

No.1 = TN21	No.13 = TN33	No.25 = TN25	No.37 = TN37
No.2 = TN22	No.14 = TN34	No.26 = TN26	No.38 = TN38
No.3 = TN23	No.15 = TN35	No.27 = TN27	No.39 = TN39
No.4 = TN24	No.16 = TN36	No.28 = TN28	No.40 = TN40
No.5 = TN25	No.17 = TN37	No.29 = TN29	No.41 = TN41
No.6 = TN26	No.18 = TN38	No.30 = TN30	No.42 = TN42
No.7 = TN27	No.19 = TN39	No.31 = TN31	No.43 = TN43
No.8 = TN28	No.20 = TN40	No.32 = TN32	No.44 = TN44
No.9 = TN29	No.21 = TN41	No.33 = TN33	No.45 = TN45
No.10 = TN30	No.22 = TN42	No.34 = TN34	No.46 = TN46
No.11 = TN31	No.23 = TN43	No.35 = TN35	No.47 = TN47
No.12 = TN32	No.24 = TN44	No.36 = TN36	No.48 = TN48

Approved By.

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Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (°C)									
		TN21	TN22	TN23	TN24	TN25	TN26	TN27	TN28	TN29	TN30
95	Max	95.30	95.46	96.02	96.07	96.19	95.57	95.82	95.79	96.10	95.84
	Min	95.10	95.24	95.78	95.82	96.02	95.42	95.66	95.64	95.93	95.66
	Average	95.20	95.35	95.90	95.94	96.10	95.50	95.74	95.71	96.02	95.75
		TN31	TN32	TN33	TN34	TN35	TN36	TN37	TN38	TN39	TN40
	Max	95.66	95.57	95.73	96.64	96.14	95.91	95.88	95.71	95.54	95.16
	Min	95.50	95.40	95.60	95.88	95.97	95.69	95.70	95.53	95.36	95.03
	Average	95.58	95.49	95.67	95.96	96.06	95.80	95.79	95.62	95.45	95.10
		TN21	TN22	TN23	TN24	TN25	TN26	TN27	TN28	TN29	TN30
	Max	95.30	94.97	95.35	95.24	96.11	95.86	95.92	96.00	95.82	95.67
	Min	94.91	94.61	94.99	94.84	95.75	95.51	95.55	95.64	95.47	95.34
	Average	95.10	94.79	95.17	95.04	95.93	95.68	95.73	95.82	95.65	95.51
		TN31	TN32	TN33	TN34	TN35	TN36	TN37	TN38	TN39	TN40
	Max	95.83	96.10	96.06	95.66	95.44	95.00	95.18	95.56	95.13	94.90
	Min	95.44	95.75	95.73	95.33	95.12	94.69	94.83	95.17	94.76	94.57
	Average	95.63	95.92	95.89	95.50	95.28	94.85	95.01	95.36	94.95	94.74
		TN21	TN22	TN23	TN24	TN25	TN26	TN27	TN28		
	Max	95.82	95.67	95.83	96.10	96.06	95.66	95.44	95.00		
	Min	95.47	95.34	95.44	95.75	95.73	95.33	95.12	94.69		
	Average	95.65	95.51	95.63	95.92	95.89	95.50	95.28	94.85		

Approved By.

[Signature]

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Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (°C)									
		TN21	TN22	TN23	TN24	TN25	TN26	TN27	TN28	TN29	TN30
105	Max	105.68	105.33	105.67	105.39	106.20	106.04	106.14	105.91	105.85	105.30
	Min	105.40	105.12	105.48	105.20	105.94	105.69	105.84	105.73	105.64	105.15
	Average	105.54	105.22	105.57	105.29	106.07	105.86	105.99	105.82	105.74	105.23
		TN31	TN32	TN33	TN34	TN35	TN36	TN37	TN38	TN39	TN40
	Max	105.82	106.16	106.09	105.87	105.70	105.27	105.77	106.00	105.50	105.00
	Min	105.43	105.82	105.91	105.48	105.49	105.05	105.36	105.66	105.24	104.83
	Average	105.62	105.99	106.00	105.78	105.60	105.16	105.57	105.83	105.37	104.92
		TN21	TN22	TN23	TN24	TN25	TN26	TN27	TN28	TN29	TN30
	Max	105.82	105.67	106.18	105.67	106.27	105.77	106.33	106.50	106.49	106.45
	Min	105.60	105.52	106.01	105.47	106.13	105.65	106.16	106.34	106.32	106.29
	Average	105.71	105.59	106.09	105.57	106.20	105.71	106.25	106.42	106.40	106.37
		TN31	TN32	TN33	TN34	TN35	TN36	TN37	TN38	TN39	TN40
	Max	105.70	105.81	106.66	106.40	106.38	105.97	105.50	105.39	105.45	105.32
	Min	105.31	105.66	106.36	106.22	106.17	105.75	105.32	105.25	105.26	105.15
	Average	105.60	105.73	106.51	106.31	106.28	105.86	105.41	105.32	105.36	105.24
		TN21	TN22	TN23	TN24	TN25	TN26	TN27	TN28		
	Max	106.49	106.45	105.70	105.81	106.66	106.40	106.38	105.97		
	Min	106.32	106.29	105.51	105.66	106.36	106.22	106.17	105.75		
	Average	106.40	106.37	105.60	105.73	106.51	106.31	106.28	105.86		

Approved By.

[Signature]

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Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110

Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T202398

Page 5 of 5

Calibration Report

Hot Block			Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (± °C)	Uncertainty (± °C)
	Min , Max	Average		
100.0	100.3 , 100.5	100.4	0.20	1.12
105.0	105.1 , 105.3	105.2	0.21	1.04

* The quoted uncertainty exclude "stability" and "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 %.

Approved By.

[Signature]

FM-L13 108-30-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.
Saraburi Tel: +66 3627 3086 Fax: +66 3627 3100
Bangkok Tel: +669 9205 8851, +669 8247 2360
Website: www.scieco.co.th E-Mail: calibrate@scg.co.th



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T211009

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cold Room)

Manufacturer : KOLDTECH

Model : KM 320

Serial No. : TBN-1012061/05

Customer Code : BKK_EN0167

ID No. : T2463A3

Customer : ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250

Customer Location : Laboratory

Date of Receipt : 6 May 2021

Calibrated By : Watcharapon Songthong (Technician)

Approved By : Boonchai Suriyawong / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 20 MAY 2021

REVIEW BY Sinik P.
APPROVED BY LL AL
NEXT CAL DATE 16/11/22

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L14 11/7/01-02-64

Certificate No. T211009

Page 2 of 4

Calibration Report

Equipment : Chamber (Cold Room)

Date of Calibration : 18 May 2021

Environment : Temperature : 23.4-24.9 °C

Line Voltage : 221.4-230.2 V

Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 16 standard thermocouples type T into its chamber, the other one standard thermocouples type T use for ambient temperature measurement. The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986). All data show below were final values and the initial data from customer request. The temperature scale used was based on ITS - 90.

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN161-TN170	T210009	8 January 2022
TC	TYPE T	TN171-TN180	T210009	8 January 2022
DATA LOGGER	34970A	T149	T210009	8 January 2022

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

Time Constant ☐ 1 Hour ☐ Minute At ☐ 3 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

(X) without adjustment () after adjustment

Approved By: Boonchai



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand



Metrological Center

SCI ECO Services Company Limited

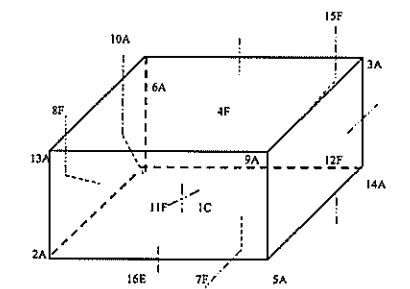
33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand



Certificate No. T211009

Page 3 of 4

Calibration Report



C = Centre, F = Centre of Face, A = Corner, E = Centre of Edge

1C = TN161	12F = TN172
2A = TN162	13A = TN173
3A = TN163	14A = TN174
4F = TN164	15F = TN175
5A = TN165	16E = TN176
6A = TN166	
7F = TN167	
8F = TN168	
9A = TN169	
10A = TN170	
11F = TN171	

Approved By: Boonchai

FM-L15 11/7/15-05-63

Certificate No. T211009

Page 4 of 4

Calibration Report

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)									
	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169	TN170
3	3.23	3.38	3.23	3.41	3.36	3.52	3.51	3.11	3.29	3.50
	TN171	TN172	TN173	TN174	TN175	TN176				
	3.36	3.18	3.52	3.22	3.28	3.31				

Chamber (Cold Room)			Temperature Distribution					
Setting (°C)	Reading (°C)		Average (°C)	Stability (± °C)	Uniformity (°C)	Uncertainty (± °C)	Coverage Factor <i>k</i>	
	Min	Max						
3.0	2.7	3.4	3.0	3.34	1.00	1.10	1.46	2.00

* The Accepted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 %.

Approved By: Boonchai

FM-L15 11/7/15-05-63

ภาคผนวก จ

สำเนาหนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการ

วิเคราะห์เอกชน



ที่ กอ ๐๓๑๐(๑)/ ๑๐๖ ๙

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๕๐๐

๒๘ มกราคม ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์ทดสอบ

เรียน กรรมการผู้จัดการ บริษัท เอนกเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์ทดสอบ
ลงวันที่ ๓๐ กรกฎาคม ๒๕๖๓

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ แผ่น
๓. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอนกเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุ
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์ทดสอบ เลขทะเบียน ๖-๒๐๔-๙-๑๐๔
ขอพัฒนาการ ๕๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร
ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอนกเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย)
จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์ทดสอบ โดยมีองค์ประกอบดังนี้
ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖๒ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๕๙ รายการ น้ำใต้ดิน
จำนวน ๑๖๖ รายการ อากาศเสีย ๑๖ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๓๙ รายการ และดิน
จำนวน ๒๕๕ รายการ รวมทั้งสิ้นจำนวน ๓๖๓ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๖ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์ทดสอบ ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอ
ต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นสุดของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์
ทดสอบ ซึ่งคำขอต่ออายุดังกล่าวจะรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายศิระ จันทร์เลิศ)

ผู้อำนวยการสำนักมาตรฐานทางวิชาการและการพัฒนา
ผู้ควบคุมการปฏิบัติงานและควบคุมคุณภาพ
ปฏิบัติการทางเคมีและชีวเคมี กรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยแลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๔๑๔๖ ๐ ๒๒๐๒ ๔๑๐๒

โทรสาร ๐ ๒๒๕๔ ๓๒๐๘ ๐ ๒๒๕๔ ๓๔๔๘

เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์ทดสอบ

บริษัท เอนกเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ๖-๒๐๔

ที่ กอ ๐๓๑๐(๑)/ ๑๐๖ ๙ ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖๒ ราย

- | | |
|---|---------------------------|
| ๑) นางสาวจินดา ไชยธรรม | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒) นางสาวสวรินทร์ ชัยธรรม | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓) นางสาวณัฐกาญจน์ อิ่มชม | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔) นางสาวนันทิรา สายสิง | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕) นางสาวนันทิรา สมบูรณ์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖) นางสาวศรัณยา เถียรธรรม | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๗) นางสาวสวรินทร์ มงคลเจริญ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๘) นางสาวศิริลักษณ์ พึ่งแพง | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๙) นายณพงศ์ จันทร์นุ้ย | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๑๐) นายณเศรษฐ์ โกมลย์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๑๑) นายธันวา จรรย์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๑๒) นางสาวเกตุพร แก้วมณี | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๑๓) นางสาวสุวิมล ชัยเรืองวุฒิ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๑๔) นางสาวสุชาดา ธรรมถาวร | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๑๕) นางสาวเปรมิกา ชัยเศรษฐกุล | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๑๖) นางสาวศศิธร พงษ์สวัสดิ์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๑๗) นางสาวเสาวลักษณ์ ภูณายาพร | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๑๘) นายอภิสิทธิ์ สิงหา | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๑๙) นายศักดิ์สิทธิ์ ไพศาลพิสุทธิ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒๐) ว่าที่ร้อยตรีหญิง พรรณิภา ช่างเจริญ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒๑) นายฉัตร คำแก้ว | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒๒) นางสาวอรรณพ รักษ์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒๓) นางสาวพรวิมล แยมกรณ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒๔) นายจุลเดช วรวิทย์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒๕) นางสาวตาสุรัตน์ ร้องคำ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒๖) นายณกร สุขเจริญ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒๗) นายบัญชา นามเขตต์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒๘) นายพรมณ์ ศรีปิ่นนคร | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒๙) นายอุทิศ อุณิ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓๐) ว่าที่ร้อยตรี เฉลิมเกียรติ อมศรีเสริม | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓๑) นางสาววิภา สร้างนา | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓๒) นายอนุพงศ์ รัตนศรีประเสริฐ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓๓) นางสาวจุฬารัตน์ โอนสินเพียร | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓๔) นางสาวจางวรรณ พิมพ์อุทัย | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |

(นายศิระ จันทร์เลิศ)

ผู้อำนวยการสำนักมาตรฐานทางวิชาการและการพัฒนา
ผู้ควบคุมการปฏิบัติงานและควบคุมคุณภาพ
ปฏิบัติการทางเคมีและชีวเคมี กรมโรงงานอุตสาหกรรม

๓๕) นางสาวปรังคิยา...

เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์ทดสอบ

บริษัท เอนกเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ๖-๒๐๔

ที่ กอ ๐๓๑๐(๑)/

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย

- | | |
|---------------------------|---------------------------|
| ๑) นางสาวบุษพา จันทน์เพ็ง | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๒) นางสาวจิตติยา โกมลย์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓) นายศราวุธ จิตราพันธ์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔) นางสาวกนกกร เอนก | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕) นายสุวิทย์ สอนแก้ว | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖) นายวิชัย ชุมทรัพย์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |

(นายศิระ จันทร์เลิศ)

ผู้อำนวยการสำนักมาตรฐานทางวิชาการและการพัฒนา
ผู้ควบคุมการปฏิบัติงานและควบคุมคุณภาพ
ปฏิบัติการทางเคมีและชีวเคมี กรมโรงงานอุตสาหกรรม

- ๒ -

- | | |
|---------------------------------|---------------------------|
| ๓๕) นางสาวปรังคิยา... | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓๖) นางสาวเดือนใจ หางกลาง | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓๗) นางสาวจิราพร ศิริเวช | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓๘) นายวรกร ญารักษ์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๓๙) นายทง วีระสิทธิ์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔๐) นายอดิศักดิ์ เจริญ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔๑) นายคณิศร จำเริญ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔๒) นายอรุณศักดิ์ นิยมวัฒนา | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔๓) นายภูริช ทรหมะอาด | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔๔) นายณเดช ไพศาลพิสุทธิ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔๕) นายชวฤทธิ์ วงษ์จันทร์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔๖) นายอาทิตย์ ศรีสม | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔๗) นายเจตนาถ คงศักดิ์ไทย | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔๘) นายจรัส บุญยั้ง | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๔๙) นายอนันต์ เอนก | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕๐) นายอภิวัฒน์ ทุมพู | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕๑) นางสาวสุภาวดี มาก | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕๒) นางสาวศศิธร พงษ์สวัสดิ์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕๓) นางสาวจิตติภา ปุณเฑาะ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕๔) นางสาวกนกกร เข้มเพ็ชร | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕๕) นางสาวจิราพร หงษ์มณี | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕๖) นางสาวภาวิดา สุรางค์ธรรมกุล | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕๗) นางสาวภาณุภา นามรัตน์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕๘) นางสาวอุไรรัตน์ หิรัญรัตน์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๕๙) นายธีรวัฒน์ ปางฟู | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖๐) นายอริยพร ยะโส | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖๑) นายประพนธ์ วรรณสุข | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖๒) นายชรัส พงษ์ทิพย์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖๓) นางสาวกนกวรรณ จันทนาล | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖๔) นางสาวนภสร หลักบุญ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖๕) นายสิทธิโชค ธงเงิน | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖๖) นาคศิลาธรรม โปญ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖๗) นางสาวพรรณิศา ทุมคง | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖๘) นางสาวพรวิมล ยี่ดี | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๖๙) นายณภัทร ศรีวิริยะ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๗๐) นายสุวิทย์ หงษ์มณี | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |
| ๗๑) นายวิชัย ชุมทรัพย์ | ทะเบียนเลขที่ ๖-๒๐๔-๙-๑๐๔ |

(นายศิระ จันทร์เลิศ)

ผู้อำนวยการสำนักมาตรฐานทางวิชาการและการพัฒนา
ผู้ควบคุมการปฏิบัติงานและควบคุมคุณภาพ
ปฏิบัติการทางเคมีและชีวเคมี กรมโรงงานอุตสาหกรรม

๓๖) นายสมบุญ...

[illegible]

๑๐๘) นายบนาชัย...

[illegible]

๑๕๖) นางสาวชุตานภรณ์...

ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๕๘
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๖๒
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๖๗
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๖๘
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๖๙
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๗๐
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๗๑
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๗๒
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๗๓
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๗๔
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๗๕
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๗๖
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๗๗
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๗๘
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๗๙
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๘๐
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๘๑
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๘๒
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๘๓
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๘๔
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๘๕
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๘๖
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๘๗
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๘๘
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๘๙
ทะเบียนเลขที่ 7-๒๐๙-๔-๑๓๙๐

205-7-5100

เลขทะเบียน 7-๒๐๔

ลงวันที่ ๒๘ มกราคม ๒๕๖๔

ឧបសគ្គ ៧២៣

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldicarb	High-Performance Liquid Chromatographic Method ⁽⁴⁾
2	Aldicarb Sulfone	High-Performance Liquid Chromatographic Method ⁽⁴⁾
3	Aldicarb Sulfoxide	High-Performance Liquid Chromatographic Method ⁽⁴⁾
4	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
5	Arsenic	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
6	Barium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
7	α -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
8	β -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
9	δ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
10	γ -BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
11	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ⁽⁴⁾ 2) 5-Day BOD Test, Membrane Electrode Method ⁽⁴⁾
12	Carbaryl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
13	Carbofuran	High-Performance Liquid Chromatographic Method ⁽⁴⁾
14	Cadmium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
15	Chemical Oxygen Demand	1) Closed Reflux, Colorimetric Method ⁽⁴⁾ 2) Closed Reflux, Titrimetric Method ⁽⁴⁾
16	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
17	Chromium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Spectrometric Method ⁽⁴⁾
18	Color	ADMI Weighted-Ordinate Spectrophotometric Method

19 Copper...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Copper	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
20	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
21	2,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
33	Formaldehyde	Distillation, Colorimetric Method ⁽³⁾
34	Free Chlorine	1) DPD Ferrous Titrimetric Method ⁽⁴⁾ 2) Iodometric Method ⁽⁴⁾
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
36	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
37	Hexavalent Chromium	Filtration, Colorimetric Method ⁽⁴⁾
38	3-Hydroxycarbofuran	High-Performance Liquid Chromatographic Method ⁽⁴⁾
39	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
40	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
41	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/Mass spectrometric Method ⁽⁴⁾
42	Methiocarb	High-Performance Liquid Chromatographic Method ⁽⁴⁾
43	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾

วิมล
(นางวิภาณูจน์ นัครฤกษ์วิไล)
ผู้อำนวยการศูนย์มาตรฐานวิธีการวิเคราะห์และควบคุมมลพิษ
กรมควบคุมมลพิษ

44 Methomyl...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
44	Methomyl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
45	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
46	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ⁽⁴⁾ 2) Soxhlet Extraction Method ⁽⁴⁾
47	Oxamyl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
48	Propoxur	High-Performance Liquid Chromatographic Method ⁽⁴⁾
49	pH	Electrometric Method ⁽⁴⁾
50	Phenols	1) Distillation, Chloroform Extraction Method ⁽⁴⁾ 2) Distillation, Direct Photometric Method ⁽⁴⁾
51	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
52	Sulfide	Iodometric Method ⁽⁴⁾
53	Temperature	Laboratory and Field Methods ⁽⁴⁾
54	Total Dissolved Solids	Dried at 180 °C ⁽⁴⁾
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method ⁽⁴⁾
56	Total Suspended Solids	Dried at 103-105 °C ⁽⁴⁾
57	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
58	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾
59	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁴⁾

ได้คิดค้น จำนวน 126 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

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กรมควบคุมมลพิษ

3 Aldrin...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
8	Barium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

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กรมควบคุมมลพิษ


18 Bis(2-ethylhexyl)phthalate...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
22	Butyl Benzyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾

วิมล
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กรมควบคุมมลพิษ


34 Chromium (III)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾
35	Chromium (VI)	2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾
36	Chrysene	Colorimetric Method ⁽⁴⁾
37	Cyanide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
38	2,4-D	Distillation, Colorimetric Method ⁽⁴⁾
39	DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
40	DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
41	DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
42	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
43	Di-n-Butyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
47	3,3-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾


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 กรมวิทยาศาสตร์สิ่งแวดล้อม


51 cis-1,2-Dichloroethylene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
57	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
58	Diethyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
63	Di-n-Octyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
64	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
65	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾


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
68 Fluorene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
74	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
75	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
76	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
81	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
83	Mercury	1) Cold Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾


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84 Methanol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾ 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1248 - PCB 1254 - PCB 1260	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾


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97 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
98	pH	Electrometric Method ⁽⁴⁾
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
100	Phenol	1) Distillation, Direct Photometric Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
103	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
109	TPH (C ₅ -C ₉)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(3,24)
110	TPH (C ₁₀ -C ₁₉)	Solvent Extraction, Gas Chromatographic Method ^(3,21)
111	TPH (C ₁₀ -C ₁₉)	Solvent Extraction, Gas Chromatographic Method ^(3,21)
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

114 1,1,2-Trichloroethane...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
120	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
121	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
122	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
123	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
124	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
126	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾

ฉลากห่อหุ้ม (กล่องบรรจุ) จำนวน 16 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
2	Arsenic	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾

3 Carbon Monoxide...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
3	Carbon Monoxide	1) Sampling Bag Non-Dispersive Infrared Method ⁽²⁾ 2) Non-Dispersive Infrared Method ⁽⁵⁾ 3) Instrumental Analyzer Method ⁽⁵⁾
4	Chlorine	1) Absorption Sampling, Ion Chromatographic Method ⁽⁵⁾
5	Copper	2) Isokinetic Sampling, Ion Chromatographic Method ⁽⁵⁾ Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
6	Dioxins	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) ⁽⁵⁾
7	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method ⁽⁵⁾
8	Hydrogen Sulfide	2) Isokinetic Sampling, Ion Chromatographic Method ⁽⁵⁾ Absorption Sampling, Iodometric Method ⁽⁵⁾
9	Lead	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
10	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁵⁾ 2) Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
11	Opacity	Ringelmann's Method ⁽²⁾
12	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method ⁽⁵⁾ 2) Chemiluminescence Method ⁽⁵⁾ 3) Instrumental Analyzer Method ⁽⁵⁾
13	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾ 2) UV Fluorescence Method ⁽⁵⁾ 3) Instrumental Analyzer Method ⁽⁵⁾
14	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾
15	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ⁽⁵⁾
16	Xylene	Absorption Sampling, Gas Chromatographic Method ⁽⁵⁾

สิ่งปฏิกูล...

(นางริกาญจน์ อัครสกุลวิไล)
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สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1,9,22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)

6 Cadmium...

(นางริกาญจน์ อัครสกุลวิไล)
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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.15,17) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.16,17) 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.15,17) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.16,17)
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^(1.6.17) 2) Alkaline Digestion, Colorimetric Method ^(3.17)

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11 Cobalt...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25)

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2) Soxhlet...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.6.18)

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2) Waste Extraction...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
23	Methoxychlor	2) Waste Extraction, Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^(1.6.19) 3) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^(1.6.20) 4) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.6) 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^(1.6) 6) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^(2.20)
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)

(นางสาวกัญจน์ อัครฤทธิไค)
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กรมส่งเสริมการค้าระหว่างประเทศ

27 Polychlorinated...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4,5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3',3',4,6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,6-Nonachlorobiphenyl	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)

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28 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)
29	pH	Electrometric Method ^(29,30)
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,16)
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion...

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4) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
35	Zinc	4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)

พิมพ์ จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
4	Anthracene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)

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
9 Benz(a)anthracene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Benz(a)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
11	Benzo(b)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
12	Benzo(k)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
13	Benzoic acid	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
14	Benzo(a)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
15	Benzo(g,h,i)perylene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
17	Bis(2-chloroethyl)ether	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
18	Bis(2-ethylhexyl)phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)
21	Butanol	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(12,29)
22	Butyl Benzyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,16)
24	Carbazole	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,24)


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26 Carbon tetrachloride...


ลำดับที่	สารเคมี	วิธีวิเคราะห์
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
28	p-Chloroaniline	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
32	2-Chlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7A,15,17) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7A,16,17)
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(8,17)
36	Chrysene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(26,27,28)
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
39	DDD	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)


 (นางจิราพร ชีรพร) 40 DDE...
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
ลำดับที่	สารเคมี	วิธีวิเคราะห์
40	DDE	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
41	DDT	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
42	Dibenz(a,h)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
43	Di-n-Butyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
47	3,3-Dichlorobenzidine	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
53	2,4-Dichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)


 (นางจิราพร ชีรพร) 57 Dieldrin...
 ผู้อำนวยการศูนย์มาตรฐานวิธีวิเคราะห์ทางเคมี

ลำดับที่	สารเคมี	วิธีวิเคราะห์
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
58	Diethyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
59	2,4-Dimethylphenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
60	2,4-Dinitrophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
61	2,4-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
62	2,6-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
63	Di-n-Octyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
67	Fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
68	Fluorene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
70	Heptachlor Epoxide	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)


 (นางจิราพร ชีรพร) 71 Hexachlorobenzene...
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ลำดับที่	สารเคมี	วิธีวิเคราะห์
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
74	α-HCH	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
75	β-HCH	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
76	γ-HCH	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
77	Hexachlorocyclopentadiene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
78	Hexachloroethane	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
79	Indeno(1,2,3-cd)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
80	Isophorone	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
81	Lead	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹⁸⁾


 (นางจิราพร ชีรพร) 2) Thermal...
 ผู้อำนวยการศูนย์มาตรฐานวิธีวิเคราะห์ทางเคมี

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ⁽¹⁾⁽⁹⁾ 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁾⁽⁹⁾ Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽¹²⁾⁽²⁴⁾
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²²⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
88	2-methylphenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
89	2-Methylnaphthalene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
91	Naphthalene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹⁵⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁴⁾
93	Nitrobenzene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
94	N-Nitrosodiphenylamine	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
95	N-Nitrosodi-n-propylamine	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232	1) Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic Method ⁽²⁵⁾⁽³¹⁾

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- Aroclor 1242...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
	- Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4,6'-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,5,5',6'-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5',6'-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl	
97	Pentachlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
98	Phenanthrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
99	Phenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
100	Pyrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾

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กรมควบคุมมลพิษ

101 Selenium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
101	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹⁵⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁴⁾
102	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹⁵⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁴⁾
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²²⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
108	TPH (C ₈ -C ₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
109	TPH (C ₈ -C ₁₀)	1) Solvent Extraction, Gas Chromatographic Method ⁽¹⁾⁽²¹⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic Method ⁽²⁵⁾⁽³¹⁾
110	TPH (C ₁₀ -C ₃₀)	1) Solvent Extraction, Gas Chromatographic Method ⁽¹⁾⁽²¹⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic Method ⁽²⁵⁾⁽³¹⁾
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
115	2,4,5-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾

อธิบดี
(นางวิภาดาญจน์ อัครกุลสุวิไล)
ผู้อำนวยการกองมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

116 2,4,6-Trichlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
116	2,4,6-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽²⁵⁾⁽³¹⁾
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹⁵⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁴⁾
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
121	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
122	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
123	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁴⁾⁽²⁴⁾
125	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹⁵⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁷⁾⁽¹⁴⁾

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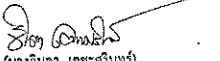
อธิบดี
(นางวิภาดาญจน์ อัครกุลสุวิไล)
ผู้อำนวยการกองมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

7. United States...

หนังสือฉบับนี้มีอายุ ๓ ปี นับจากวันที่กรมโรงงานอุตสาหกรรมออกหนังสือ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน จึงส่งคำขอต่ออายุดังกล่าวขอรับใช้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นางจิตา เกษะกรีนทร์)

ผู้อำนวยการศูนย์วิเคราะห์สิ่งแวดล้อมและโรงงาน
ปฏิบัติการทางเคมีและโลหะหนัก กรมโรงงานอุตสาหกรรม

๒๘ มี.ย. ๒๕๖๕

กองวิจัยและเตือนภัยมลพิษโรงงาน
ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๘๘๐๕ ๘๐๖๑-๓
ไปรษณีย์อิเล็กทรอนิกส์ env@dlw.go.th


เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ว-๓๒๓
ที่ กก ๐๓๑๐(๓)/ ๒๕๗๐ ลงวันที่ ๒๘ มิถุนายน ๒๕๖๕

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๔ รายการ
แนบท้าย จำนวน ๑๔ รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Biochemical Oxygen Demand	1) 5-Day BOD Test, Membrane Electrode Method ^[2] 2) 5-Day BOD Test, Azide Modification Method ^[2]
2	Chemical Oxygen Demand	1) Open Reflux, Titrimetric Method ^[2] 2) Closed Reflux, Colorimetric Method ^[2] 3) Closed Reflux, Titrimetric Method ^[2]
3	Color	ADM Weighted - Ordinate Spectrophotometric Method ^[2]
4	Cyanide	Distillation, Colorimetric Method ^[2]
5	Formaldehyde	Distillation, Colorimetric Method ^[2]
6	Free Chlorine	DPD-Ferrous Titrimetric Method ^[2]
7	Oil and Grease	Liquid-Liquid Partition-Gravimetric Method ^[2]
8	pH	Electrometric Method ^[2]
9	Phenols	1) Distillation, Chloroform Extraction Method ^[2] 2) Distillation, Direct Photometric Method ^[2]
10	Sulfide	ZnS Precipitation, Iodometric Method ^[2]
11	Temperature	Laboratory and Field Method ^[2]
12	Total Dissolved Solids	Dried at 180 °C ^[2]
13	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method ^[2]
14	Total Suspended Solids	Dried at 103-105 °C ^[2]

อากาศเสีย (ปล่อยระบาย) จำนวน 7 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Carbon Monoxide	1) Sampling Bag, Non-Dispersive Infrared Method ^[2] 2) Instrumental Analyzer Method ^[2]
2	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ^[2]
3	Opacity	Ringelmann's Method ^[2,4]
4	Oxide of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method ^[2] 2) Instrumental Analyzer Method ^[2]
5	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ^[2] 2) Instrumental Analyzer Method ^[2]


(นางสาวจิตา เกษะกรีนทร์)

ผู้อำนวยการ
ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก Sulfuric Acid...


ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
6	Sulfuric Acid	Isokinetic Sampling, Barium - Thorin Titrimetric Method ^[2]
7	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ^[2]

น้ำใช้ดื่ม จำนวน 3 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Cyanide	Distillation, Colorimetric Method ^[2]
2	pH	Electrometric Method ^[2]
3	Phenols	Distillation, Direct Photometric Method ^[2]

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(นางสาวจิตา เกษะกรีนทร์)

ผู้อำนวยการ

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก



ที่ ทส ๑๐๑๐.๘/ ๑๕ ๓๔ ๕ -

สำนักงานนโยบายและแผน
ทรัพยากรธรรมชาติและสิ่งแวดล้อม
๑๑๘/๑ อาคารทิปโก้ ๒ ถนนพระรามที่ ๖
แขวงพญาไท เขตพญาไท
กรุงเทพฯ ๑๐๕๐๐

๑๗ พฤศจิกายน ๒๕๖๓

เรื่อง การโอนสิทธิ์และการระงับผูกพันในการดำเนินการและรับผิดชอบปฏิบัติตามรายละเอียดและมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม ในรายงานการวิเคราะห์ผลกระทบสิ่งแวดล้อม โครงการโรงงานผลิตสารโพรพิลีนออกไซด์และสารโพรพิลีนไกลคอล ของบริษัท เอ็มทีพี เอชพีพีโอ แมนูแฟคเจอร์ริง จำกัด ให้แก่ บริษัท ดาว เคมิคอล ประเทศไทย จำกัด

เรียน กรรมการผู้จัดการบริษัท เอ็มทีพี เอชพีพีโอ แมนูแฟคเจอร์ริง จำกัด

อ้างถึง หนังสือบริษัท เอ็มทีพี เอชพีพีโอ แมนูแฟคเจอร์ริง จำกัด ที่ MTP_HPPO/สผ 2009 - 005 ลงวันที่ ๓๐ กันยายน ๒๕๖๓

ตามหนังสือที่อ้างถึง บริษัท เอ็มทีพี เอชพีพีโอ แมนูแฟคเจอร์ริง จำกัด ได้แจ้งสำนักงานนโยบายและแผนทรัพยากรธรรมชาติและสิ่งแวดล้อม ว่าบริษัทฯ ได้รับการอนุมัติการขอโอนสิทธิ์และการระงับผูกพันในการดำเนินการและรับผิดชอบปฏิบัติตามรายละเอียดและมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อมในรายงานการวิเคราะห์ผลกระทบสิ่งแวดล้อม โครงการโรงงานผลิตโพรพิลีนออกไซด์และสารโพรพิลีนไกลคอล ของบริษัท เอ็มทีพี เอชพีพีโอ แมนูแฟคเจอร์ริง จำกัด ให้แก่ บริษัท ดาว เคมิคอล ประเทศไทย จำกัด โดยจะมีผลตั้งแต่วันที่ ๒ พฤศจิกายน ๒๕๖๓ เป็นต้นไป ความละเอียดแจ้งแล้ว นั้น

สำนักงานนโยบายและแผนทรัพยากรธรรมชาติและสิ่งแวดล้อมได้นำเรื่องดังกล่าว เสนอต่อคณะกรรมการผู้ชำนาญการพิจารณารายงานการวิเคราะห์ผลกระทบสิ่งแวดล้อมโครงการอุตสาหกรรมกลั่นน้ำมันปิโตรเลียม ปิโตรเคมี และแยกหรือแปรสภาพก๊าซธรรมชาติ ในการประชุม ครั้งที่ ๒๖/๒๕๖๓ เมื่อวันที่ ๒ พฤศจิกายน ๒๕๖๓ ซึ่งที่ประชุมมีมติรับทราบการโอนสิทธิ์และการระงับผูกพันในการดำเนินการและรับผิดชอบปฏิบัติตามรายละเอียดและมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อมในรายงานการวิเคราะห์ผลกระทบสิ่งแวดล้อมโครงการโรงงานผลิตสารโพรพิลีนออกไซด์และสารโพรพิลีนไกลคอล ของบริษัท เอ็มทีพี เอชพีพีโอ แมนูแฟคเจอร์ริง จำกัด ให้แก่ บริษัท ดาว เคมิคอล ประเทศไทย จำกัด ทั้งนี้ ให้บริษัท ดาว เคมิคอล ประเทศไทย จำกัด ปฏิบัติตามมาตรการป้องกันและแก้ไขผลกระทบสิ่งแวดล้อม และมาตรการติดตามตรวจสอบผลกระทบสิ่งแวดล้อมที่เสนอไว้ในรายงานการวิเคราะห์ผลกระทบสิ่งแวดล้อมโครงการโรงงานผลิตสารโพรพิลีนออกไซด์และสารโพรพิลีนไกลคอล (ส่วนขยาย ครั้งที่ ๑)


ของบริษัท...

Received - 27 Nov 2020

ของบริษัท เอ็มทีพี เอชพีพีโอ แมนูแฟคเจอร์ริง จำกัด ตั้งอยู่ที่นิคมอุตสาหกรรมเอเชีย อำเภอบ้านฉาง จังหวัดระยอง อย่างเคร่งครัด

จึงเรียนมาเพื่อโปรดทราบ

ขอแสดงความนับถือ



(นายพิรุณ สัยยะสิทธิ์พานิช)

รองเลขาธิการฯ ปฏิบัติราชการแทน

เลขาธิการสำนักงานนโยบายและแผนทรัพยากรธรรมชาติและสิ่งแวดล้อม

กองวิเคราะห์ผลกระทบสิ่งแวดล้อม

โทร. ๐๒ ๒๖๕ ๖๕๐๐ ต่อ ๖๗๙๕

โทรสาร ๐๒ ๒๖๕ ๖๖๑๖

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