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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496081
Date Received : Sep 17, 2024
Date Reported : Sep 21, 2024
Report Number: 3088447-1

Sample Description Air Quality
Location [illegible] (GPS 47P 0724381, 1402551)
Parameter Nitrogen dioxide (ppm)
Measurement Date Sep 05, 2024 - Sep 12, 2024
Measurement by Santi Chaichana

Time	2496081-1 Sep 05, 2024	2496081-2 Sep 06, 2024	2496081-3 Sep 07, 2024	2496081-4 Sep 08, 2024	2496081-5 Sep 09, 2024	2496081-6 Sep 10, 2024	2496081-7 Sep 11, 2024
12:00 PM - 01:00 PM	0.0029	0.0006	0.0005	0.0003	0.0004	0.0003	0.0002
01:00 PM - 02:00 PM	0.0045	0.0006	0.0008	0.0004	0.0003	0.0002	0.0003
02:00 PM - 03:00 PM	0.0016	0.0005	0.0005	0.0004	0.0004	0.0004	0.0003
03:00 PM - 04:00 PM	0.0012	0.0006	0.0004	0.0003	0.0003	0.0004	0.0003
04:00 PM - 05:00 PM	0.0011	0.0007	0.0020	0.0001	0.0008	0.0003	0.0004
05:00 PM - 06:00 PM	0.0012	0.0010	0.0025	0.0004	0.0004	0.0003	0.0007
06:00 PM - 07:00 PM	0.0013	0.0011	0.0008	0.0008	0.0006	0.0001	0.0004
07:00 PM - 08:00 PM	0.0016	0.0015	0.0007	0.0013	0.0004	0.0004	0.0004
08:00 PM - 09:00 PM	0.0017	0.0016	0.0003	0.0017	0.0006	0.0007	0.0007
09:00 PM - 10:00 PM	0.0018	0.0009	0.0003	0.0007	0.0009	0.0006	0.0004
10:00 PM - 11:00 PM	0.0017	0.0008	0.0004	0.0005	0.0011	0.0013	0.0008
11:00 PM - 12:00 AM	0.0014	0.0005	0.0004	0.0004	0.0006	0.0014	0.0016
12:00 AM - 01:00 AM	0.0015	0.0006	0.0002	0.0007	0.0004	0.0012	0.0014
01:00 AM - 02:00 AM	0.0017	0.0004	0.0006	0.0004	0.0006	0.0013	0.0013
02:00 AM - 03:00 AM	0.0015	0.0007	0.0003	0.0005	0.0005	0.0014	0.0011
03:00 AM - 04:00 AM	0.0012	0.0004	0.0002	0.0003	0.0004	0.0013	0.0012
04:00 AM - 05:00 AM	0.0010	0.0006	0.0005	0.0005	0.0004	0.0011	0.0023
05:00 AM - 06:00 AM	0.0009	0.0004	0.0003	0.0004	0.0001	0.0010	0.0031
06:00 AM - 07:00 AM	0.0006	0.0003	0.0003	0.0004	0.0003	0.0007	0.0023
07:00 AM - 08:00 AM	0.0010	0.0008	0.0004	0.0005	0.0004	0.0009	0.0020
08:00 AM - 09:00 AM	0.0009	0.0007	0.0005	0.0004	0.0004	0.0007	0.0017
09:00 AM - 10:00 AM	0.0007	0.0007	0.0003	0.0019	0.0003	0.0004	0.0012
10:00 AM - 11:00 AM	0.0008	0.0006	0.0002	0.0004	0.0004	0.0003	0.0012
11:00 AM - 12:00 PM	0.0006	0.0004	0.0002	0.0003	0.0011	0.0005	0.0019
Average	0.0014	0.0007	0.0006	0.0006	0.0005	0.0007	0.0011
1hr - Maximum	0.0045	0.0016	0.0025	0.0019	0.0011	0.0014	0.0031
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)

Approved by Orawan R.
Orawan Rakyong
Scientist (3)

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496084
Date Received : Sep 16, 2024
Date Reported : Sep 21, 2024
Report Number: 3088449-1

Sample Description Air Quality
Location [illegible] (GPS 47P 0724381, 1402551)
Date Analysis Commenced Sep 17, 2024
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)
2496084-1	Sep 05 - Sep 06, 2024	0.016	754	31
2496084-2	Sep 06 - Sep 07, 2024	0.021	754	32
2496084-3	Sep 07 - Sep 08, 2024	0.027	754	32
2496084-4	Sep 08 - Sep 09, 2024	0.041	754	31
2496084-5	Sep 09 - Sep 10, 2024	0.035	754	32
2496084-6	Sep 10 - Sep 11, 2024	0.024	754	32
2496084-7	Sep 11 - Sep 12, 2024	0.026	754	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 : Santi Chaichana

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

Approved by Thanita K.
Thanita Kulsuriwong
Scientist (4)

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496083
Date Received :Sep 16, 2024
Date Reported :Sep 24, 2024
Report Number :3088448-1

Sample Number 2496083-1 to 7
Parameter Wind Speed / Wind Direction
Location [illegible] (GPS 47P 0724381, 1402551)
Sampling Date Sep 05 - Sep 12, 2024
Sampling by Santi Chaichana

Time	Sep 05 - Sep 06, 2024			Sep 06 - Sep 07, 2024			Sep 07 - Sep 08, 2024			Sep 08 - Sep 09, 2024			Sep 09 - Sep 10, 2024			Sep 10 - Sep 11, 2024			Sep 11 - Sep 12, 2024		
	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)	
12:00 PM - 01:00 PM	2.2	182.0	S	1.4	112.0	ESE	2.2	203.0	SSW	1.6	192.0	SSW	1.5	205.0	SSW	0.6	198.0	SSW	1.4	196.0	SSW
01:00 PM - 02:00 PM	0.2	-	-	0.9	102.0	ESE	0.6	202.0	SSW	0.5	204.0	SSW	2.4	204.0	SSW	0.5	208.0	SSW	1.0	212.0	SSW
02:00 PM - 03:00 PM	1.2	174.0	S	1.4	230.0	SW	0.2	-	-	1.0	202.0	SSW	0.6	208.0	SSW	1.5	196.0	SSW	1.5	193.0	SSW
03:00 PM - 04:00 PM	1.1	173.0	S	1.2	224.0	SW	1.2	197.0	SSW	1.2	212.0	SSW	1.7	202.0	SSW	1.4	200.0	SSW	1.4	204.0	SSW
04:00 PM - 05:00 PM	1.4	169.0	S	1.2	221.0	SW	1.3	195.0	SSW	1.4	205.0	SSW	0.9	198.0	SSW	1.7	195.0	SSW	2.4	195.0	SSW
05:00 PM - 06:00 PM	0.5	166.0	SSE	2.3	222.0	SW	0.5	196.0	SSW	1.6	208.0	SSW	1.0	197.0	SSW	1.4	198.0	SSW	1.9	203.0	SSW
06:00 PM - 07:00 PM	0.7	200.0	SSW	1.5	224.0	SW	0.8	198.0	SSW	1.4	210.0	SSW	0.8	199.0	SSW	0.6	196.0	SSW	0.7	197.0	SSW
07:00 PM - 08:00 PM	0.3	212.0	SSW	1.2	225.0	SW	1.0	201.0	SSW	0.6	211.0	SSW	0.8	201.0	SSW	0.9	198.0	SSW	0.9	198.0	SSW
08:00 PM - 09:00 PM	0.3	188.0	S	0.8	235.0	SW	0.6	205.0	SSW	0.9	212.0	SSW	0.7	202.0	SSW	1.1	199.0	SSW	0.5	212.0	SSW
09:00 PM - 10:00 PM	0.4	164.0	SSE	0.8	221.0	SW	0.6	203.0	SSW	0.7	213.0	SSW	1.2	203.0	SSW	1.0	200.0	SSW	0.9	199.0	SSW
10:00 PM - 11:00 PM	0.5	186.0	S	0.8	225.0	SW	0.7	204.0	SSW	0.4	223.0	SW	0.6	208.0	SSW	1.4	203.0	SSW	1.0	216.0	SW
11:00 PM - 12:00 AM	1.0	163.0	SSE	0.5	224.0	SW	1.0	207.0	SSW	0.8	213.0	SSW	0.7	211.0	SSW	0.6	201.0	SSW	0.7	200.0	SSW
12:00 AM - 01:00 AM	0.3	162.0	SSE	0.9	223.0	SW	0.8	203.0	SSW	0.6	212.0	SSW	0.8	207.0	SSW	0.6	212.0	SSW	0.8	210.0	SSW
01:00 AM - 02:00 AM	0.4	161.0	SSE	-	-	-	1.2	206.0	SSW	0.5	207.0	SSW	1.2	204.0	SSW	0.5	202.0	SSW	0.9	214.0	SW
02:00 AM - 03:00 AM	0.8	160.0	SSE	0.8	222.0	SW	0.8	203.0	SSW	0.9	212.0	SSW	0.7	205.0	SSW	1.0	203.0	SSW	0.6	201.0	SSW
03:00 AM - 04:00 AM	0.3	159.0	SSE	0.3	221.0	SW	0.6	204.0	SSW	0.7	214.0	SW	1.0	206.0	SSW	0.6	213.0	SSW	0.5	216.0	SW
04:00 AM - 05:00 AM	1.0	158.0	SSE	0.7	227.0	SW	1.3	209.0	SSW	0.9	212.0	SSW	0.8	211.0	SSW	0.7	203.0	SSW	0.9	201.0	SSW
05:00 AM - 06:00 AM	1.1	157.0	SSE	1.0	221.0	SW	1.4	214.0	SW	0.5	216.0	SW	0.6	214.0	SW	1.5	207.0	SSW	1.4	202.0	SSW
06:00 AM - 07:00 AM	1.2	156.0	SSE	0.2	-	-	0.5	204.0	SSW	0.9	217.0	SW	0.7	206.0	SSW	1.4	203.0	SSW	0.6	215.0	SW
07:00 AM - 08:00 AM	0.4	155.0	SSE	1.0	217.0	SW	0.8	202.0	SSW	0.7	210.0	SSW	1.4	205.0	SSW	0.6	202.0	SSW	1.4	201.0	SSW
08:00 AM - 09:00 AM	0.8	154.0	SSE	0.6	212.0	SSW	1.2	200.0	SSW	0.9	209.0	SSW	1.6	204.0	SSW	1.6	200.0	SSW	1.5	230.0	SW
09:00 AM - 10:00 AM	2.2	148.0	SSE	1.3	207.0	SSW	0.6	197.0	SSW	1.1	220.0	SW	1.2	202.0	SSW	0.9	199.0	SSW	1.4	212.0	SSW
10:00 AM - 11:00 AM	1.3	138.0	SE	1.0	206.0	SSW	1.1	195.0	SSW	1.1	208.0	SSW	1.4	200.0	SSW	0.9	198.0	SSW	1.2	203.0	SSW
11:00 AM - 12:00 PM	1.2	123.0	ESE	0.8	205.0	SSW	2.4	194.0	SSW	0.5	207.0	SSW	1.7	199.0	SSW	1.5	200.0	SSW	2.4	210.0	SSW

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

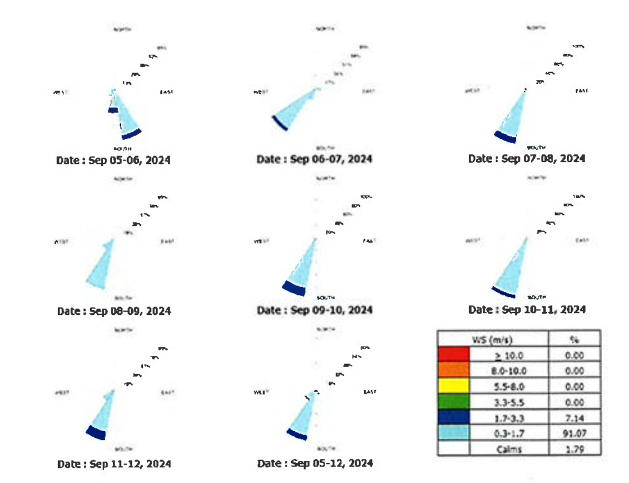
Approved by
Sarayuth Jittranont
Assistant General Manager

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496083
Date Received :Sep 16, 2024
Date Reported :Sep 24, 2024
Report Number :3088448-1

Wind Rose



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	7.14
0.3-1.7	91.07
Calms	1.79

Approved by
Sarayuth Jittranont
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496085
Date Received : Sep 17, 2024
Date Reported : Sep 21, 2024
Report Number: 3088451-1

Sample Description Air Quality
Location ชุมชนมาบชลูด (GPS 47P 20730823, 1407374)
Parameter Nitrogen dioxide (ppm)
Measurement Date Sep 05, 2024 - Sep 12, 2024
Measurement by Santi Chaichana

Time	2496085-1 Sep 05, 2024	2496085-2 Sep 06, 2024	2496085-3 Sep 07, 2024	2496085-4 Sep 08, 2024	2496085-5 Sep 09, 2024	2496085-6 Sep 10, 2024	2496085-7 Sep 11, 2024
10:00 AM - 11:00 AM	0.0025	0.0041	0.0043	0.0028	0.0040	0.0038	0.0031
11:00 AM - 12:00 PM	0.0025	0.0033	0.0041	0.0026	0.0026	0.0038	0.0024
12:00 PM - 01:00 PM	0.0033	0.0031	0.0037	0.0024	0.0022	0.0100	0.0030
01:00 PM - 02:00 PM	0.0030	0.0026	0.0037	0.0022	0.0027	0.0038	0.0042
02:00 PM - 03:00 PM	0.0034	0.0193	0.0026	0.0017	0.0023	0.0033	0.0030
03:00 PM - 04:00 PM	0.0033	0.0028	0.0026	0.0031	0.0022	0.0036	0.0027
04:00 PM - 05:00 PM	0.0044	0.0027	0.0030	0.0023	0.0026	0.0036	0.0021
05:00 PM - 06:00 PM	0.0035	0.0029	0.0027	0.0023	0.0022	0.0026	0.0027
06:00 PM - 07:00 PM	0.0025	0.0028	0.0034	0.0019	0.0021	0.0025	0.0023
07:00 PM - 08:00 PM	0.0022	0.0031	0.0025	0.0017	0.0019	0.0022	0.0028
08:00 PM - 09:00 PM	0.0030	0.0031	0.0022	0.0020	0.0022	0.0020	0.0020
09:00 PM - 10:00 PM	0.0040	0.0032	0.0023	0.0027	0.0020	0.0018	0.0020
10:00 PM - 11:00 PM	0.0043	0.0026	0.0019	0.0036	0.0017	0.0017	0.0028
11:00 PM - 12:00 AM	0.0040	0.0021	0.0019	0.0034	0.0027	0.0019	0.0040
12:00 AM - 01:00 AM	0.0044	0.0020	0.0021	0.0045	0.0040	0.0023	0.0047
01:00 AM - 02:00 AM	0.0043	0.0019	0.0022	0.0027	0.0026	0.0030	0.0063
02:00 AM - 03:00 AM	0.0045	0.0019	0.0022	0.0026	0.0027	0.0033	0.0105
03:00 AM - 04:00 AM	0.0034	0.0020	0.0018	0.0021	0.0036	0.0027	0.0034
04:00 AM - 05:00 AM	0.0031	0.0024	0.0019	0.0024	0.0030	0.0029	0.0044
05:00 AM - 06:00 AM	0.0033	0.0027	0.0018	0.0025	0.0030	0.0033	0.0052
06:00 AM - 07:00 AM	0.0032	0.0023	0.0023	0.0026	0.0027	0.0032	0.0044
07:00 AM - 08:00 AM	0.0041	0.0024	0.0028	0.0023	0.0030	0.0032	0.0060
08:00 AM - 09:00 AM	0.0081	0.0029	0.0030	0.0026	0.0034	0.0089	0.0190
09:00 AM - 10:00 AM	0.0128	0.0045	0.0028	0.0027	0.0036	0.0086	0.0258
Average	0.0040	0.0034	0.0027	0.0026	0.0027	0.0037	0.0054
1hr - Maximum	0.0128	0.0193	0.0043	0.0045	0.0040	0.0100	0.0258
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)

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Approved by Orawan R.
Orawan Rakyong
Scientist (3)

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496088
Date Received : Sep 16, 2024
Date Reported : Sep 21, 2024
Report Number: 3088455-1

Sample Description Air Quality
Location ชุมชนมาบชลูด (GPS 47P 20730823, 1407374)
Date Analysis Commenced Sep 17, 2024
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)
2496088-1	Sep 05 - Sep 06, 2024	0.034	754	31
2496088-2	Sep 06 - Sep 07, 2024	0.047	754	32
2496088-3	Sep 07 - Sep 08, 2024	0.058	754	32
2496088-4	Sep 08 - Sep 09, 2024	0.031	754	31
2496088-5	Sep 09 - Sep 10, 2024	0.051	754	32
2496088-6	Sep 10 - Sep 11, 2024	0.052	754	32
2496088-7	Sep 11 - Sep 12, 2024	0.032	754	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 : Santi Chaichana

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Approved by ThanitaK.
Thanita Kulsuriwong
Scientist (4)

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496087
Date Received :Sep 16, 2024
Date Reported :Sep 24, 2024
Report Number :3088454-1

Sample Number 2496087-1 to 7
Parameter Wind Speed / Wind Direction
Location ชุมชนมาบชลูด (GPS 47P 0730823, 1407374)
Sampling Date Sep 05 - Sep 12, 2024
Sampling by Santi Chaichana

Time	Sep 05 - Sep 06, 2024 WS (m/s)	WD (deg)		Sep 06 - Sep 07, 2024 WS (m/s)	WD (deg)		Sep 07 - Sep 08, 2024 WS (m/s)	WD (deg)		Sep 08 - Sep 09, 2024 WS (m/s)	WD (deg)	
10:00 AM - 11:00 AM	2.0	296.0	WNW	2.0	319.0	NW	1.0	293.0	WNW	1.0	266.0	W
11:00 AM - 12:00 PM	1.2	334.0	NNW	1.4	300.0	WNW	0.8	324.0	NW	1.1	269.0	W
12:00 PM - 01:00 PM	0.6	325.0	NW	1.2	318.0	NW	0.5	206.0	SSW	0.5	5.0	N
01:00 PM - 02:00 PM	1.0	278.0	W	1.9	359.0	N	0.4	302.0	WNW	0.8	268.0	W
02:00 PM - 03:00 PM	1.1	324.0	NW	1.1	296.0	WNW	0.7	309.0	NW	1.0	259.0	W
03:00 PM - 04:00 PM	3.3	335.0	NNW	1.0	251.0	WSW	0.8	310.0	NW	1.0	261.0	W
04:00 PM - 05:00 PM	1.1	10.0	N	0.5	315.0	NW	0.4	281.0	W	0.6	302.0	WNW
05:00 PM - 06:00 PM	1.0	114.0	ESE	0.4	291.0	WNW	0.6	253.0	WSW	0.8	200.0	SSW
06:00 PM - 07:00 PM	1.2	295.0	WNW	1.0	338.0	NNW	0.1	-	-	0.4	230.0	SW
07:00 PM - 08:00 PM	0.5	350.0	N	0.6	297.0	WNW	0.8	266.0	W	0.2	-	-
08:00 PM - 09:00 PM	0.2	-	-	0.8	291.0	WNW	0.5	309.0	NW	1.0	146.0	SE
09:00 PM - 10:00 PM	0.0	-	-	0.0	-	-	0.4	307.0	NW	0.5	328.0	NNW
10:00 PM - 11:00 PM	0.6	340.0	NNW	0.3	300.0	WNW	0.3	341.0	NNW	0.9	122.0	ESE
11:00 PM - 12:00 AM	0.4	348.0	NNW	-	-	-	0.5	307.0	NW	0.1	-	-
12:00 AM - 01:00 AM	0.9	328.0	NNW	0.5	304.0	NW	0.3	300.0	WNW	0.1	-	-
01:00 AM - 02:00 AM	0.2	-	-	0.4	303.0	WNW	0.2	-	-	0.1	-	-
02:00 AM - 03:00 AM	0.5	305.0	NW	0.8	332.0	NNW	0.5	320.0	NW	0.5	36.0	NE
03:00 AM - 04:00 AM	0.3	335.0	NNW	0.6	265.0	W	0.6	318.0	NW	0.5	0.0	N
04:00 AM - 05:00 AM	1.0	338.0	NNW	0.4	331.0	NNW	0.4	305.0	NW	1.0	309.0	NW
05:00 AM - 06:00 AM	0.5	300.0	WNW	0.2	-	-	0.5	322.0	NW	0.5	326.0	NW
06:00 AM - 07:00 AM	0.5	307.0	NW	0.6	324.0	NW	0.7	315.0	NW	0.5	338.0	NNW
07:00 AM - 08:00 AM	0.4	329.0	NNW	0.9	1.0	N	3.0	342.0	NNW	0.4	317.0	NW
08:00 AM - 09:00 AM	0.2	-	-	1.0	288.0	WNW	0.0	-	-	0.4	273.0	W
09:00 AM - 10:00 AM	0.6	257.0	WSW	0.2	-	-	0.6	224.0	SW	1.8	345.0	NNW

Time	Sep 09 - Sep 10, 2024 WS (m/s)	WD (deg)		Sep 10 - Sep 11, 2024 WS (m/s)	WD (deg)		Sep 11 - Sep 12, 2024 WS (m/s)	WD (deg)	
10:00 AM - 11:00 AM	2.0	251.0	WSW	0.5	263.0	W	1.0	255.0	WSW
11:00 AM - 12:00 PM	0.1	-	-	3.0	321.0	NW	1.2	248.0	WSW
12:00 PM - 01:00 PM	0.7	320.0	NW	0.4	323.0	NW	1.6	261.0	W
01:00 PM - 02:00 PM	1.8	265.0	W	0.5	238.0	WSW	0.4	277.0	W
02:00 PM - 03:00 PM	0.0	-	-	0.1	-	-	0.0	-	-
03:00 PM - 04:00 PM	1.0	248.0	WSW	0.6	275.0	W	0.4	306.0	NW
04:00 PM - 05:00 PM	0.5	259.0	W	0.1	-	-	0.5	333.0	NNW
05:00 PM - 06:00 PM	0.5	4.0	N	0.4	280.0	W	0.3	290.0	WNW
06:00 PM - 07:00 PM	0.2	-	-	0.5	278.0	W	0.4	287.0	WNW
07:00 PM - 08:00 PM	0.1	-	-	1.1	285.0	WNW	0.1	-	-
08:00 PM - 09:00 PM	0.3	332.0	NNW	0.2	-	-	0.5	339.0	NNW
09:00 PM - 10:00 PM	0.1	-	-	0.3	349.0	NNW	0.4	326.0	NW
10:00 PM - 11:00 PM	0.5	305.0	NW	0.4	200.0	SSW	0.4	326.0	NW
11:00 PM - 12:00 AM	0.1	-	-	0.4	166.0	SSE	0.3	330.0	NNW
12:00 AM - 01:00 AM	0.4	331.0	NNW	1.0	200.0	SSW	0.1	-	-
01:00 AM - 02:00 AM	0.4	354.0	N	1.2	198.0	SSW	0.1	-	-
02:00 AM - 03:00 AM	0.2	-	-	0.5	112.0	ESE	0.2	-	-
03:00 AM - 04:00 AM	0.1	-	-	0.4	106.0	ESE	1.1	84.0	E
04:00 AM - 05:00 AM	0.5	325.0	NW	0.3	119.0	ESE	1.0	121.0	ESE
05:00 AM - 06:00 AM	0.4	322.0	NW	0.1	-	-	0.4	110.0	ESE
06:00 AM - 07:00 AM	1.0	315.0	NW	0.2	-	-	0.2	-	-
07:00 AM - 08:00 AM	1.1	309.0	NW	0.1	-	-	1.1	300.0	WNW
08:00 AM - 09:00 AM	1.3	275.0	W	0.2	-	-	1.0	302.0	WNW
09:00 AM - 10:00 AM	0.5	267.0	W	0.3	215.0	SW	2.0	298.0	WNW

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

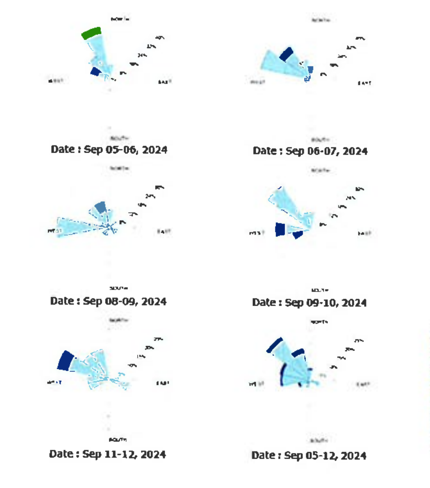
Approved by
Sarayuth Jittranont
Assistant General Manager

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496087
Date Received :Sep 16, 2024
Date Reported :Sep 24, 2024
Report Number :3088454-1

Wind Rose



WS (m/s)	%
≥ 10.0	0.00
8.0-10.0	0.00
5.5-8.0	0.00
3.3-5.5	0.60
1.7-3.3	5.36
0.3-1.7	73.21
Calms	20.83

Approved by
Sarayuth Jittranont
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496090
Date Received : Sep 17, 2024
Date Reported : Sep 21, 2024
Report Number: 3088456-1

Sample Description Air Quality
Location ชุมชนชากลูกหญ้า (GPS 47P 0730051, 1409677)
Parameter Nitrogen dioxide (ppm)
Measurement Date Sep 05, 2024 - Sep 12, 2024
Measurement by Santi Chaichana

Time	2496090-1 Sep 05, 2024	2496090-2 Sep 06, 2024	2496090-3 Sep 07, 2024	2496090-4 Sep 08, 2024	2496090-5 Sep 09, 2024	2496090-6 Sep 10, 2024	2496090-7 Sep 11, 2024
01:00 PM - 02:00 PM	0.0006	0.0068	0.0060	0.0044	0.0087	0.0084	0.0097
02:00 PM - 03:00 PM	0.0064	0.0075	0.0068	0.0062	0.0106	0.0083	0.0121
03:00 PM - 04:00 PM	0.0128	0.0058	0.0067	0.0065	0.0085	0.0091	0.0138
04:00 PM - 05:00 PM	0.0082	0.0051	0.0086	0.0076	0.0072	0.0080	0.0148
05:00 PM - 06:00 PM	0.0071	0.0128	0.0120	0.0084	0.0101	0.0140	0.0128
06:00 PM - 07:00 PM	0.0083	0.0147	0.0108	0.0055	0.0140	0.0110	0.0201
07:00 PM - 08:00 PM	0.0104	0.0135	0.0064	0.0089	0.0098	0.0097	0.0069
08:00 PM - 09:00 PM	0.0081	0.0107	0.0043	0.0124	0.0080	0.0082	0.0040
09:00 PM - 10:00 PM	0.0056	0.0086	0.0027	0.0075	0.0050	0.0029	0.0032
10:00 PM - 11:00 PM	0.0034	0.0046	0.0028	0.0053	0.0034	0.0010	0.0016
11:00 PM - 12:00 AM	0.0019	0.0026	0.0020	0.0027	0.0076	0.0032	0.0024
12:00 AM - 01:00 AM	0.0027	0.0023	0.0020	0.0027	0.0049	0.0041	0.0015
01:00 AM - 02:00 AM	0.0018	0.0015	0.0015	0.0015	0.0027	0.0010	0.0051
02:00 AM - 03:00 AM	0.0010	0.0013	0.0011	0.0014	0.0018	0.0018	0.0023
03:00 AM - 04:00 AM	0.0015	0.0015	0.0011	0.0016	0.0036	0.0027	0.0034
04:00 AM - 05:00 AM	0.0018	0.0026	0.0014	0.0081	0.0079	0.0025	0.0028
05:00 AM - 06:00 AM	0.0047	0.0062	0.0032	0.0101	0.0099	0.0060	0.0031
06:00 AM - 07:00 AM	0.0176	0.0130	0.0089	0.0410	0.0289	0.0393	0.0080
07:00 AM - 08:00 AM	0.0237	0.0271	0.0096	0.0383	0.0345	0.0485	0.0177
08:00 AM - 09:00 AM	0.0233	0.0190	0.0054	0.0162	0.0256	0.0204	0.0120
09:00 AM - 10:00 AM	0.0086	0.0091	0.0065	0.0110	0.0159	0.0159	0.0046
10:00 AM - 11:00 AM	0.0077	0.0129	0.0052	0.0092	0.0101	0.0141	0.0038
11:00 AM - 12:00 PM	0.0088	0.0077	0.0070	0.0078	0.0113	0.0091	0.0050
12:00 PM - 01:00 PM	0.0072	0.0064	0.0051	0.0091	0.0096	0.0086	0.0046
Average	0.0076	0.0085	0.0053	0.0097	0.0108	0.0107	0.0073
1hr - Maximum	0.0237	0.0271	0.0120	0.0410	0.0345	0.0485	0.0201
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)

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by
Orawan R.
Orawan Rakyong
Scientist (3)

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496093
Date Received : Sep 16, 2024
Date Reported : Sep 21, 2024
Report Number: 3088459-1

Sample Description Air Quality
Location ชุมชนชากลูกหญ้า (GPS 47P 0730051, 1409677)
Date Analysis Commenced Sep 17, 2024
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)
2496093-1	Sep 05 - Sep 06, 2024	0.050	754	31
2496093-2	Sep 06 - Sep 07, 2024	0.047	754	32
2496093-3	Sep 07 - Sep 08, 2024	0.041	754	32
2496093-4	Sep 08 - Sep 09, 2024	0.040	754	31
2496093-5	Sep 09 - Sep 10, 2024	0.055	754	32
2496093-6	Sep 10 - Sep 11, 2024	0.066	754	32
2496093-7	Sep 11 - Sep 12, 2024	0.050	754	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 : Santi Chaichana

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Approved by
ThanitaK.
Thanita Kulsuriwong
Scientist (4)

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496091
Date Received :Sep 16, 2024
Date Reported :Sep 24, 2024
Report Number :3088457-1

Sample Number 2496091-1 to 7
Parameter Wind Speed / Wind Direction
Location ชุมชนชากลูกหญ้า (GPS 47P 0730051, 1409677)
Sampling Date Sep 05 - Sep 12, 2024
Sampling by Santi Chaichana

Time	Sep 05 - Sep 06, 2024			Sep 06 - Sep 07, 2024			Sep 07 - Sep 08, 2024			Sep 08 - Sep 09, 2024			Sep 09 - Sep 10, 2024			Sep 10 - Sep 11, 2024			Sep 11 - Sep 12, 2024		
	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)	
01:00 PM - 02:00 PM	2.0	202.0	SSW	1.2	263.0	W	2.0	121.0	ESE	1.2	257.0	WSW	1.1	216.0	SW	0.2	-	-	1.0	180.0	S
02:00 PM - 03:00 PM	0.0	-	-	0.7	242.0	WSW	0.4	134.0	SE	0.1	-	-	2.0	205.0	SSW	0.1	-	-	0.6	179.0	S
03:00 PM - 04:00 PM	1.0	226.0	SW	1.2	222.0	SW	0.0	-	-	0.6	340.0	NNW	0.2	-	-	1.1	232.0	SW	1.1	188.0	S
04:00 PM - 05:00 PM	0.9	238.0	WSW	1.0	241.0	WSW	1.0	220.0	SW	0.8	227.0	SW	1.3	184.0	S	1.0	194.0	SSW	1.0	222.0	SW
05:00 PM - 06:00 PM	1.2	242.0	WSW	1.0	200.0	SSW	1.1	200.0	SSW	1.0	250.0	WSW	0.5	222.0	SW	1.3	219.0	SW	2.0	212.0	SSW
06:00 PM - 07:00 PM	0.3	257.0	WSW	2.1	223.0	SW	0.3	195.0	SSW	1.2	300.0	WNW	0.6	230.0	SW	1.0	300.0	WNW	1.5	230.0	SW
07:00 PM - 08:00 PM	0.5	251.0	WSW	1.3	320.0	NW	0.6	209.0	SSW	1.0	244.0	WSW	0.4	213.0	SSW	0.2	-	-	0.3	266.0	W
08:00 PM - 09:00 PM	0.1	-	-	1.0	240.0	WSW	0.8	229.0	SW	0.2	-	-	0.4	210.0	SSW	0.5	260.0	W	0.5	219.0	SW
09:00 PM - 10:00 PM	0.1	-	-	0.6	223.0	SW	0.4	234.0	SW	0.5	250.0	WSW	0.3	264.0	W	0.7	250.0	WSW	0.1	-	-
10:00 PM - 11:00 PM	0.2	-	-	0.6	232.0	SW	0.2	-	-	0.3	310.0	NW	0.8	255.0	WSW	0.6	200.0	SSW	0.5	300.0	WNW
11:00 PM - 12:00 AM	0.3	251.0	WSW	0.6	220.0	SW	0.3	222.0	SW	0.0	-	-	0.2	-	-	1.0	216.0	SW	0.6	298.0	WNW
12:00 AM - 01:00 AM	0.8	217.0	SW	0.3	221.0	SW	0.6	320.0	NW	0.4	250.0	WSW	0.3	267.0	W	0.2	-	-	0.3	236.0	SW
01:00 AM - 02:00 AM	0.1	-	-	0.3	234.0	SW	0.4	214.0	SW	0.2	-	-	0.4	280.0	W	0.2	-	-	0.4	240.0	WSW
02:00 AM - 03:00 AM	0.2	-	-	0.7	233.0	SW	0.8	220.0	SW	0.1	-	-	0.8	299.0	WNW	0.1	-	-	0.5	302.0	WNW
03:00 AM - 04:00 AM	0.6	238.0	WSW	0.6	320.0	NW	0.4	226.0	SW	0.5	240.0	WSW	0.3	232.0	SW	0.6	260.0	W	0.2	-	-
04:00 AM - 05:00 AM	0.1	-	-	0.1	-	-	0.2	-	-	0.3	236.0	SW	0.6	266.0	W	0.2	-	-	0.1	-	-
05:00 AM - 06:00 AM	0.8	244.0	WSW	0.5	234.0	SW	0.9	230.0	SW	0.5	233.0	SW	0.4	250.0	WSW	0.3	216.0	SW	0.5	312.0	NW
06:00 AM - 07:00 AM	0.9	245.0	WSW	0.8	266.0	W	1.0	231.0	SW	0.1	-	-	0.2	-	-	1.1	216.0	SW	1.0	326.0	NW
07:00 AM - 08:00 AM	1.0	244.0	WSW	0.0	-	-	0.1	-	-	0.5	236.0	SW	0.3	245.0	WSW	1.0	221.0	SW	0.2	-	-
08:00 AM - 09:00 AM	0.2	-	-	0.8	215.0	SW	0.4	182.0	S	0.3	185.0	S	1.0	201.0	SSW	0.2	-	-	1.0	289.0	WNW
09:00 AM - 10:00 AM	0.6	159.0	SSE	0.4	157.0	SSE	0.8	196.0	SSW	0.5	69.0	ENE	1.2	216.0	SW	1.2	112.0	ESE	1.1	300.0	WNW
10:00 AM - 11:00 AM	2.0	235.0	SW	1.1	186.0	S	0.2	-	-	0.7	225.0	SW	0.8	202.0	SSW	0.5	44.0	NE	1.0	289.0	WNW
11:00 AM - 12:00 PM	1.1	227.0	SW	0.8	221.0	SW	0.7	208.0	SSW	0.7	248.0	WSW	1.0	140.0	SE	0.5	153.0	SSE	0.8	266.0	W
12:00 PM - 01:00 PM	1.0	219.0	SW	0.6	166.0	SSE	2.0	217.0	SW	0.1	-	-	1.3	214.0	SW	1.1	233.0	SW	2.0	242.0	WSW

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

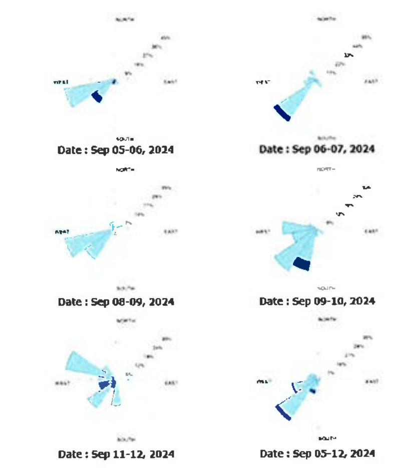
Approved by
Sarayuth Jittranont
Assistant General Manager

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496091
Date Received :Sep 16, 2024
Date Reported :Sep 24, 2024
Report Number :3088457-1

Wind Rose



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	4.76
0.3-1.7	73.21
Calms	22.02

Approved by
Sarayuth Jittranont
Assistant General Manager

ปริมาณสารอินทรีย์ระเหยในบรรยากาศ

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2472593
Date Received : Jul 02, 2024
Date Reported : Jul 10, 2024
Report Number : 3034760-1C9

Sample Number	2472593-1
Sampled Date	Jul 01, 2024
Sample Description	Air Quality
Location	ชุมชนประชุมมิตรบำรุง (GPS 47P 0726469, 1407406)
Date Analysis Commenced	Jul 03, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber glass bottle and two sorbent tubes, refrigerated
Barometric Pressure	755 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/07/24 - 02/07/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/07/24 - 02/07/24	ug/m3	0.05	0.18	6.10	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/07/24 - 02/07/24	ug/m3	0.05	0.16	0.19	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/07/24 - 02/07/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/07/24 - 02/07/24	ug/m3	0.3	5.0	<5.0	No Standard	OSHA, V16	-	Bangkok
Propene (Propylene)	01/07/24 - 02/07/24	ug/m3	0.30	0.86	<0.86	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/07/24 - 02/07/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/07/24 - 02/07/24	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. Normal activity, Cloudy, Nearby School, templed and Comunity

Sampled By : Nontachai Uppathamp

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

The above results are valid only for the analyzed/tested sample(s) as indicated in the report. No part of this report or certificate may be reproduced in any form without written consent from the Laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Approved by
Tanyatorn Mongkonjirawut
Supervisor

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2472593
Date Received : Jul 02, 2024
Date Reported : Jul 10, 2024
Report Number : 3034760-1C9

Sample Number	2472593-2
Sampled Date	Jul 01, 2024
Sample Description	Air Quality
Location	ชุมชนมาบชลูด (GPS 47P 0730823, 1407374)
Date Analysis Commenced	Jul 03, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber glass bottle and two sorbent tubes, refrigerated
Barometric Pressure	755 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/07/24 - 02/07/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/07/24 - 02/07/24	ug/m3	0.05	0.18	10.39	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/07/24 - 02/07/24	ug/m3	0.05	0.16	0.38	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/07/24 - 02/07/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/07/24 - 02/07/24	ug/m3	0.3	5.0	<5.0	No Standard	OSHA, V16	-	Bangkok
Propene (Propylene)	01/07/24 - 02/07/24	ug/m3	0.30	0.86	1.14	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/07/24 - 02/07/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/07/24 - 02/07/24	ug/m3	0.60	1.88	5.95	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. There's a funeral in the temple, Cloudy, Nearby temple, school and Comunity

Sampled By : Nontachai Uppathamp

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

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Approved by
Tanyatorn Mongkonjirawut
Supervisor

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2472593
Date Received : Jul 02, 2024
Date Reported : Jul 10, 2024
Report Number : 3034760-1C9

Sample Number	2472593-3
Sampled Date	Jul 01, 2024
Sample Description	Air Quality
Location	ชุมชนพยูน (GPS 47P 0724371, 1402551)
Date Analysis Commenced	Jul 03, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber glass bottle and two sorbent tubes, refrigerated
Barometric Pressure	755 mmHg
Atmospheric Temperature	29.0 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/07/24 - 02/07/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/07/24 - 02/07/24	ug/m3	0.05	0.18	4.08	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/07/24 - 02/07/24	ug/m3	0.05	0.16	<0.16	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/07/24 - 02/07/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/07/24 - 02/07/24	ug/m3	0.3	5.0	<5.0	No Standard	OSHA, V16	-	Bangkok
Propene (Propylene)	01/07/24 - 02/07/24	ug/m3	0.30	0.86	<0.86	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/07/24 - 02/07/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/07/24 - 02/07/24	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. Normal activity, Cloudy, Nearby temple, school and Comunity

Sampled By : Nontachai Uppathamp

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

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Approved by
Tanyatorn Mongkonjirawut
Supervisor

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2472594
Date Received : Jul 02, 2024
Date Reported : Jul 05, 2024
Report Number : 3034772-1

Sample Number	2472594-1
Parameter	Wind Speed / Wind Direction
Location	ชุมชนมาบชลูด (GPS 47P 0730823, 1407374)
Sampling Date	Jul 01 - Jul 02, 2024
Sampling by	Nontachai Uppathamp

Time	Jul 01 - Jul 02, 2024			-			-			-			-			-			-		
	WS (m/s)	WD (deg)		-	-		-	-		-	-		-	-		-	-		-	-	
11:00 AM - 12:00 PM	1.4	207.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	2.6	249.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	3.8	254.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	2.0	245.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	1.2	243.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.8	221.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.4	240.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.5	240.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	0.6	246.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.8	2.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.6	359.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	1.4	160.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	2.6	91.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	2.2	94.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	1.4	34.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	0.8	16.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	1.2	258.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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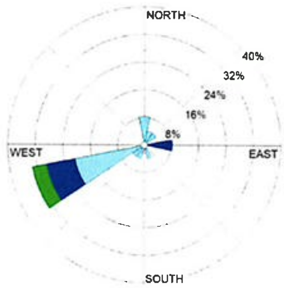
Approved by
Sarayuth Jittranont
Assistant General Manager

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2472594
Date Received :Jul 02, 2024
Date Reported :Jul 05, 2024
Report Number :3034772-1

Wind Rose



Date : Jul 01-02, 2024

	WS (m/s)	%
	≥ 10.0	0.00
	8.0-10.0	0.00
	5.5-8.0	0.00
	3.3-5.5	4.17
	1.7-3.3	16.67
	0.3-1.7	50.00
	Calms	29.17

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Approved by

Sarayuth Jittranont
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485485
Date Received : Aug 02, 2024
Date Reported : Aug 09, 2024
Report Number : 3065528-1C9

Sample Number	2485485-1
Sampled Date	Aug 01, 2024
Sample Description	Air Quality
Location	ชุมชนประชุมมิตรบำรุง (GPS 47P 0726469, 1407406)
Date Analysis Commenced	Aug 03, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure	758 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	01/08/24 - 02/08/24	ug/m3	0.20	0.60	0.72	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/08/24 - 02/08/24	ug/m3	0.05	0.18	3.50	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/08/24 - 02/08/24	ug/m3	0.05	0.16	0.58	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/08/24 - 02/08/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/08/24 - 02/08/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, V16	-	Bangkok
Propene (Propylene)	01/08/24 - 02/08/24	ug/m3	0.30	0.86	1.89	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/08/24 - 02/08/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/08/24 - 02/08/24	ug/m3	0.60	1.88	2.11	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. Normal activity, Clare sky, Nearby School, templel and Comunity
Sampled By : Suphanut Pisaipan
Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by

Tanyatorn Mongkonjirawut
Supervisor

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485485
Date Received : Aug 02, 2024
Date Reported : Aug 09, 2024
Report Number : 3065528-1C9

Sample Number	2485485-2
Sampled Date	Aug 01, 2024
Sample Description	Air Quality
Location	ชุมชนมาบชลูด (GPS 47P 0730823, 1407374)
Date Analysis Commenced	Aug 03, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure	758 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	01/08/24 - 02/08/24	ug/m3	0.20	0.60	<0.60	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/08/24 - 02/08/24	ug/m3	0.05	0.18	2.60	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/08/24 - 02/08/24	ug/m3	0.05	0.16	0.32	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/08/24 - 02/08/24	ug/m3	0.60	1.76	<1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/08/24 - 02/08/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, V16	-	Bangkok
Propene (Propylene)	01/08/24 - 02/08/24	ug/m3	0.30	0.86	4.72	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/08/24 - 02/08/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/08/24 - 02/08/24	ug/m3	0.60	1.88	3.32	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. Normal activity, Cloudy, Nearby temple, school and Comunity
Sampled By : Suphanut Pisaipan
Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by

Tanyatorn Mongkonjirawut
Supervisor

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485485
Date Received : Aug 02, 2024
Date Reported : Aug 09, 2024
Report Number : 3065528-1C9

Sample Number	2485485-3
Sampled Date	Aug 01, 2024
Sample Description	Air Quality
Location	ชุมชนป่ายูบ (GPS 47P 0724371, 1402551)
Date Analysis Commenced	Aug 03, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure	758 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	01/08/24 - 02/08/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/08/24 - 02/08/24	ug/m3	0.05	0.18	2.67	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/08/24 - 02/08/24	ug/m3	0.05	0.16	<0.16	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/08/24 - 02/08/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/08/24 - 02/08/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, V16	-	Bangkok
Propene (Propylene)	01/08/24 - 02/08/24	ug/m3	0.30	0.86	<0.86	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/08/24 - 02/08/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/08/24 - 02/08/24	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. Normal activity, Clare sky, Nearby temple, school and Comunity
Sampled By : Suphanut Pisaipan
Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by

Tanyatorn Mongkonjirawut
Supervisor

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485489
Date Received :Aug 02, 2024
Date Reported :Aug 06, 2024
Report Number :3065532-1

Sample Number 2485489-1
Parameter Wind Speed / Wind Direction
Location ชุมชนมาบชลูด (GPS 47P 0730823, 1407374)
Sampling Date Aug 01 - Aug 02, 2024
Sampling by Suphanut Pisalpan

Time	Aug 01 - Aug 02, 2024			-			-			-			-			-			-		
	WS (m/s)	WD (deg)		-	-		-	-		-	-		-	-		-	-		-	-	
11:00 AM - 12:00 PM	0.3	349.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.3	348.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	1.0	258.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.3	217.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.6	315.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	0.3	328.0	NNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.3	302.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	2.7	153.0	SSE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.9	293.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	0.4	284.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	0.3	287.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

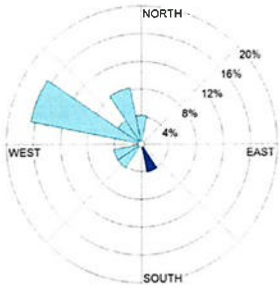
Approved by
Sarayuth Jittranont
Assistant General Manager

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485489
Date Received :Aug 02, 2024
Date Reported :Aug 06, 2024
Report Number :3065532-1

Wind Rose



Date : Aug 01-02, 2024

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	4.17
	0.3-1.7	41.67
	Calms	54.17

Approved by
Sarayuth Jittranont
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496097
Date Received : Sep 03, 2024
Date Reported : Sep 11, 2024
Report Number : 3088460-1C9

Sample Number 2496097-1
Sampled Date Sep 02, 2024
Sample Description Air Quality
Location ชุมชนประชุมมิตรบำรุง (GPS 47P 0726469, 1407406)
Date Analysis Commenced Sep 04, 2024
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure 755 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	02/09/24 - 03/09/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	02/09/24 - 03/09/24	ug/m3	0.05	0.18	12.59	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	02/09/24 - 03/09/24	ug/m3	0.05	0.16	0.58	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	02/09/24 - 03/09/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	02/09/24 - 03/09/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	02/09/24 - 03/09/24	ug/m3	0.30	0.86	1.31	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	02/09/24 - 03/09/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	02/09/24 - 03/09/24	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. Normal activity, Cloudy, Nearby School, templel and Comunity
Sampled By : Tarin Octjinda
Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by
Tanyatorn Mongkonjirawut
Supervisor

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496097
Date Received : Sep 03, 2024
Date Reported : Sep 11, 2024
Report Number : 3088460-1C9

Sample Number 2496097-2
Sampled Date Sep 02, 2024
Sample Description Air Quality
Location ชุมชนมาบชลูด (GPS 47P 0730823, 1407374)
Date Analysis Commenced Sep 04, 2024
Condition of Sample Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure 755 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	02/09/24 - 03/09/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	02/09/24 - 03/09/24	ug/m3	0.05	0.18	8.87	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	02/09/24 - 03/09/24	ug/m3	0.05	0.16	0.64	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	02/09/24 - 03/09/24	ug/m3	0.60	1.76	<1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	02/09/24 - 03/09/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	02/09/24 - 03/09/24	ug/m3	0.30	0.86	1.27	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	02/09/24 - 03/09/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	02/09/24 - 03/09/24	ug/m3	0.60	1.88	3.47	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. Normal activity, Cloudy, Nearby temple, school and Comunity
Sampled By : Tarin Octjinda
Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by
Tanyatorn Mongkonjirawut
Supervisor

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496097
Date Received : Sep 03, 2024
Date Reported : Sep 11, 2024
Report Number : 3088460-1C9

Sample Number	2496097-3
Sampled Date	Sep 02, 2024
Sample Description	Air Quality
Location	ชุมชนป่ายูน (GPS 47P 0724371, 1402551)
Date Analysis Commenced	Sep 04, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure	755 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	02/09/24 - 03/09/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	02/09/24 - 03/09/24	ug/m3	0.05	0.18	11.72	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	02/09/24 - 03/09/24	ug/m3	0.05	0.16	0.77	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	02/09/24 - 03/09/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	02/09/24 - 03/09/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	02/09/24 - 03/09/24	ug/m3	0.30	0.86	1.69	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	02/09/24 - 03/09/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	02/09/24 - 03/09/24	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. Normal activity, Cloudy, Nearby temple, school and Comunity
Sampled By : Tarin Octjinda
Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by
Tanyatorn Mongkonjirawut
Supervisor

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496100
Date Received :Sep 03, 2024
Date Reported :Sep 06, 2024
Report Number :3088464-1

Sample Number	2496100-1
Parameter	Wind Speed / Wind Direction
Location	ชุมชนมาบชลูด (GPS 47P 0730823, 1407374)
Sampling Date	Sep 02 - Sep 03, 2024
Sampling by	Tarin Octjinda

Time	Sep 02 - Sep 03, 2024			-			-			-			-			-			-		
	WS (m/s)	WD (deg)		-	-		-	-		-	-		-	-		-	-		-	-	
10:00 AM - 11:00 AM	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	0.5	67.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	0.5	65.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.3	64.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.3	259.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	1.4	262.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.3	266.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.3	256.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.3	185.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.4	23.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.7	225.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.3	298.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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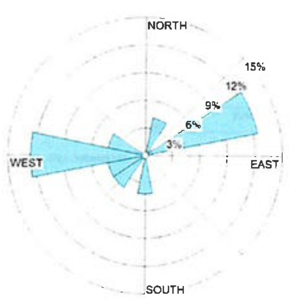
Approved by
Sarayuth Jittranont
Assistant General Manager

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496100
Date Received :Sep 03, 2024
Date Reported :Sep 06, 2024
Report Number :3088464-1

Wind Rose



Date : Sep 02-03, 2024

	WS (m/s)	%
(red)	≥ 10.0	0.00
(orange)	8.0-10.0	0.00
(yellow)	5.5-8.0	0.00
(green)	3.3-5.5	0.00
(dark blue)	1.7-3.3	0.00
(light blue)	0.3-1.7	45.83
	Calms	54.17

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Approved by
Sarayuth Jittranont
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24107075
Date Received : Oct 02, 2024
Date Reported : Oct 09, 2024
Report Number : 3112961-1C9

Sample Number	24107075-1
Sampled Date	Oct 01, 2024
Sample Description	Air Quality
Location	ชุมชนประชุมมิตรบำรุง (GPS 47P 0726469, 1407406)
Date Analysis Commenced	Oct 03, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure	758 mmHg
Atmospheric Temperature	32.7 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/10/24 - 02/10/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/10/24 - 02/10/24	ug/m3	0.05	0.18	5.01	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/10/24 - 02/10/24	ug/m3	0.05	0.16	0.38	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/10/24 - 02/10/24	ug/m3	0.60	1.76	<1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/10/24 - 02/10/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	01/10/24 - 02/10/24	ug/m3	0.30	0.86	1.17	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/10/24 - 02/10/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/10/24 - 02/10/24	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. Normal activity, Cloudy, Nearby school, templel and comunity
Sampled By : Tarin Octjinda
Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)

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Approved by
Tanyatorn Mongkonjirawut
Supervisor

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24107075
Date Received : Oct 02, 2024
Date Reported : Oct 09, 2024
Report Number : 3112961-1C9

Sample Number	24107075-2
Sampled Date	Oct 01, 2024
Sample Description	Air Quality
Location	ชุมชนมาบยุ่ง (GPS 47P 0730823, 1407374)
Date Analysis Commenced	Oct 03, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure	758 mmHg
Atmospheric Temperature	32.7 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/10/24 - 02/10/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/10/24 - 02/10/24	ug/m3	0.05	0.18	4.33	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/10/24 - 02/10/24	ug/m3	0.05	0.16	0.83	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/10/24 - 02/10/24	ug/m3	0.60	1.76	1.83	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/10/24 - 02/10/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, V16	-	Bangkok
Propene (Propylene)	01/10/24 - 02/10/24	ug/m3	0.30	0.86	3.96	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/10/24 - 02/10/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/10/24 - 02/10/24	ug/m3	0.60	1.88	3.84	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, Normal activity, Cloudy, Nearby temple, school and comunity

Sampled By : Tarin Octjinda

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

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Approved by
Tanyatorn Mongkonjirawut
Supervisor

ADDRESS 104 Phaithanakan 40, Phaithanakan Rd., Khwaeng Phaithanakan, Khet Suan Luang, Bangkok 10250 Thailand PHONE +66 0 2760 3000 FAX +66 0 2760 3197
ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24107075
Date Received : Oct 02, 2024
Date Reported : Oct 09, 2024
Report Number : 3112961-1C9

Sample Number	24107075-3
Sampled Date	Oct 01, 2024
Sample Description	Air Quality
Location	ชุมชนมาบยุ่ง (GPS 47P 0724371, 1402551)
Date Analysis Commenced	Oct 03, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and two sorbent tubes, refrigerated
Barometric Pressure	758 mmHg
Atmospheric Temperature	32.7 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	01/10/24 - 02/10/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	01/10/24 - 02/10/24	ug/m3	0.05	0.18	5.27	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	01/10/24 - 02/10/24	ug/m3	0.05	0.16	0.19	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	01/10/24 - 02/10/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	01/10/24 - 02/10/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, V16	-	Bangkok
Propene (Propylene)	01/10/24 - 02/10/24	ug/m3	0.30	0.86	<0.66	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	01/10/24 - 02/10/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	01/10/24 - 02/10/24	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, Normal activity, Cloudy, Nearby temple, school and comunity

Sampled By : Tarin Octjinda

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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ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company
Life Sciences www.alsglobal.com
RIGHT SOLUTIONS RIGHT PARTNER
8525-20N/ EPASL

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24107077
Date Received :Oct 02, 2024
Date Reported :Oct 08, 2024
Report Number :3112966-1

Sample Number	24107077-1
Parameter	Wind Speed / Wind Direction
Location	ชุมชนมาบยุ่ง (GPS 47P 0730823, 1407374)
Sampling Date	Oct 01 - Oct 02, 2024
Sampling by	Tarin Octjinda

Time	Oct 01 - Oct 02, 2024			-			-			-			-			-			-		
	WS (m/s)	WD (deg)		-		-	-		-	-		-	-		-	-		-	-		-
11:00 AM - 12:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	0.5	183.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	1.1	185.0	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	1.3	280.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	1.4	199.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.7	214.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	0.5	285.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	0.6	213.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	0.8	232.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.9	308.0	NW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.4	280.0	W	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	0.6	60.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by
Sarayuth Jittranont
Assistant General Manager

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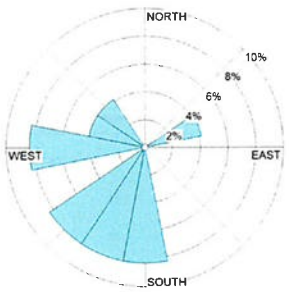
ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24107077
Date Received :Oct 02, 2024
Date Reported :Oct 08, 2024
Report Number :3112966-1

Wind Rose



Date : Oct 01-02, 2024

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	0.00
0.3-1.7	45.83
Calms	54.17

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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122860
Date Received : Nov 05, 2024
Date Reported : Nov 11, 2024
Report Number : 3148493-1C9

Sample Number	24122860-1
Sampled Date	Nov 04, 2024
Sample Description	Air Quality
Location	ชุมชนประชาอุทิศบางนา (GPS 47P 0726469, 1407406)
Date Analysis Commenced	Nov 06, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure	757 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	04/11/24 - 05/11/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	04/11/24 - 05/11/24	ug/m3	0.05	0.18	7.72	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	04/11/24 - 05/11/24	ug/m3	0.05	0.16	1.34	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	04/11/24 - 05/11/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	04/11/24 - 05/11/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	04/11/24 - 05/11/24	ug/m3	0.30	0.86	2.68	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	04/11/24 - 05/11/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	04/11/24 - 05/11/24	ug/m3	0.60	1.88	3.54	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 Mil Bamrung Community station has moderate traffic. Normal activity, Clare sky, Nearby school, temple and comunity

Sampled By : Jittakorn Sriwasa

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

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8525-20N/ EHAQL

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122860
Date Received : Nov 05, 2024
Date Reported : Nov 11, 2024
Report Number : 3148493-1C9

Sample Number	24122860-2
Sampled Date	Nov 04, 2024
Sample Description	Air Quality
Location	ชุมชนแสนสิริ (GPS 47P 0730823, 1407374)
Date Analysis Commenced	Nov 06, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure	757 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	04/11/24 - 05/11/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	04/11/24 - 05/11/24	ug/m3	0.05	0.18	7.94	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	04/11/24 - 05/11/24	ug/m3	0.05	0.16	1.53	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	04/11/24 - 05/11/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	04/11/24 - 05/11/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	04/11/24 - 05/11/24	ug/m3	0.30	0.86	2.62	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	04/11/24 - 05/11/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	04/11/24 - 05/11/24	ug/m3	0.60	1.88	4.60	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. Normal activity, Clare sky, Nearby temple, school and comunity

Sampled By : Jittakorn Sriwasa

Remark :
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8525-20N/ EHAQL

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122860
Date Received : Nov 05, 2024
Date Reported : Nov 11, 2024
Report Number : 3148493-1C9

Sample Number	24122860-3
Sampled Date	Nov 04, 2024
Sample Description	Air Quality
Location	ชุมชนพหุน (GPS 47P 0724371, 1402551)
Date Analysis Commenced	Nov 06, 2024
Condition of Sample	Drawn into one 6-L Canister, one amber plastic bottle and one sorbent tube, refrigerated
Barometric Pressure	757 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	04/11/24 - 05/11/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	04/11/24 - 05/11/24	ug/m3	0.05	0.18	7.83	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	04/11/24 - 05/11/24	ug/m3	0.05	0.16	1.15	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	04/11/24 - 05/11/24	ug/m3	0.60	1.76	Not Detected	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	04/11/24 - 05/11/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	04/11/24 - 05/11/24	ug/m3	0.30	0.86	1.89	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	04/11/24 - 05/11/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	04/11/24 - 05/11/24	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 : Pa Yoon Community station has moderate traffic. Normal activity, Clare sky, Nearby temple, school and comunity

Sampled By : Jittakorn Sriwasa

Remark :
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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122861
Date Received :Nov 05, 2024
Date Reported :Nov 12, 2024
Report Number :3148495-1

Sample Number	24122861-1
Parameter	Wind Speed / Wind Direction
Location	ชุมชนแสนสิริ (GPS 47P 0730823, 1407374)
Sampling Date	Nov 04 - Nov 05, 2024
Sampling by	Jittakorn Sriwasa

Time	Nov 04 - Nov 05, 2024			-		-		-		-		-		-		-		-	
	WS (m/s)	WD (deg)																	
10:00 AM - 11:00 AM	1.3	35.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM - 12:00 PM	1.0	38.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	0.8	40.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.4	29.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	1.4	30.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	2.0	34.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	2.2	25.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	2.5	18.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.8	20.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.6	36.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.8	33.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	1.0	50.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	1.1	65.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	1.4	70.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	2.0	94.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	2.2	83.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	2.3	50.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	0.5	55.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.6	60.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	1.4	38.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	1.2	35.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	2.3	61.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	2.5	62.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	1.7	73.0	ENE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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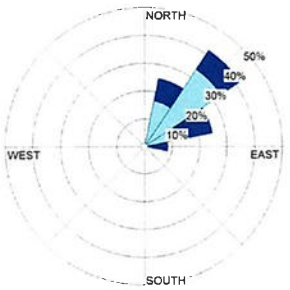
Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122861
Date Received :Nov 05, 2024
Date Reported :Nov 12, 2024
Report Number :3148495-1

Wind Rose



Date : Nov 04-05, 2024

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	37.50
0.3-1.7	62.50
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24133832
Date Received : Dec 03, 2024
Date Reported : Dec 12, 2024
Report Number : 3176112-1C9

Sample Number	24133832-1
Sampled Date	Dec 02, 2024
Sample Description	Air Quality
Location	ชุมชนประชุมชีดหน้าวัด (GPS 47P 0726469, 1407406)
Date Analysis Commenced	Dec 04, 2024
Condition of Sample	Drawn into one 6-L Canister, one sorbent tube and one amber plastic bottle, refrigerated
Barometric Pressure	758 mmHg
Atmospheric Temperature	28.2 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	02/12/24 - 03/12/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	02/12/24 - 03/12/24	ug/m3	0.05	0.18	2.06	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	02/12/24 - 03/12/24	ug/m3	0.05	0.16	2.62	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	02/12/24 - 03/12/24	ug/m3	0.60	1.76	<1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	02/12/24 - 03/12/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	02/12/24 - 03/12/24	ug/m3	0.30	0.86	3.41	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	02/12/24 - 03/12/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	02/12/24 - 03/12/24	ug/m3	0.60	1.88	8.89	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. Normal activity, Clare sky, Nearby school, tempiel and comunity

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
Tanyatorn Mongkonjiravut
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24133832
Date Received : Dec 03, 2024
Date Reported : Dec 12, 2024
Report Number : 3176112-1C9

Sample Number	24133832-2
Sampled Date	Dec 02, 2024
Sample Description	Air Quality
Location	ชุมชนมาบยุ่ง (GPS 47P 0730823, 1407374)
Date Analysis Commenced	Dec 04, 2024
Condition of Sample	Drawn into one 6-L Canister, one sorbent tube and one amber plastic bottle, refrigerated
Barometric Pressure	758 mmHg
Atmospheric Temperature	28.2 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	02/12/24 - 03/12/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	02/12/24 - 03/12/24	ug/m3	0.05	0.18	2.96	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	02/12/24 - 03/12/24	ug/m3	0.05	0.16	1.66	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	02/12/24 - 03/12/24	ug/m3	0.60	1.76	<1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	02/12/24 - 03/12/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	02/12/24 - 03/12/24	ug/m3	0.30	0.86	1.89	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	02/12/24 - 03/12/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	02/12/24 - 03/12/24	ug/m3	0.60	1.88	9.72	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. There's a funeral in the temple, Clare sky, Nearby temple, school and comunity

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
Tanyatorn Mongkonjiravut
Supervisor

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

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24133832
Date Received : Dec 03, 2024
Date Reported : Dec 12, 2024
Report Number : 3176112-1C9

Sample Number	24133832-3
Sampled Date	Dec 02, 2024
Sample Description	Air Quality
Location	ชุมชนหนองจุก (GPS 47P 0724371, 1402551)
Date Analysis Commenced	Dec 04, 2024
Condition of Sample	Drawn into one 6-L Canister, one sorbent tube and one amber plastic bottle, refrigerated
Barometric Pressure	758 mmHg
Atmospheric Temperature	28.2 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
1,4-Dichlorobenzene	02/12/24 - 03/12/24	ug/m3	0.20	0.60	Not Detected	1100	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Acetaldehyde	02/12/24 - 03/12/24	ug/m3	0.05	0.18	3.64	860	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Benzene	02/12/24 - 03/12/24	ug/m3	0.05	0.16	1.92	7.6	Based on US EPA Compendium Method, TO-15	PCD	Rayong
Hexane	02/12/24 - 03/12/24	ug/m3	0.60	1.76	<1.76	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Hydrogen Peroxide	02/12/24 - 03/12/24	ug/m3	0.3	5.0	Not Detected	No Standard	OSHA, VI6	-	Bangkok
Propene (Propylene)	02/12/24 - 03/12/24	ug/m3	0.30	0.86	2.48	No Standard	Based on US EPA Compendium Method, TO-15	-	Rayong
Propylene Oxide	02/12/24 - 03/12/24	ug/m3	1.2	14	Not Detected	No Standard	Based on NIOSH, 1612	-	Bangkok
Toluene	02/12/24 - 03/12/24	ug/m3	0.60	1.88	8.74	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. Normal activity, Clare sky, Nearby temple, school and comunity

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
Tanyatorn Mongkonjiravut
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24133833
Date Received :Dec 03, 2024
Date Reported :Dec 11, 2024
Report Number :3176115-1

Sample Number 24133833-1
Parameter Wind Speed / Wind Direction
Location ชุมชนมาบตูม (GPS 47P 0730823, 1407374)
Sampling Date Dec 02 - Dec 03, 2024
Sampling by Sawai Tonpho

Time	Dec 02 - Dec 03, 2024			-			-			-			-			-			-		
	WS (m/s)	WD (deg)		-			-			-			-			-			-		
11:00 AM - 12:00 PM	0.6	50.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 PM - 01:00 PM	1.6	223.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 PM - 02:00 PM	0.6	192.0	SSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 PM - 03:00 PM	1.4	255.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 PM - 04:00 PM	1.3	258.0	WSW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 PM - 05:00 PM	0.8	221.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 PM - 06:00 PM	0.9	219.0	SW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 PM - 07:00 PM	0.5	6.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 PM - 08:00 PM	0.9	4.0	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 PM - 09:00 PM	0.6	46.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 PM - 10:00 PM	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 PM - 11:00 PM	1.1	23.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 PM - 12:00 AM	1.5	21.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12:00 AM - 01:00 AM	1.3	20.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01:00 AM - 02:00 AM	1.4	53.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02:00 AM - 03:00 AM	0.3	31.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03:00 AM - 04:00 AM	1.2	295.0	WNW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
04:00 AM - 05:00 AM	0.7	14.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
05:00 AM - 06:00 AM	0.4	52.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
06:00 AM - 07:00 AM	1.6	33.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
07:00 AM - 08:00 AM	1.5	21.0	NNE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08:00 AM - 09:00 AM	1.0	79.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
09:00 AM - 10:00 AM	1.0	79.0	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10:00 AM - 11:00 AM	0.5	39.0	NE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

Approved by

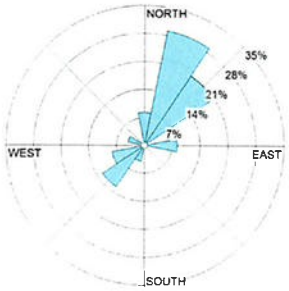
Sarayuth Jittranont
Assistant General Manager

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24133833
Date Received :Dec 03, 2024
Date Reported :Dec 11, 2024
Report Number :3176115-1

Wind Rose



Date : Dec 02-03, 2024

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	0.00
0.3-1.7	95.83
Calms	4.17

Approved by

Sarayuth Jittranont
Assistant General Manager

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คุณภาพอากาศจากแหล่งกำเนิด

Analysis / Test Report

TESTING
No.0042

Lot ID: 2498951
Date Received : Sep 09, 2024
Date Reported : Sep 14, 2024
Report Number: 3093867-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Sample Number	2498951-1
Sampled Date	Sep 09, 2024
Sample Description	Emission from Stationary Source
Location	TOX1 (ERU Stack) (GPS 47P 0726915, 1405346)
Date Analysis Commenced	Sep 10, 2024
Condition of Sample	Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	753	mmHg	Diameter	3.00	m	Oxygen	8.2	%
Ambient Temperature	34.8	°C	Shape	Circle		Carbon Dioxide	7.9	%
Type of Process	Combustion		Stack Temperature	186	°C	Gas Velocity	3.5	m/s
Type of Fuel	Natural Gas		Moisture	27.29	%	Flow Rate (Actual O2)	41188	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 %O_2	Result at 8.2 % O_2	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing										
Total Suspended Particulate	11:50 AM - 12:38 PM	mg/m3	-	0.5	2.3	2.10	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 Kulsuriwong, Scientist (4), ทะเบียนเลขที่ ว-323-ง-0029
Approved by Dej Changchon, Senior Manager, ทะเบียนเลขที่ ว-323-ก-0001

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

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Analysis / Test Report

TESTING
No.0042

Lot ID: 2498951
Date Received : Sep 09, 2024
Date Reported : Sep 14, 2024
Report Number: 3093867-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Sample Number	2498951-1
Sampled Date	Sep 09, 2024
Sample Description	Emission from Stationary Source
Location	TOX1 (ERU Stack) (GPS 47P 0726915, 1405346)
Date Analysis Commenced	Sep 10, 2024
Condition of Sample	Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	753	mmHg	Diameter	3.00	m	Oxygen	8.2	%
Ambient Temperature	34.8	°C	Shape	Circle		Carbon Dioxide	7.9	%
Type of Process	Combustion		Stack Temperature	186	°C	Gas Velocity	3.5	m/s
Type of Fuel	Natural Gas		Moisture	27.29	%	Flow Rate (Actual O2)	41188	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate *	11:50 AM - 12:38 PM	g/s	-	-	0.02	-	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)

Sampling By : Sittipan Sanachiw ทะเบียนเลขที่ ว-323-ง-0009

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 Kulsuriwong, Scientist (4), ทะเบียนเลขที่ ว-323-ง-0029
Approved by Dej Changchon, Senior Manager, ทะเบียนเลขที่ ว-323-ก-0001

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8525-209/ EMAIL S:\Reports_Air Stack_O2_2GL.rpt (2.37PM)

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498833
Date Received :Sep 10, 2024
Date Reported :Sep 21, 2024
Report Number :3093849-1

Sample Number	2498833-1
Sample Description	Emission from Stationary Source
Location	TOX1 (ERU Stack) (GPS 47P 0726915, 1405346)
Measurement Date	Sep 09, 2024

Stack Description

Ambient Temperature	34.8	°C	Diameter	3.00	m	Oxygen	8.15	%
Ambient Pressure	752.9	mmHg	Shape	Circle		Carbon dioxide	7.86	%
Type of Process	Combustion		Stack Temperature	186	°C	Gas Velocity	3.46	m/s
Type of Fuel	Natural Gas		Moisture	27.47	%	Flow Rate	41050	Nm3/hr

Run No.	Sampling Time	Oxygen (%)	Carbon Dioxide (%)	Oxides of Nitrogen (ppm) at Actual O_2	Oxides of Nitrogen (ppm) At 7% O_2
1	11:50 AM - 12:10 PM	8.15	7.86	23.76	25.92
2	12:11 PM - 12:31 PM	8.12	7.88	23.83	25.91
3	12:32 PM - 12:52 PM	8.17	7.84	23.63	25.80
Average (ppm)		8.15	7.86	23.74	25.88
Guideline[2] (ppm)				-	200
Guideline[1] (ppm)				-	72
Result (mg/Nm³)				44.66	48.68
Emission Rate at Actual O_2 (g/s)				0.5093	
Guideline[2] (g/s)				2.0	
Method				US EPA Method 7E	

Sampled By : Sathapron Thakarw
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 Wichan Choonharat, Manager, ทะเบียนเลขที่ ว-204-ก-0006
Approved by Sarayuth Jittranont, Assistant General Manager, ทะเบียนเลขที่ ว-204-ก-0003

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Analysis / Test Report

TESTING
No.0042

Lot ID: 2498954
Date Received : Sep 10, 2024
Date Reported : Sep 18, 2024
Report Number: 3093871-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Sample Number	2498954-1
Sampled Date	Sep 10, 2024
Sample Description	Emission from Stationary Source
Location	TOX2 (ERU Stack) (GPS 47P 0726941, 1405348)
Date Analysis Commenced	Sep 11, 2024
Condition of Sample	Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	753	mmHg	Diameter	3.00	m	Oxygen	6.6	%
Ambient Temperature	34.6	°C	Shape	Circle		Carbon Dioxide	8.7	%
Type of Process	Combustion		Stack Temperature	176	°C	Gas Velocity	3.4	m/s
Type of Fuel	Natural Gas		Moisture	26.26	%	Flow Rate (Actual O2)	42089	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 %O_2	Result at 6.6 % O_2	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing										
Total Suspended Particulate	11:50 AM - 12:38 PM	mg/m3	-	0.5	1.2	1.23	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 Kulsuriwong, Scientist (4), ทะเบียนเลขที่ ว-323-ง-0029
Approved by Dej Changchon, Senior Manager, ทะเบียนเลขที่ ว-323-ก-0001

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8525-209/ EMAIL S:\Reports_Air Stack_O2_2GL.rpt (2.03PM)

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498954
Date Received : Sep 10, 2024
Date Reported : Sep 18, 2024
Report Number: 3093871-1

Sample Number	2498954-1
Sampled Date	Sep 10, 2024
Sample Description	Emission from Stationary Source
Location	TOX2 (ERU Stack) (GPS 47P 0726941, 1405348)
Date Analysis Commenced	Sep 11, 2024
Condition of Sample	Extracted into one filter paper placed in plastic petri dish and one plastic bottle

Stack Description

Ambient Pressure	753	mmHg	Diameter	3.00	m	Oxygen	6.6	%
Ambient Temperature	34.6	°C	Shape	Circle		Carbon Dioxide	8.7	%
Type of Process	Combustion		Stack Temperature	176	°C	Gas Velocity	3.4	m/s
Type of Fuel	Natural Gas		Moisture	26.26	%	Flow Rate (Actual O2)	42089	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate *	11:50 AM - 12:38 PM	g/s	-	-	0.014	-	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)

Sampling By : Sittipan Sanachiw ทะเบียนเลขที่ ว-323-ง-0009

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)
ทะเบียนเลขที่ ว-323-ง-0029

Approved by
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ง-0001

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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498836
Date Received :Sep 11, 2024
Date Reported :Sep 23, 2024
Report Number :3093854-1

Sample Number	2498836-1
Sample Description	Emission from Stationary Source
Location	TOX2 (ERU Stack) (GPS 47P 0726941, 1405348)
Measurement Date	Sep 10, 2024

Stack Description

Ambient Temperature	34.6	°C	Diameter	3.00	m	Oxygen	6.62	%
Ambient Pressure	752.9	mmHg	Shape	Circle		Carbon dioxide	8.73	%
Type of Process	Combustion		Stack Temperature	176	°C	Gas Velocity	3.41	m/s
Type of Fuel	Natural Gas		Moisture	26.31	%	Flow Rate	42017	Nm3/hr

Run No.	Sampling Time	Oxygen (%)	Carbon Dioxide (%)	Oxides of Nitrogen (ppm) at Actual O_2	Oxides of Nitrogen (ppm) At 7% O_2
1	11:50 AM - 12:10 PM	6.65	8.70	27.07	26.41
2	12:11 PM - 12:31 PM	6.65	8.71	26.71	26.05
3	12:32 PM - 12:52 PM	6.56	8.77	26.84	26.01
Average (ppm)		6.62	8.73	26.87	26.15
Guideline[1] (ppm)				-	200
Guideline[2] (ppm)				-	72
Result (mg/Nm³)				50.56	49.21
Emission Rate at Actual O_2 (g/s)				0.5901	
Guideline[2] (g/s)				2.0	
Method				US EPA Method 7E	

Sampled By : Sathapron Thakarw
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
Wichan Choonharat
Manager
ทะเบียนเลขที่ ว-204-ง-0006

Approved by
Sarayuth Jittranont
Assistant General Manager
ทะเบียนเลขที่ ว-204-ง-0003

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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498831
Date Received :Sep 10, 2024
Date Reported :Sep 21, 2024
Report Number :3093544-1

Sample Number	2498831-1
Sampled Date	Sep 09, 2024
Sample Description	Emission from Stationary Source
Location	TOX1 (ERU Stack) (GPS 47P 0726915, 1405346)
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	09 Sep 24	11:50	12:10	28.37	23.76	29.58	25.92	-3.66
2	09 Sep 24	12:11	12:31	28.49	23.83	29.64	25.91	-3.72
3	09 Sep 24	12:32	12:52	28.37	23.63	29.51	25.80	-3.72
4	09 Sep 24	12:53	13:13	28.56	23.82	29.70	26.00	-3.70
5	09 Sep 24	13:14	13:34	28.62	23.81	29.74	25.98	-3.76
6	09 Sep 24	13:35	13:55	28.36	23.66	29.44	25.79	-3.65
7*	09 Sep 24	13:56	14:16	28.51	23.72	29.55	25.76	-3.79
8	09 Sep 24	14:17	14:37	28.24	23.47	29.42	25.62	-3.79
9	09 Sep 24	14:38	14:58	28.03	23.30	29.13	25.42	-3.70
10*	09 Sep 24	14:59	15:19	28.18	23.30	29.15	25.33	-3.82
11*	09 Sep 24	15:20	15:40	27.88	22.93	28.85	24.97	-3.88
12	09 Sep 24	15:41	16:01	27.47	22.75	28.52	24.83	-3.70
	Average					29.41	25.70	-3.71
	Confidence Coefficient (CC)							0.03
	Relative Accuracy (Compared with Emission Standard : 72 ppm) (%)							5.20
	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 ว-204-ก-0006

Approved by Sarayuth Jittranont
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0003

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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498831
Date Received :Sep 10, 2024
Date Reported :Sep 21, 2024
Report Number :3093544-1

Sample Number	2498831-1
Sampled Date	Sep 09, 2024
Sample Description	Emission from Stationary Source
Location	TOX1 (ERU Stack) (GPS 47P 0726915, 1405346)
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	09 Sep 24	11:50	12:10	0.56	2.54	0.58	2.76	2.18
2	09 Sep 24	12:11	12:31	0.51	2.86	0.53	3.11	2.57
3	09 Sep 24	12:32	12:52	0.54	3.15	0.56	3.44	2.87
4	09 Sep 24	12:53	13:13	0.54	3.43	0.56	3.74	3.18
5	09 Sep 24	13:14	13:34	0.51	3.54	0.53	3.87	3.34
6	09 Sep 24	13:35	13:55	0.52	3.63	0.54	3.95	3.41
7	09 Sep 24	13:56	14:16	0.56	3.76	0.58	4.09	3.51
8	09 Sep 24	14:17	14:37	0.50	3.84	0.52	4.19	3.67
9	09 Sep 24	14:18	14:58	0.52	3.90	0.54	4.25	3.72
10*	09 Sep 24	14:59	15:19	0.55	3.96	0.57	4.30	3.73
11*	09 Sep 24	15:20	15:40	0.55	4.01	0.57	4.37	3.79
12*	09 Sep 24	15:41	16:01	0.49	4.08	0.50	4.45	3.94
	Average					0.55	3.71	3.16
	Confidence Coefficient (CC)							0.40
	Relative Accuracy (Compared with Emission Standard : 690 ppm) (%)							0.52
	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 ว-204-ก-0006

Approved by Sarayuth Jittranont
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0003

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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498831
Date Received :Sep 10, 2024
Date Reported :Sep 21, 2024
Report Number :3093544-1

Sample Number	2498831-1
Sampled Date	Sep 09, 2024
Sample Description	Emission from Stationary Source
Location	TOX1 (ERU Stack) (GPS 47P 0726915, 1405346)
Parameter	O2

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual		Difference
		Start	Stop	CEMs (%)	RM (%)	
1	09 Sep 24	11:50	12:10	7.57	8.15	0.59
2	09 Sep 24	12:11	12:31	7.54	8.12	0.58
3	09 Sep 24	12:32	12:52	7.54	8.17	0.63
4	09 Sep 24	12:53	13:13	7.53	8.17	0.63
5	09 Sep 24	13:14	13:34	7.52	8.16	0.64
6	09 Sep 24	13:35	13:55	7.51	8.15	0.64
7	09 Sep 24	13:56	14:16	7.49	8.10	0.61
8	09 Sep 24	14:17	14:37	7.55	8.17	0.62
9	09 Sep 24	14:38	14:58	7.52	8.16	0.64
10*	09 Sep 24	14:59	15:19	7.46	8.11	0.65
11*	09 Sep 24	15:20	15:40	7.47	8.13	0.66
12*	09 Sep 24	15:41	16:01	7.51	8.16	0.65
	Average			7.53	8.15	0.62
	Confidence Coefficient (CC)					-
	Relative Accuracy (Compared In Actual) (%)					0.62
	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 : Sathapron Thakarw

Technical Management Wichan Choonharat
Manager
ทะเบียนเลขที่ ว-204-ก-0006

Approved by Sarayuth Jittranont
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0003

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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498943
Date Received :Sep 10, 2024
Date Reported :Nov 13, 2024
Report Number :3093861-2 Rev. No.1

Sample Number	2498943-1
Sampled Date	Sep 09, 2024
Sample Description	Emission from Stationary Source
Location	TOX1 (ERU Stack) (GPS 47P 0726915, 1405346)
Parameter	Flowrate

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual		Difference
		Start	Stop	CEMs (Nm3/Hr)	RM (Nm3/Hr)	
1	09 Sep 24	11:50	12:11	40,152	41,223	1,071
2	09 Sep 24	12:12	12:33	40,418	41,261	843
3	09 Sep 24	12:34	12:55	40,412	39,515	-897
4	09 Sep 24	12:55	13:16	40,594	41,637	1,043
5	09 Sep 24	13:17	13:38	40,451	41,208	757
6*	09 Sep 24	13:39	14:00	41,397	37,999	-3,398
7	09 Sep 24	14:01	14:22	40,905	41,219	314
8*	09 Sep 24	14:23	14:44	41,114	38,756	-2,359
9	09 Sep 24	14:45	15:06	40,966	41,564	598
10	09 Sep 24	15:07	15:28	41,809	41,213	-597
11	09 Sep 24	15:29	15:50	40,595	41,251	656
12*	09 Sep 24	15:51	16:12	39,239	41,208	1,968
	Average			40,700	41,121	421
	Confidence Coefficient (CC)					542
	Relative Accuracy [1/] (Compared with RM) (%)					2.34
	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 : Natthawut Duangpang

Note : This Analysis test report is reissued to supersede report No.3093861-2, Date Reported : Oct 02, 2024 due to revise analytical information.

Technical Management Wichan Choonharat
Manager
ทะเบียนเลขที่ ว-204-ก-0006

Approved by Sarayuth Jittranont
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0003

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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 : 4516534929
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24102619
Date Received :Sep 10, 2024
Date Reported :Sep 20, 2024
Report Number :3101615-2

Sample Number	24102619-1
Sampled Date	Sep 09, 2024
Sample Description	Emission from Stationary Source
Location	TOX1 (ERU Stack) (GPS 47P 0726915, 1405346)
Parameter	Stack Temperature

Relative Accuracy Test Audit Report

Run No.	Date	Time		Temperature Data		Difference
		Start	Stop	CEMs (°C)	RM (°C)	
1	09 Sep 24	11:50	12:11	201.0	186.0	-15.0
2	09 Sep 24	12:12	12:33	200.8	185.2	-15.6
3	09 Sep 24	12:34	12:55	200.7	184.8	-15.9
4	09 Sep 24	12:55	13:16	200.4	184.4	-16.0
5*	09 Sep 24	13:17	13:38	200.5	184.0	-16.5
6*	09 Sep 24	13:39	14:00	200.5	184.0	-16.5
7	09 Sep 24	14:01	14:22	200.1	184.0	-16.1
8	09 Sep 24	14:23	14:44	200.2	183.7	-16.5
9	09 Sep 24	14:45	15:06	200.1	184.0	-16.1
10	09 Sep 24	15:07	15:28	200.0	184.0	-16.0
11*	09 Sep 24	15:29	15:50	200.0	183.0	-17.0
12	09 Sep 24	15:51	16:12	200.2	184.0	-16.2
Average				200.4	184.5	-15.9
Confidence Coefficient (CC)						0.3
Relative Accuracy 1/ (Compared with RM) (%)						8.8
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 Stack Temperature is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 6 (PS-6)

RA Result is within Criteria

Sampled By : Natthawut Duangpang

Technical Management Wichan Choonharat, Manager, ทะเบียนเลขที่ ว-204-ค-0006

Approved by Sarayuth Jittranont, Assistant General Manager, ทะเบียนเลขที่ ว-204-ค-0003

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498832
Date Received :Sep 11, 2024
Date Reported :Sep 21, 2024
Report Number :3093547-1

Sample Number	2498832-1
Sampled Date	Sep 10, 2024
Sample Description	Emission from Stationary Source
Location	TOX2 (ERU Stack) (GPS 47P 0726941, 1405348)
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	10 Sep 24	11:50	12:10	26.54	27.07	26.17	26.41	0.23
2	10 Sep 24	12:11	12:31	26.22	26.71	25.85	26.05	0.19
3	10 Sep 24	12:32	12:52	26.41	26.84	25.87	26.01	0.14
4*	10 Sep 24	12:53	13:13	26.64	27.23	26.13	26.42	0.28
5*	10 Sep 24	13:14	13:34	26.43	27.03	26.02	26.30	0.27
6	10 Sep 24	13:35	13:55	26.19	26.65	25.86	26.01	0.16
7	10 Sep 24	13:56	14:16	26.42	26.91	25.94	26.13	0.20
8*	10 Sep 24	14:17	14:37	26.21	26.81	25.68	25.98	0.29
9	10 Sep 24	14:38	14:58	26.16	26.72	25.53	25.78	0.25
10	10 Sep 24	14:59	15:19	25.81	26.31	25.35	25.56	0.21
11	10 Sep 24	15:20	15:40	25.85	26.20	25.51	25.56	0.04
12	10 Sep 24	15:41	16:01	26.07	26.48	25.68	25.79	0.11
Average						25.75	25.92	0.17
Confidence Coefficient (CC)								0.05
Relative Accuracy (Compared with Emission Standard : 72 ppm) (%)								0.30
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 ว-204-ค-0006

Approved by Sarayuth Jittranont, Assistant General Manager, ทะเบียนเลขที่ ว-204-ค-0003

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498832
Date Received :Sep 11, 2024
Date Reported :Sep 21, 2024
Report Number :3093547-1

Sample Number	2498832-1
Sampled Date	Sep 10, 2024
Sample Description	Emission from Stationary Source
Location	TOX2 (ERU Stack) (GPS 47P 0726941, 1405348)
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*	10 Sep 24	11:50	12:10	0.53	1.48	0.52	1.45	0.93
2*	10 Sep 24	12:11	12:31	0.55	1.23	0.55	1.20	0.65
3*	10 Sep 24	12:32	12:52	0.59	1.11	0.58	1.08	0.50
4	10 Sep 24	12:53	13:13	0.54	1.05	0.53	1.01	0.48
5	10 Sep 24	13:14	13:34	0.57	1.03	0.56	1.00	0.44
6	10 Sep 24	13:35	13:55	0.57	1.00	0.56	0.98	0.42
7	10 Sep 24	13:56	14:16	0.59	0.92	0.58	0.89	0.31
8	10 Sep 24	14:17	14:37	0.52	0.91	0.51	0.88	0.37
9	10 Sep 24	14:38	14:58	0.50	0.81	0.48	0.78	0.30
10	10 Sep 24	14:59	15:19	0.50	0.75	0.49	0.72	0.24
11	10 Sep 24	15:20	15:40	0.53	0.70	0.52	0.69	0.17
12	10 Sep 24	15:41	16:01	0.48	0.64	0.48	0.62	0.15
Average						0.52	0.84	0.32
Confidence Coefficient (CC)								0.09
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, ทะเบียนเลขที่ ว-204-ค-0006

Approved by Sarayuth Jittranont, Assistant General Manager, ทะเบียนเลขที่ ว-204-ค-0003

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498832
Date Received :Sep 11, 2024
Date Reported :Sep 21, 2024
Report Number :3093547-1

Sample Number	2498832-1
Sampled Date	Sep 10, 2024
Sample Description	Emission from Stationary Source
Location	TOX2 (ERU Stack) (GPS 47P 0726941, 1405348)
Parameter	O2

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual		Difference
		Start	Stop	CEMs (%)	RM (%)	
1	10 Sep 24	11:50	12:10	6.80	6.65	-0.15
2	10 Sep 24	12:11	12:31	6.80	6.65	-0.15
3	10 Sep 24	12:32	12:52	6.71	6.56	-0.15
4	10 Sep 24	12:53	13:13	6.73	6.57	-0.16
5*	10 Sep 24	13:14	13:34	6.78	6.61	-0.17
6	10 Sep 24	13:35	13:55	6.82	6.66	-0.16
7	10 Sep 24	13:56	14:16	6.74	6.59	-0.15
8*	10 Sep 24	14:17	14:37	6.71	6.55	-0.16
9	10 Sep 24	14:38	14:58	6.66	6.49	-0.16
10	10 Sep 24	14:59	15:19	6.75	6.59	-0.16
11*	10 Sep 24	15:20	15:40	6.82	6.65	-0.17
12	10 Sep 24	15:41	16:01	6.79	6.63	-0.16
Average				6.75	6.60	-0.16
Confidence Coefficient (CC)						-
Relative Accuracy (Compared in Actual) (%)						0.16
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 : Sathapron Thakarw

Technical Management Wichan Choonharat, Manager, ทะเบียนเลขที่ ว-204-ค-0006

Approved by Sarayuth Jittranont, Assistant General Manager, ทะเบียนเลขที่ ว-204-ค-0003

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2498946
Date Received : Sep 11, 2024
Date Reported : Nov 13, 2024
Report Number : 3093863-2 Rev. No.1

Sample Number	2498946-1
Sampled Date	Sep 10, 2024
Sample Description	Emission from Stationary Source
Location	TOX2 (ERU Stack) (GPS 47P 0726947, 1405348)
Parameter	Flowrate

Relative Accuracy Test Audit Report

Run No.	Date	Time		Raw Data at Actual		Difference
		Start	Stop	CEMs (Nm3/Hr)	RM (Nm3/Hr)	
1	10 Sep 24	11:50	12:11	41,321	41,411	89
2	10 Sep 24	12:12	12:33	41,357	41,411	54
3	10 Sep 24	12:34	12:55	41,061	42,467	1,406
4*	10 Sep 24	12:56	13:17	41,036	43,164	2,128
5	10 Sep 24	13:18	13:39	41,344	41,934	590
6	10 Sep 24	13:40	14:01	41,373	41,930	556
7	10 Sep 24	14:02	14:23	41,687	41,184	-503
8*	10 Sep 24	14:24	14:45	41,962	40,147	-1,816
9	10 Sep 24	14:46	15:07	42,005	42,109	104
10	10 Sep 24	15:08	15:29	42,086	41,809	-277
11*	10 Sep 24	15:30	15:51	41,685	43,517	1,832
12	10 Sep 24	15:52	16:13	41,645	42,846	1,202
	Average			41,542	41,900	358
	Confidence Coefficient (CC)					492
	Relative Accuracy [1/] (Compared with RM) (%)					2.03
	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 : Natthawut Duangpang

Note : This Analysis test report is reissued to supersede report No.3093863-2, Date Reported : Oct 02, 2024 due to revise analytical information.

Technical Management Wichan Choonharat
Manager
ทะเบียนเลขที่ ว-204-ท-0006

Approved by Sarayuth Jittranont
Assistant General Manager
ทะเบียนเลขที่ ว-204-ท-0003

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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 : 4516534929
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24102626
Date Received : Sep 11, 2024
Date Reported : Sep 24, 2024
Report Number : 3101619-2

Sample Number	24102626-1
Sampled Date	Sep 10, 2024
Sample Description	Emission from Stationary Source
Location	TOX2 (ERU Stack) (GPS 47P 0726941, 1405348)
Parameter	Stack Temperature

Relative Accuracy Test Audit Report

Run No.	Date	Time		Temperature Data		Difference
		Start	Stop	CEMs (°C)	RM (°C)	
1	10 Sep 24	11:50	12:11	187.8	176.0	-11.8
2	10 Sep 24	12:12	12:33	187.9	176.0	-11.9
3*	10 Sep 24	12:34	12:55	188.0	176.0	-12.0
4	10 Sep 24	12:56	13:17	187.9	176.0	-11.9
5	10 Sep 24	13:18	13:39	187.9	176.0	-11.9
6	10 Sep 24	13:40	14:01	187.9	176.0	-11.9
7	10 Sep 24	14:02	14:23	187.7	177.0	-10.7
8*	10 Sep 24	14:24	14:45	188.1	176.0	-12.1
9	10 Sep 24	14:46	15:07	188.2	177.0	-11.2
10	10 Sep 24	15:08	15:29	188.0	176.0	-12.0
11	10 Sep 24	15:30	15:51	188.0	176.0	-12.0
12*	10 Sep 24	15:52	16:13	188.0	176.0	-12.0
	Average			187.9	176.2	-11.7
	Confidence Coefficient (CC)					0.3
	Relative Accuracy [1/] (Compared with RM) (%)					6.8
	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 Stack Temperature is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 6 (PS-6)

RA Result is within Criteria

Sampled By : Natthawut Duangpang

Technical Management Wichan Choonharat
Manager
ทะเบียนเลขที่ ว-204-ท-0006

Approved by Sarayuth Jittranont
Assistant General Manager
ทะเบียนเลขที่ ว-204-ท-0003

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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485491
Date Received : Aug 06, 2024
Date Reported : Aug 15, 2024
Report Number : 3065535-1

Sample Number	2485491-1
Sampled Date	Aug 06, 2024
Sample Description	Air Quality
Location	บริเวณหน่วยผลิตสาร PO
Date Analysis Commenced	Aug 06, 2024
Condition of Sample	Drawn into one 10-L air sampling bag and one sorbent tube, refrigerated
Barometric Pressure	755 mmHg
Atmospheric Temperature	32.7 °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	1.04	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Non Methane Hydrocarbon as Propane	09:30 AM - 11:30 AM	ppm	-	0.33	<0.33	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	1.04	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 ThanitaK.
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485491
Date Received : Aug 06, 2024
Date Reported : Aug 15, 2024
Report Number : 3065535-1

Sample Number	2485491-2
Sampled Date	Aug 06, 2024
Sample Description	Air Quality
Location	บริเวณถังเก็บกักสาร PO
Date Analysis Commenced	Aug 06, 2024
Condition of Sample	Drawn into one 10-L air sampling bag and one sorbent tube, refrigerated
Barometric Pressure	755 mmHg
Atmospheric Temperature	32.7 °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	1.02	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Non Methane Hydrocarbon as Propane	09:30 AM - 11:30 AM	ppm	-	0.33	<0.33	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	1.02	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 ThanitaK.
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122862
Date Received : Nov 18, 2024
Date Reported : Nov 26, 2024
Report Number : 3148497-1

Sample Number	24122862-1
Sampled Date	Nov 18, 2024
Sample Description	Air Quality
Location	บริเวณหน่วยผลิตสาร PO
Date Analysis Commenced	Nov 19, 2024
Condition of Sample	Drawn into one 10-L air sampling bag and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	32.4 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Methane as Propane	09:30 AM - 09:50 AM	ppm	-	0.33	0.79	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Non Methane Hydrocarbon as Propane	09:30 AM - 09:50 AM	ppm	-	0.33	<0.33	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 - 09:50 AM	ppm	-	0.33	0.79	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 Saranya C.
Saranya Chalermthamrong
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122862
Date Received : Nov 18, 2024
Date Reported : Nov 26, 2024
Report Number : 3148497-1

Sample Number	24122862-2
Sampled Date	Nov 18, 2024
Sample Description	Air Quality
Location	บริเวณถังเก็บกักสาร PO
Date Analysis Commenced	Nov 19, 2024
Condition of Sample	Drawn into one 10-L air sampling bag and one sorbent tube, refrigerated
Barometric Pressure	757 mmHg
Atmospheric Temperature	32.4 °C

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Methane as Propane	09:30 AM - 09:50 AM	ppm	-	0.33	0.83	No Standard	Total Hydrocarbon Analyzer	-	Rayong
Non Methane Hydrocarbon as Propane	09:30 AM - 09:50 AM	ppm	-	0.33	<0.33	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 - 09:50 AM	ppm	-	0.33	0.83	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 Saranya C.
Saranya Chalermthamrong
Scientist (4)

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496101
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115441-1

Sample Number	2496101-1
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date	Sep 05 - Sep 06, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296517

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	58.8	76.3	55.7
10:00 AM - 11:00 AM	57.4	73.3	55.3
11:00 AM - 12:00 PM	60.7	82.9	55.1
12:00 PM - 01:00 PM	58.1	77.0	54.8
01:00 PM - 02:00 PM	57.2	75.0	55.1
02:00 PM - 03:00 PM	57.1	75.2	55.1
03:00 PM - 04:00 PM	57.0	72.0	55.3
04:00 PM - 05:00 PM	60.8	81.3	55.5
05:00 PM - 06:00 PM	58.0	74.4	55.3
06:00 PM - 07:00 PM	58.2	77.8	55.7
07:00 PM - 08:00 PM	61.4	91.5	56.2
08:00 PM - 09:00 PM	57.8	79.7	56.4
09:00 PM - 10:00 PM	57.2	69.0	56.5
10:00 PM - 11:00 PM	56.9	69.6	56.1
11:00 PM - 12:00 AM	57.2	69.4	56.5
12:00 AM - 01:00 AM	57.1	75.2	56.4
01:00 AM - 02:00 AM	57.0	68.1	56.5
02:00 AM - 03:00 AM	57.2	62.4	56.7
03:00 AM - 04:00 AM	57.2	65.7	56.7
04:00 AM - 05:00 AM	57.4	77.1	56.4
05:00 AM - 06:00 AM	58.6	80.9	56.4
06:00 AM - 07:00 AM	61.5	81.9	56.7
07:00 AM - 08:00 AM	61.4	81.9	56.6
08:00 AM - 09:00 AM	58.9	79.3	55.8
Leq Average 24 hrs. (dB(A))	58.7		
Lmax (dB(A))		91.5	
L90 (dB(A))			56.1
Ldn (dB(A))	64.6		
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 Chontichak — Chontcha Subongkoch, Scientist (3)
Approved by Supt S. — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496101
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115442-1

Sample Number	2496101-2
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date	Sep 06 - Sep 07, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296517

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	56.6	67.7	54.9
10:00 AM - 11:00 AM	56.9	72.1	54.9
11:00 AM - 12:00 PM	57.6	76.4	54.9
12:00 PM - 01:00 PM	58.8	85.1	54.6
01:00 PM - 02:00 PM	57.8	74.7	55.5
02:00 PM - 03:00 PM	57.2	73.1	55.0
03:00 PM - 04:00 PM	56.9	73.6	55.1
04:00 PM - 05:00 PM	61.5	87.9	55.7
05:00 PM - 06:00 PM	63.6	93.3	57.1
06:00 PM - 07:00 PM	60.0	78.1	57.5
07:00 PM - 08:00 PM	58.7	72.1	57.3
08:00 PM - 09:00 PM	58.4	68.8	57.6
09:00 PM - 10:00 PM	57.6	68.0	56.6
10:00 PM - 11:00 PM	56.6	65.1	55.9
11:00 PM - 12:00 AM	56.7	65.8	55.9
12:00 AM - 01:00 AM	56.8	71.4	55.8
01:00 AM - 02:00 AM	56.9	68.4	56.2
02:00 AM - 03:00 AM	57.5	62.1	56.8
03:00 AM - 04:00 AM	57.5	66.2	56.7
04:00 AM - 05:00 AM	58.0	65.9	57.4
05:00 AM - 06:00 AM	58.4	67.0	57.7
06:00 AM - 07:00 AM	60.4	79.4	57.2
07:00 AM - 08:00 AM	60.8	83.2	56.3
08:00 AM - 09:00 AM	57.5	74.9	55.5
Leq Average 24 hrs. (dB(A))	58.7		
Lmax (dB(A))		93.3	
L90 (dB(A))			55.9
Ldn (dB(A))	64.4		
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 Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by Supt S. — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496101
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115443-1

Sample Number	2496101-3
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date	Sep 07 - Sep 08, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296517

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	56.9	72.0	54.9
10:00 AM - 11:00 AM	57.7	76.0	55.4
11:00 AM - 12:00 PM	57.5	77.5	55.4
12:00 PM - 01:00 PM	57.4	70.7	55.7
01:00 PM - 02:00 PM	59.0	86.2	55.9
02:00 PM - 03:00 PM	59.0	80.6	56.5
03:00 PM - 04:00 PM	58.7	80.9	56.1
04:00 PM - 05:00 PM	60.0	81.1	55.9
05:00 PM - 06:00 PM	58.3	78.1	56.5
06:00 PM - 07:00 PM	59.3	78.8	56.9
07:00 PM - 08:00 PM	57.9	74.8	56.3
08:00 PM - 09:00 PM	57.2	76.5	55.9
09:00 PM - 10:00 PM	56.5	65.2	55.6
10:00 PM - 11:00 PM	56.7	67.4	55.8
11:00 PM - 12:00 AM	57.7	75.6	56.7
12:00 AM - 01:00 AM	57.8	72.9	57.1
01:00 AM - 02:00 AM	57.4	69.5	56.6
02:00 AM - 03:00 AM	57.2	59.6	56.5
03:00 AM - 04:00 AM	56.9	62.9	56.2
04:00 AM - 05:00 AM	57.8	62.7	57.1
05:00 AM - 06:00 AM	58.0	72.6	57.0
06:00 AM - 07:00 AM	59.8	78.7	57.3
07:00 AM - 08:00 AM	60.4	86.4	56.4
08:00 AM - 09:00 AM	57.0	71.9	55.7
Leq Average 24 hrs. (dB(A))	58.1		
Lmax (dB(A))		86.4	
L90 (dB(A))			56.2
Ldn (dB(A))	64.3		
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 Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by Supt S. — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496101
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115444-1

Sample Number	2496101-4
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date	Sep 08 - Sep 09, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296517

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	57.8	81.5	55.7
10:00 AM - 11:00 AM	56.8	68.1	55.6
11:00 AM - 12:00 PM	56.8	69.4	55.4
12:00 PM - 01:00 PM	57.1	70.1	55.6
01:00 PM - 02:00 PM	57.8	78.0	56.1
02:00 PM - 03:00 PM	57.5	74.1	56.4
03:00 PM - 04:00 PM	58.3	70.5	56.8
04:00 PM - 05:00 PM	58.4	71.1	56.9
05:00 PM - 06:00 PM	58.3	71.8	56.7
06:00 PM - 07:00 PM	59.2	73.8	57.7
07:00 PM - 08:00 PM	59.3	69.5	58.3
08:00 PM - 09:00 PM	58.4	74.8	57.1
09:00 PM - 10:00 PM	57.6	74.7	56.9
10:00 PM - 11:00 PM	57.4	65.8	56.7
11:00 PM - 12:00 AM	57.4	68.7	56.7
12:00 AM - 01:00 AM	59.1	68.6	58.2
01:00 AM - 02:00 AM	58.5	69.0	57.4
02:00 AM - 03:00 AM	58.4	65.2	57.3
03:00 AM - 04:00 AM	58.7	72.3	58.0
04:00 AM - 05:00 AM	58.3	59.9	57.9
05:00 AM - 06:00 AM	58.7	60.1	58.2
06:00 AM - 07:00 AM	59.4	69.0	58.5
07:00 AM - 08:00 AM	59.1	61.4	58.6
08:00 AM - 09:00 AM	59.1	65.7	58.4
Leq Average 24 hrs. (dB(A))	58.3		
Lmax (dB(A))		81.5	
L90 (dB(A))			56.9
Ldn (dB(A))	64.8		
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 Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by Supt S. — Supot Salamteh, Section Head

ALS

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496101
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115445-1

Sample Number	2496101-5
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date	Sep 09 - Sep 10, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296517

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	59.1	68.2	58.4
10:00 AM - 11:00 AM	58.0	61.4	57.3
11:00 AM - 12:00 PM	57.9	63.2	57.1
12:00 PM - 01:00 PM	57.9	60.2	57.1
01:00 PM - 02:00 PM	58.2	68.6	56.9
02:00 PM - 03:00 PM	57.9	64.8	57.0
03:00 PM - 04:00 PM	59.0	68.8	58.2
04:00 PM - 05:00 PM	62.3	86.0	57.9
05:00 PM - 06:00 PM	62.8	90.8	57.4
06:00 PM - 07:00 PM	60.0	84.8	56.8
07:00 PM - 08:00 PM	58.0	78.8	55.4
08:00 PM - 09:00 PM	58.2	77.1	56.0
09:00 PM - 10:00 PM	58.3	75.1	56.3
10:00 PM - 11:00 PM	62.0	87.5	56.0
11:00 PM - 12:00 AM	58.8	75.1	56.4
12:00 AM - 01:00 AM	59.5	81.5	57.7
01:00 AM - 02:00 AM	58.7	68.3	57.7
02:00 AM - 03:00 AM	58.8	70.6	58.2
03:00 AM - 04:00 AM	59.0	65.2	58.2
04:00 AM - 05:00 AM	58.2	66.7	57.6
05:00 AM - 06:00 AM	58.1	65.7	57.0
06:00 AM - 07:00 AM	57.5	61.2	57.0
07:00 AM - 08:00 AM	58.2	60.2	57.6
08:00 AM - 09:00 AM	58.4	69.6	57.9
Leq Average 24 hrs. (dB(A))	59.2		
Lmax (dB(A))		90.8	
L90 (dB(A))			57.1
Ldn (dB(A))	65.6		
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 Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by Supot S.
Supot Salamteh
Section Head

ALS

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496101
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115446-1

Sample Number	2496101-6
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date	Sep 10 - Sep 11, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296517

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	58.1	66.1	57.4
10:00 AM - 11:00 AM	58.5	70.9	57.7
11:00 AM - 12:00 PM	60.7	79.7	57.9
12:00 PM - 01:00 PM	61.9	76.0	57.7
01:00 PM - 02:00 PM	60.7	86.4	56.4
02:00 PM - 03:00 PM	61.8	92.6	55.7
03:00 PM - 04:00 PM	57.5	71.5	55.8
04:00 PM - 05:00 PM	58.4	78.5	55.6
05:00 PM - 06:00 PM	57.8	70.6	55.7
06:00 PM - 07:00 PM	57.6	70.9	55.5
07:00 PM - 08:00 PM	57.2	71.5	55.7
08:00 PM - 09:00 PM	58.8	74.2	56.6
09:00 PM - 10:00 PM	58.7	77.6	56.4
10:00 PM - 11:00 PM	61.0	88.5	57.1
11:00 PM - 12:00 AM	59.5	76.3	57.6
12:00 AM - 01:00 AM	59.3	72.8	57.8
01:00 AM - 02:00 AM	59.1	77.9	57.8
02:00 AM - 03:00 AM	57.3	67.7	56.2
03:00 AM - 04:00 AM	57.9	65.7	57.1
04:00 AM - 05:00 AM	58.2	69.7	57.3
05:00 AM - 06:00 AM	58.2	60.7	57.5
06:00 AM - 07:00 AM	59.3	64.3	58.1
07:00 AM - 08:00 AM	58.4	65.6	57.8
08:00 AM - 09:00 AM	58.5	74.1	57.8
Leq Average 24 hrs. (dB(A))	59.2		
Lmax (dB(A))		92.6	
L90 (dB(A))			57.1
Ldn (dB(A))	65.4		
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 Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by Supot S.
Supot Salamteh
Section Head

ALS

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496101
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115447-1

Sample Number	2496101-7
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางด้านทิศตะวันตกของพื้นที่ HPPO (GPS 47P 0726777, 1405417)
Measurement Date	Sep 11 - Sep 12, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296517

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:00 AM - 10:00 AM	58.8	65.6	57.9
10:00 AM - 11:00 AM	59.1	65.1	58.3
11:00 AM - 12:00 PM	60.7	76.1	58.4
12:00 PM - 01:00 PM	62.3	82.8	57.5
01:00 PM - 02:00 PM	59.2	75.0	55.8
02:00 PM - 03:00 PM	58.0	68.6	56.1
03:00 PM - 04:00 PM	57.8	69.3	55.9
04:00 PM - 05:00 PM	58.0	74.4	55.8
05:00 PM - 06:00 PM	57.3	71.8	55.0
06:00 PM - 07:00 PM	59.1	84.5	55.9
07:00 PM - 08:00 PM	57.8	69.2	56.4
08:00 PM - 09:00 PM	59.8	85.1	57.0
09:00 PM - 10:00 PM	58.7	75.9	57.2
10:00 PM - 11:00 PM	61.4	87.3	57.6
11:00 PM - 12:00 AM	59.6	77.1	57.5
12:00 AM - 01:00 AM	59.4	73.9	57.3
01:00 AM - 02:00 AM	59.5	69.4	58.6
02:00 AM - 03:00 AM	58.7	69.4	58.1
03:00 AM - 04:00 AM	58.5	69.7	57.9
04:00 AM - 05:00 AM	58.8	77.1	57.7
05:00 AM - 06:00 AM	58.1	72.1	57.6
06:00 AM - 07:00 AM	58.0	66.4	57.4
07:00 AM - 08:00 AM	58.5	68.9	58.1
08:00 AM - 09:00 AM	59.2	61.7	58.6
Leq Average 24 hrs. (dB(A))	59.2		
Lmax (dB(A))		87.3	
L90 (dB(A))			57.5
Ldn (dB(A))	65.6		
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 Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by Supot S.
Supot Salamteh
Section Head

ALS

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496104
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115466-1

Sample Number	2496104-1
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ข้างป้อม รปภ บล็อค 45) (GPS 47P 0727136, 1404550)
Measurement Date	Sep 05 - Sep 06, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	47.9	76.9	44.8
11:00 AM - 12:00 PM	48.7	66.3	44.6
12:00 PM - 01:00 PM	46.8	67.7	43.6
01:00 PM - 02:00 PM	53.6	77.5	44.2
02:00 PM - 03:00 PM	49.2	71.2	44.5
03:00 PM - 04:00 PM	51.0	70.7	45.8
04:00 PM - 05:00 PM	49.8	69.8	46.4
05:00 PM - 06:00 PM	52.3	69.7	49.3
06:00 PM - 07:00 PM	51.6	75.1	48.1
07:00 PM - 08:00 PM	47.9	63.8	46.4
08:00 PM - 09:00 PM	47.1	61.4	46.1
09:00 PM - 10:00 PM	47.4	59.4	46.3
10:00 PM - 11:00 PM	49.7	70.6	46.0
11:00 PM - 12:00 AM	46.7	59.9	45.3
12:00 AM - 01:00 AM	46.8	58.3	45.0
01:00 AM - 02:00 AM	47.8	69.4	44.9
02:00 AM - 03:00 AM	47.7	60.2	45.3
03:00 AM - 04:00 AM	49.0	72.8	46.2
04:00 AM - 05:00 AM	52.6	81.8	46.8
05:00 AM - 06:00 AM	53.8	74.0	48.5
06:00 AM - 07:00 AM	55.4	76.2	46.2
07:00 AM - 08:00 AM	50.6	76.9	43.7
08:00 AM - 09:00 AM	50.6	76.8	44.9
09:00 AM - 10:00 AM	49.9	67.9	44.9
Leq Average 24 hrs. (dB(A))	50.5		
Lmax (dB(A))		81.8	
L90 (dB(A))			45.3
Ldn (dB(A))	57.4		
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 Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by Supot S.
Supot Salamteh
Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496104
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115467-1

Sample Number	2496104-2
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ปางป้อม รปภ บล็อค 45) (GPS 47P 0727136, 1404550)
Measurement Date	Sep 06 - Sep 07, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	49.5	70.2	45.1
11:00 AM - 12:00 PM	51.0	72.7	46.5
12:00 PM - 01:00 PM	53.2	83.7	44.9
01:00 PM - 02:00 PM	53.6	78.2	45.0
02:00 PM - 03:00 PM	51.0	70.9	45.9
03:00 PM - 04:00 PM	50.4	71.1	45.9
04:00 PM - 05:00 PM	52.0	74.9	45.9
05:00 PM - 06:00 PM	50.5	65.4	48.0
06:00 PM - 07:00 PM	49.2	64.1	47.5
07:00 PM - 08:00 PM	57.4	82.3	45.6
08:00 PM - 09:00 PM	46.6	58.9	45.3
09:00 PM - 10:00 PM	46.1	56.3	45.3
10:00 PM - 11:00 PM	46.7	61.4	45.1
11:00 PM - 12:00 AM	55.2	80.1	45.3
12:00 AM - 01:00 AM	46.0	55.6	45.2
01:00 AM - 02:00 AM	47.8	66.6	45.3
02:00 AM - 03:00 AM	46.3	59.9	45.2
03:00 AM - 04:00 AM	46.7	61.2	45.3
04:00 AM - 05:00 AM	51.8	78.7	46.4
05:00 AM - 06:00 AM	52.5	68.5	47.9
06:00 AM - 07:00 AM	54.1	72.2	47.4
07:00 AM - 08:00 AM	52.4	71.2	46.6
08:00 AM - 09:00 AM	51.7	77.4	45.5
09:00 AM - 10:00 AM	49.2	63.7	45.2
Leq Average 24 hrs. (dB(A))	51.6		
Lmax (dB(A))		83.7	
L90 (dB(A))			45.3
Ldn (dB(A))	57.6		
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: Chontichak (signature) — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. (signature) — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496104
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115468-1

Sample Number	2496104-3
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ปางป้อม รปภ บล็อค 45) (GPS 47P 0727136, 1404550)
Measurement Date	Sep 07 - Sep 08, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	48.1	67.1	44.4
11:00 AM - 12:00 PM	47.1	65.4	44.3
12:00 PM - 01:00 PM	51.8	69.9	45.1
01:00 PM - 02:00 PM	54.6	76.0	45.9
02:00 PM - 03:00 PM	50.4	71.9	45.6
03:00 PM - 04:00 PM	51.2	83.1	45.3
04:00 PM - 05:00 PM	54.6	84.5	45.5
05:00 PM - 06:00 PM	51.4	70.9	46.4
06:00 PM - 07:00 PM	48.6	70.6	45.1
07:00 PM - 08:00 PM	47.0	60.1	45.2
08:00 PM - 09:00 PM	46.8	60.7	45.0
09:00 PM - 10:00 PM	46.8	59.1	45.6
10:00 PM - 11:00 PM	47.4	72.6	45.2
11:00 PM - 12:00 AM	45.8	67.0	44.6
12:00 AM - 01:00 AM	45.4	61.7	44.3
01:00 AM - 02:00 AM	47.5	69.4	44.5
02:00 AM - 03:00 AM	49.3	69.6	46.1
03:00 AM - 04:00 AM	46.9	62.1	45.7
04:00 AM - 05:00 AM	50.2	64.2	46.9
05:00 AM - 06:00 AM	51.1	69.5	46.0
06:00 AM - 07:00 AM	50.7	68.7	44.7
07:00 AM - 08:00 AM	48.1	64.6	44.5
08:00 AM - 09:00 AM	50.3	73.2	44.4
09:00 AM - 10:00 AM	48.5	65.2	45.1
Leq Average 24 hrs. (dB(A))	49.9		
Lmax (dB(A))		84.5	
L90 (dB(A))			45.1
Ldn (dB(A))	55.4		
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: Chontichak (signature) — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. (signature) — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496104
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115469-1

Sample Number	2496104-4
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ปางป้อม รปภ บล็อค 45) (GPS 47P 0727136, 1404550)
Measurement Date	Sep 08 - Sep 09, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	46.4	68.0	44.0
11:00 AM - 12:00 PM	48.8	67.5	44.2
12:00 PM - 01:00 PM	52.2	78.8	43.4
01:00 PM - 02:00 PM	48.3	68.7	43.7
02:00 PM - 03:00 PM	52.2	76.1	43.9
03:00 PM - 04:00 PM	52.8	68.3	45.9
04:00 PM - 05:00 PM	49.7	68.8	47.4
05:00 PM - 06:00 PM	49.9	67.4	47.7
06:00 PM - 07:00 PM	48.6	71.5	47.0
07:00 PM - 08:00 PM	47.4	63.5	46.3
08:00 PM - 09:00 PM	47.2	59.2	46.1
09:00 PM - 10:00 PM	49.5	71.0	46.1
10:00 PM - 11:00 PM	47.3	67.1	45.4
11:00 PM - 12:00 AM	47.1	65.3	45.0
12:00 AM - 01:00 AM	50.3	68.0	45.3
01:00 AM - 02:00 AM	52.6	70.1	46.4
02:00 AM - 03:00 AM	54.5	77.9	47.1
03:00 AM - 04:00 AM	55.0	77.9	48.1
04:00 AM - 05:00 AM	51.1	71.0	47.1
05:00 AM - 06:00 AM	53.3	76.5	48.2
06:00 AM - 07:00 AM	51.8	70.1	46.9
07:00 AM - 08:00 AM	51.5	69.2	46.5
08:00 AM - 09:00 AM	53.4	76.7	45.0
09:00 AM - 10:00 AM	49.6	66.7	45.2
Leq Average 24 hrs. (dB(A))	51.1		
Lmax (dB(A))		78.8	
L90 (dB(A))			46.1
Ldn (dB(A))	58.4		
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: Chontichak (signature) — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. (signature) — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496104
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115470-1

Sample Number	2496104-5
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางด้านทิศใต้ของพื้นที่ HPPO (ปางป้อม รปภ บล็อค 45) (GPS 47P 0727136, 1404550)
Measurement Date	Sep 09 - Sep 10, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	49.6	65.3	45.6
11:00 AM - 12:00 PM	48.4	68.1	44.6
12:00 PM - 01:00 PM	49.2	66.9	45.3
01:00 PM - 02:00 PM	50.5	72.8	45.0
02:00 PM - 03:00 PM	54.3	77.4	44.9
03:00 PM - 04:00 PM	51.4	74.4	44.8
04:00 PM - 05:00 PM	51.1	68.7	45.7
05:00 PM - 06:00 PM	53.8	83.2	45.8
06:00 PM - 07:00 PM	51.2	78.7	45.5
07:00 PM - 08:00 PM	47.5	64.6	46.2
08:00 PM - 09:00 PM	47.8	67.2	46.2
09:00 PM - 10:00 PM	49.8	77.9	45.9
10:00 PM - 11:00 PM	46.9	64.4	45.6
11:00 PM - 12:00 AM	46.2	53.7	45.4
12:00 AM - 01:00 AM	46.6	55.7	45.6
01:00 AM - 02:00 AM	47.1	68.5	45.5
02:00 AM - 03:00 AM	46.4	57.6	45.2
03:00 AM - 04:00 AM	47.4	59.7	45.2
04:00 AM - 05:00 AM	51.8	64.4	47.9
05:00 AM - 06:00 AM	56.3	76.7	47.7
06:00 AM - 07:00 AM	53.0	71.6	48.5
07:00 AM - 08:00 AM	55.2	74.7	47.5
08:00 AM - 09:00 AM	54.1	82.1	46.6
09:00 AM - 10:00 AM	49.9	68.5	45.5
Leq Average 24 hrs. (dB(A))	51.3		
Lmax (dB(A))		83.2	
L90 (dB(A))			45.6
Ldn (dB(A))	57.3		
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: Chontichak (signature) — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. (signature) — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496104
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115471-1

Sample Number	2496104-6
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางด่วนพัฒนาตัดใต้ของพื้นที่ HPPO (ส่างป๋อม ชปก บล็อค 45) (GPS 47P 0727136, 1404550)
Measurement Date	Sep 10 - Sep 11, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	50.0	66.3	45.6
11:00 AM - 12:00 PM	49.7	66.0	44.7
12:00 PM - 01:00 PM	48.5	65.4	44.9
01:00 PM - 02:00 PM	48.5	62.3	44.9
02:00 PM - 03:00 PM	54.9	79.5	44.4
03:00 PM - 04:00 PM	49.4	70.9	44.5
04:00 PM - 05:00 PM	54.8	80.4	46.7
05:00 PM - 06:00 PM	52.6	76.7	46.9
06:00 PM - 07:00 PM	50.9	70.1	47.4
07:00 PM - 08:00 PM	49.0	65.5	46.3
08:00 PM - 09:00 PM	49.0	56.1	47.1
09:00 PM - 10:00 PM	50.5	64.1	46.8
10:00 PM - 11:00 PM	48.9	54.9	47.5
11:00 PM - 12:00 AM	48.0	55.6	46.9
12:00 AM - 01:00 AM	51.1	73.0	47.3
01:00 AM - 02:00 AM	54.1	77.5	47.2
02:00 AM - 03:00 AM	48.0	58.5	46.4
03:00 AM - 04:00 AM	50.2	66.8	46.3
04:00 AM - 05:00 AM	54.0	77.2	46.9
05:00 AM - 06:00 AM	51.6	70.8	47.6
06:00 AM - 07:00 AM	53.7	70.9	48.9
07:00 AM - 08:00 AM	51.2	70.8	45.1
08:00 AM - 09:00 AM	50.0	74.1	44.1
09:00 AM - 10:00 AM	50.3	77.8	43.7
Leq Average 24 hrs. (dB(A))	51.4		
Lmax (dB(A))		80.4	
L90 (dB(A))			46.4
Ldn (dB(A))	58.0		
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 Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by Supot S
Supot Salamteh
Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496104
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115472-1

Sample Number	2496104-7
Parameter	Noise (Leq 24 hrs.)
Location	บริเวณริมรั้วของโครงการทางด่วนพัฒนาตัดใต้ของพื้นที่ HPPO (ส่างป๋อม ชปก บล็อค 45) (GPS 47P 0727136, 1404550)
Measurement Date	Sep 11 - Sep 12, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 597167

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	48.3	63.8	44.0
11:00 AM - 12:00 PM	47.5	64.5	44.5
12:00 PM - 01:00 PM	49.4	66.5	45.2
01:00 PM - 02:00 PM	50.3	69.9	44.7
02:00 PM - 03:00 PM	52.9	71.3	46.0
03:00 PM - 04:00 PM	50.9	73.5	45.7
04:00 PM - 05:00 PM	51.2	70.6	47.0
05:00 PM - 06:00 PM	53.8	77.2	46.7
06:00 PM - 07:00 PM	51.1	69.6	48.1
07:00 PM - 08:00 PM	51.5	72.8	47.4
08:00 PM - 09:00 PM	48.8	69.3	46.3
09:00 PM - 10:00 PM	47.7	63.0	46.3
10:00 PM - 11:00 PM	49.1	66.1	47.5
11:00 PM - 12:00 AM	50.2	68.2	47.3
12:00 AM - 01:00 AM	49.3	64.9	46.9
01:00 AM - 02:00 AM	49.8	59.7	47.8
02:00 AM - 03:00 AM	51.4	60.9	48.9
03:00 AM - 04:00 AM	52.6	64.5	49.5
04:00 AM - 05:00 AM	52.0	67.5	49.5
05:00 AM - 06:00 AM	55.5	68.5	51.3
06:00 AM - 07:00 AM	55.3	75.6	49.5
07:00 AM - 08:00 AM	52.8	73.2	45.5
08:00 AM - 09:00 AM	49.4	68.1	44.8
09:00 AM - 10:00 AM	47.9	68.7	43.7
Leq Average 24 hrs. (dB(A))	51.4		
Lmax (dB(A))		77.2	
L90 (dB(A))			46.7
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 Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by Supot S
Supot Salamteh
Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496106
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115494-1

Sample Number 2496106-1
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านในชุมชนประชุมมิตรบำรุง (บ้านคุณมนูญบัง) (GPS 47P 0726338, 1405748)
Measurement Date Sep 05 - Sep 06, 2024
Measurement by Santi Chaichana
Sound Level meter Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	52.9	79.2	43.6
12:00 PM - 01:00 PM	49.3	71.6	42.2
01:00 PM - 02:00 PM	51.4	78.1	43.0
02:00 PM - 03:00 PM	51.7	73.3	44.5
03:00 PM - 04:00 PM	51.8	72.9	43.3
04:00 PM - 05:00 PM	52.6	74.9	43.7
05:00 PM - 06:00 PM	52.3	74.7	44.6
06:00 PM - 07:00 PM	55.7	88.6	47.0
07:00 PM - 08:00 PM	49.5	72.4	46.5
08:00 PM - 09:00 PM	47.7	67.9	45.1
09:00 PM - 10:00 PM	46.6	67.8	43.6
10:00 PM - 11:00 PM	59.2	93.3	43.2
11:00 PM - 12:00 AM	44.3	63.8	42.1
12:00 AM - 01:00 AM	44.5	69.8	41.7
01:00 AM - 02:00 AM	49.2	77.4	42.6
02:00 AM - 03:00 AM	47.4	76.8	42.2
03:00 AM - 04:00 AM	47.4	70.8	41.9
04:00 AM - 05:00 AM	50.2	71.7	43.3
05:00 AM - 06:00 AM	56.9	83.0	46.5
06:00 AM - 07:00 AM	57.5	82.5	47.2
07:00 AM - 08:00 AM	51.7	76.7	43.0
08:00 AM - 09:00 AM	48.0	68.7	41.9
09:00 AM - 10:00 AM	50.0	78.3	42.9
10:00 AM - 11:00 AM	52.5	78.6	43.7

	Leq	Lmax	L90
Leq Average 24 hrs. (dB(A))	52.6		
Lmax (dB(A))		93.3	
L90 (dB(A))			43.3
Ldn (dB(A))	60.1		
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: Chontichak (signature) — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. (signature) — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496106
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115495-1

Sample Number 2496106-2
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านในชุมชนประชุมมิตรบำรุง (บ้านคุณมนูญบัง) (GPS 47P 0726338, 1405748)
Measurement Date Sep 06 - Sep 07, 2024
Measurement by Santi Chaichana
Sound Level meter Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	51.0	75.6	42.8
12:00 PM - 01:00 PM	51.4	74.0	43.9
01:00 PM - 02:00 PM	49.2	70.2	42.1
02:00 PM - 03:00 PM	52.9	77.4	43.0
03:00 PM - 04:00 PM	52.3	81.8	44.0
04:00 PM - 05:00 PM	55.9	84.2	44.7
05:00 PM - 06:00 PM	52.6	72.7	45.2
06:00 PM - 07:00 PM	51.3	71.6	46.7
07:00 PM - 08:00 PM	49.0	66.7	46.3
08:00 PM - 09:00 PM	49.3	72.2	44.2
09:00 PM - 10:00 PM	47.3	73.0	43.3
10:00 PM - 11:00 PM	44.8	58.5	43.0
11:00 PM - 12:00 AM	46.2	66.1	43.1
12:00 AM - 01:00 AM	45.5	62.4	42.4
01:00 AM - 02:00 AM	45.0	67.2	42.6
02:00 AM - 03:00 AM	44.8	65.9	42.3
03:00 AM - 04:00 AM	46.2	63.7	43.1
04:00 AM - 05:00 AM	54.7	84.3	44.2
05:00 AM - 06:00 AM	59.7	89.5	46.4
06:00 AM - 07:00 AM	56.2	80.1	44.6
07:00 AM - 08:00 AM	50.1	74.6	42.6
08:00 AM - 09:00 AM	51.3	80.2	43.3
09:00 AM - 10:00 AM	51.0	73.9	44.6
10:00 AM - 11:00 AM	52.4	77.0	45.1

	Leq	Lmax	L90
Leq Average 24 hrs. (dB(A))	52.3		
Lmax (dB(A))		89.5	
L90 (dB(A))			43.3
Ldn (dB(A))	59.4		
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: Chontichak (signature) — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. (signature) — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496106
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115496-1

Sample Number 2496106-3
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านในชุมชนประชุมมิตรบำรุง (บ้านคุณมนูญบัง) (GPS 47P 0726338, 1405748)
Measurement Date Sep 07 - Sep 08, 2024
Measurement by Santi Chaichana
Sound Level meter Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	50.7	73.6	44.8
12:00 PM - 01:00 PM	51.8	70.8	46.5
01:00 PM - 02:00 PM	54.1	80.7	47.2
02:00 PM - 03:00 PM	52.1	75.2	44.7
03:00 PM - 04:00 PM	51.8	74.7	44.0
04:00 PM - 05:00 PM	53.3	75.3	44.6
05:00 PM - 06:00 PM	52.1	71.3	45.7
06:00 PM - 07:00 PM	52.7	76.5	47.7
07:00 PM - 08:00 PM	49.8	69.7	47.3
08:00 PM - 09:00 PM	49.0	63.1	46.7
09:00 PM - 10:00 PM	48.3	68.9	46.2
10:00 PM - 11:00 PM	46.5	63.0	43.5
11:00 PM - 12:00 AM	46.8	71.7	43.5
12:00 AM - 01:00 AM	45.6	69.3	42.7
01:00 AM - 02:00 AM	45.3	68.8	42.6
02:00 AM - 03:00 AM	45.3	65.2	41.6
03:00 AM - 04:00 AM	46.4	65.1	42.0
04:00 AM - 05:00 AM	50.7	77.5	43.6
05:00 AM - 06:00 AM	55.7	80.7	45.9
06:00 AM - 07:00 AM	53.2	77.9	44.6
07:00 AM - 08:00 AM	51.1	82.4	43.6
08:00 AM - 09:00 AM	49.3	76.4	43.8
09:00 AM - 10:00 AM	48.3	70.4	44.1
10:00 AM - 11:00 AM	50.5	78.5	44.5

	Leq	Lmax	L90
Leq Average 24 hrs. (dB(A))	50.9		
Lmax (dB(A))		82.4	
L90 (dB(A))			44.5
Ldn (dB(A))	56.8		
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: Chontichak (signature) — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. (signature) — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496106
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115497-1

Sample Number 2496106-4
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านในชุมชนประชุมมิตรบำรุง (บ้านคุณมนูญบัง) (GPS 47P 0726338, 1405748)
Measurement Date Sep 08 - Sep 09, 2024
Measurement by Santi Chaichana
Sound Level meter Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	49.6	74.2	42.7
12:00 PM - 01:00 PM	55.9	77.8	42.7
01:00 PM - 02:00 PM	51.3	78.8	44.9
02:00 PM - 03:00 PM	48.7	69.7	44.3
03:00 PM - 04:00 PM	53.9	75.1	44.6
04:00 PM - 05:00 PM	55.9	75.0	45.0
05:00 PM - 06:00 PM	50.7	68.2	45.7
06:00 PM - 07:00 PM	50.9	71.4	46.9
07:00 PM - 08:00 PM	49.8	72.9	45.8
08:00 PM - 09:00 PM	49.5	77.8	44.5
09:00 PM - 10:00 PM	48.0	67.3	44.9
10:00 PM - 11:00 PM	49.2	66.3	44.2
11:00 PM - 12:00 AM	48.0	68.3	44.1
12:00 AM - 01:00 AM	45.8	58.0	43.6
01:00 AM - 02:00 AM	44.8	52.3	43.2
02:00 AM - 03:00 AM	45.1	57.6	42.7
03:00 AM - 04:00 AM	47.7	65.8	43.1
04:00 AM - 05:00 AM	51.6	73.1	45.4
05:00 AM - 06:00 AM	57.4	83.3	47.9
06:00 AM - 07:00 AM	59.2	88.8	48.2
07:00 AM - 08:00 AM	50.6	67.6	44.2
08:00 AM - 09:00 AM	50.0	74.4	43.1
09:00 AM - 10:00 AM	48.6	68.9	44.0
10:00 AM - 11:00 AM	52.3	70.2	45.6

	Leq	Lmax	L90
Leq Average 24 hrs. (dB(A))	52.3		
Lmax (dB(A))		88.8	
L90 (dB(A))			44.3
Ldn (dB(A))	59.3		
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: Chontichak (signature) — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. (signature) — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496106
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115498-1

Sample Number	2496106-5
Parameter	Noise (Leq 24 hrs.)
Location	กลุ่มบ้านในชุมชนประชุมมิตรบำรุง (บ้านคุณบุญยัง) (GPS 47P 0726338, 1405748)
Measurement Date	Sep 09 - Sep 10, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	52.0	75.4	44.6
12:00 PM - 01:00 PM	50.9	69.7	44.4
01:00 PM - 02:00 PM	49.1	73.7	43.3
02:00 PM - 03:00 PM	50.4	69.4	43.6
03:00 PM - 04:00 PM	51.8	74.2	43.6
04:00 PM - 05:00 PM	55.7	80.4	44.7
05:00 PM - 06:00 PM	52.0	75.6	44.1
06:00 PM - 07:00 PM	52.3	77.1	47.4
07:00 PM - 08:00 PM	50.6	74.0	47.0
08:00 PM - 09:00 PM	49.1	73.1	46.1
09:00 PM - 10:00 PM	48.4	68.0	46.1
10:00 PM - 11:00 PM	45.8	68.9	43.7
11:00 PM - 12:00 AM	44.7	57.5	43.2
12:00 AM - 01:00 AM	52.2	85.4	42.2
01:00 AM - 02:00 AM	44.2	58.7	42.5
02:00 AM - 03:00 AM	44.3	53.3	43.1
03:00 AM - 04:00 AM	46.5	65.9	42.9
04:00 AM - 05:00 AM	47.6	65.7	43.1
05:00 AM - 06:00 AM	58.9	82.1	47.3
06:00 AM - 07:00 AM	57.3	85.8	48.3
07:00 AM - 08:00 AM	57.8	83.5	44.2
08:00 AM - 09:00 AM	54.1	87.3	42.3
09:00 AM - 10:00 AM	49.8	72.0	42.8
10:00 AM - 11:00 AM	49.7	70.5	43.6
Leq Average 24 hrs. (dB(A))	52.6		
Lmax (dB(A))		87.3	
L90 (dB(A))			43.6
Ldn (dB(A))	59.1		
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: Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496106
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115499-1

Sample Number	2496106-6
Parameter	Noise (Leq 24 hrs.)
Location	กลุ่มบ้านในชุมชนประชุมมิตรบำรุง (บ้านคุณบุญยัง) (GPS 47P 0726338, 1405748)
Measurement Date	Sep 10 - Sep 11, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	52.9	75.0	43.6
12:00 PM - 01:00 PM	49.6	72.3	42.4
01:00 PM - 02:00 PM	47.2	67.9	42.2
02:00 PM - 03:00 PM	50.1	68.7	44.6
03:00 PM - 04:00 PM	51.6	71.4	44.6
04:00 PM - 05:00 PM	55.2	82.4	45.9
05:00 PM - 06:00 PM	53.2	78.5	45.9
06:00 PM - 07:00 PM	54.1	73.7	49.8
07:00 PM - 08:00 PM	50.8	72.7	46.5
08:00 PM - 09:00 PM	52.0	80.5	43.2
09:00 PM - 10:00 PM	49.6	72.3	43.5
10:00 PM - 11:00 PM	46.4	67.2	43.9
11:00 PM - 12:00 AM	45.7	59.2	43.3
12:00 AM - 01:00 AM	48.5	66.2	44.2
01:00 AM - 02:00 AM	46.9	67.9	43.3
02:00 AM - 03:00 AM	51.2	58.9	44.1
03:00 AM - 04:00 AM	56.7	64.7	47.8
04:00 AM - 05:00 AM	57.2	64.1	47.7
05:00 AM - 06:00 AM	56.8	81.9	47.4
06:00 AM - 07:00 AM	57.3	82.2	46.9
07:00 AM - 08:00 AM	54.4	73.4	43.5
08:00 AM - 09:00 AM	49.3	71.2	42.4
09:00 AM - 10:00 AM	47.8	69.0	41.8
10:00 AM - 11:00 AM	50.0	71.4	43.4
Leq Average 24 hrs. (dB(A))	52.8		
Lmax (dB(A))		82.4	
L90 (dB(A))			43.9
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: Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496106
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115500-1

Sample Number	2496106-7
Parameter	Noise (Leq 24 hrs.)
Location	กลุ่มบ้านในชุมชนประชุมมิตรบำรุง (บ้านคุณบุญยัง) (GPS 47P 0726338, 1405748)
Measurement Date	Sep 11 - Sep 12, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296516

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	51.0	69.9	44.8
12:00 PM - 01:00 PM	52.8	78.9	43.8
01:00 PM - 02:00 PM	49.1	73.9	43.2
02:00 PM - 03:00 PM	53.9	82.7	43.4
03:00 PM - 04:00 PM	55.2	86.6	43.0
04:00 PM - 05:00 PM	53.2	72.3	44.9
05:00 PM - 06:00 PM	51.9	77.7	45.5
06:00 PM - 07:00 PM	52.1	72.7	46.6
07:00 PM - 08:00 PM	50.7	72.2	46.3
08:00 PM - 09:00 PM	49.6	69.5	47.5
09:00 PM - 10:00 PM	47.8	62.3	45.2
10:00 PM - 11:00 PM	48.2	73.9	44.8
11:00 PM - 12:00 AM	45.1	59.4	43.5
12:00 AM - 01:00 AM	46.3	70.8	43.1
01:00 AM - 02:00 AM	46.4	65.0	44.2
02:00 AM - 03:00 AM	47.4	52.5	44.5
03:00 AM - 04:00 AM	48.4	57.5	47.4
04:00 AM - 05:00 AM	49.5	65.3	47.5
05:00 AM - 06:00 AM	55.6	80.0	47.3
06:00 AM - 07:00 AM	58.4	86.2	47.0
07:00 AM - 08:00 AM	53.5	75.7	41.4
08:00 AM - 09:00 AM	52.9	76.7	41.3
09:00 AM - 10:00 AM	52.8	72.1	43.7
10:00 AM - 11:00 AM	51.2	58.9	44.1
Leq Average 24 hrs. (dB(A))	52.2		
Lmax (dB(A))		86.6	
L90 (dB(A))			44.5
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: Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. — Supot Salamteh, Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496112
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115557-1

Sample Number	2496112-1
Parameter	Noise (Leq 24 hrs.)
Location	กลุ่มบ้านชุมชนพยูน (บ้านคุณสมจิตร) (GPS 47P 0727177, 1404390)
Measurement Date	Sep 05 - Sep 06, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296518

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	50.3	74.8	44.0
01:00 PM - 02:00 PM	49.3	66.0	44.0
02:00 PM - 03:00 PM	56.1	86.4	44.5
03:00 PM - 04:00 PM	55.2	81.1	44.1
04:00 PM - 05:00 PM	47.3	65.7	43.9
05:00 PM - 06:00 PM	48.1	66.5	44.8
06:00 PM - 07:00 PM	51.7	78.3	45.5
07:00 PM - 08:00 PM	50.5	72.0	45.7
08:00 PM - 09:00 PM	50.7	77.4	45.0
09:00 PM - 10:00 PM	46.4	56.4	45.5
10:00 PM - 11:00 PM	45.9	56.9	45.0
11:00 PM - 12:00 AM	49.8	72.2	45.5
12:00 AM - 01:00 AM	45.3	51.8	44.5
01:00 AM - 02:00 AM	44.0	47.9	43.6
02:00 AM - 03:00 AM	43.6	48.1	42.8
03:00 AM - 04:00 AM	47.8	70.4	42.7
04:00 AM - 05:00 AM	49.5	71.3	43.3
05:00 AM - 06:00 AM	59.0	73.4	43.8
06:00 AM - 07:00 AM	58.7	81.1	45.3
07:00 AM - 08:00 AM	56.5	79.7	45.4
08:00 AM - 09:00 AM	52.1	72.1	43.1
09:00 AM - 10:00 AM	49.9	69.3	43.0
10:00 AM - 11:00 AM	50.7	71.9	43.5
11:00 AM - 12:00 PM	51.7	70.1	44.0
Leq Average 24 hrs. (dB(A))	52.6		
Lmax (dB(A))		86.4	
L90 (dB(A))			44.0
Ldn (dB(A))	59.5		
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: Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by: Supot S. — Supot Salamteh, Section Head

ALS

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496112
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115558-1

Sample Number 2496112-2
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านบุ่มชนพยูน (บ้านคุณสมจิตร) (GPS 47P 0727177, 1404390)
Measurement Date Sep 06 - Sep 07, 2024
Measurement by Santi Chaichana
Sound Level meter Serial No. 296518

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	53.0	69.7	44.1
01:00 PM - 02:00 PM	50.4	66.4	45.4
02:00 PM - 03:00 PM	56.1	80.9	43.4
03:00 PM - 04:00 PM	49.7	70.5	43.3
04:00 PM - 05:00 PM	51.2	72.6	43.0
05:00 PM - 06:00 PM	48.9	66.5	43.2
06:00 PM - 07:00 PM	46.4	65.3	43.1
07:00 PM - 08:00 PM	45.3	55.2	44.1
08:00 PM - 09:00 PM	44.9	60.7	44.1
09:00 PM - 10:00 PM	57.8	83.4	43.2
10:00 PM - 11:00 PM	44.8	71.0	43.4
11:00 PM - 12:00 AM	44.4	51.9	43.8
12:00 AM - 01:00 AM	46.2	69.1	43.9
01:00 AM - 02:00 AM	56.5	82.3	43.4
02:00 AM - 03:00 AM	46.7	67.4	43.3
03:00 AM - 04:00 AM	46.3	68.6	42.7
04:00 AM - 05:00 AM	53.7	71.5	41.9
05:00 AM - 06:00 AM	58.6	74.0	42.0
06:00 AM - 07:00 AM	58.0	83.0	44.2
07:00 AM - 08:00 AM	54.3	72.7	44.4
08:00 AM - 09:00 AM	52.7	75.3	44.5
09:00 AM - 10:00 AM	55.8	74.9	43.5
10:00 AM - 11:00 AM	50.5	67.5	44.9
11:00 AM - 12:00 PM	49.4	66.3	45.0
Leq Average 24 hrs. (dB(A))	53.2		
Lmax (dB(A))		83.4	
L90 (dB(A))			43.4
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 Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by Supot S.
Supot Salamteh
Section Head

ALS

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496112
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115559-1

Sample Number 2496112-3
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านบุ่มชนพยูน (บ้านคุณสมจิตร) (GPS 47P 0727177, 1404390)
Measurement Date Sep 07 - Sep 08, 2024
Measurement by Santi Chaichana
Sound Level meter Serial No. 296518

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	51.6	72.4	44.6
01:00 PM - 02:00 PM	50.2	70.6	44.6
02:00 PM - 03:00 PM	51.9	72.9	45.8
03:00 PM - 04:00 PM	55.1	76.0	44.8
04:00 PM - 05:00 PM	48.6	66.4	43.4
05:00 PM - 06:00 PM	48.2	70.6	43.5
06:00 PM - 07:00 PM	46.8	62.5	43.6
07:00 PM - 08:00 PM	49.3	70.8	44.5
08:00 PM - 09:00 PM	47.5	70.7	44.0
09:00 PM - 10:00 PM	45.7	52.3	44.2
10:00 PM - 11:00 PM	44.5	53.1	43.8
11:00 PM - 12:00 AM	44.4	57.5	43.9
12:00 AM - 01:00 AM	44.3	62.4	43.4
01:00 AM - 02:00 AM	43.4	56.1	42.9
02:00 AM - 03:00 AM	43.5	48.9	42.9
03:00 AM - 04:00 AM	45.8	66.0	43.0
04:00 AM - 05:00 AM	54.0	73.1	42.2
05:00 AM - 06:00 AM	59.5	74.8	41.7
06:00 AM - 07:00 AM	57.7	74.5	44.1
07:00 AM - 08:00 AM	52.0	71.3	43.4
08:00 AM - 09:00 AM	52.6	72.5	43.6
09:00 AM - 10:00 AM	49.1	71.3	44.1
10:00 AM - 11:00 AM	46.9	56.5	44.5
11:00 AM - 12:00 PM	50.7	67.9	45.3
Leq Average 24 hrs. (dB(A))	51.7		
Lmax (dB(A))		76.0	
L90 (dB(A))			43.8
Ldn (dB(A))	59.3		
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 Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by Supot S.
Supot Salamteh
Section Head

ALS

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496112
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115560-1

Sample Number 2496112-4
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านบุ่มชนพยูน (บ้านคุณสมจิตร) (GPS 47P 0727177, 1404390)
Measurement Date Sep 08 - Sep 09, 2024
Measurement by Santi Chaichana
Sound Level meter Serial No. 296518

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	51.3	73.2	43.9
01:00 PM - 02:00 PM	52.0	69.9	43.8
02:00 PM - 03:00 PM	53.6	73.5	43.8
03:00 PM - 04:00 PM	57.3	84.0	43.5
04:00 PM - 05:00 PM	50.9	70.7	43.5
05:00 PM - 06:00 PM	51.5	67.4	44.8
06:00 PM - 07:00 PM	46.4	63.8	43.6
07:00 PM - 08:00 PM	43.8	56.1	43.1
08:00 PM - 09:00 PM	43.6	55.3	42.8
09:00 PM - 10:00 PM	43.7	52.2	43.0
10:00 PM - 11:00 PM	47.8	70.5	42.8
11:00 PM - 12:00 AM	44.0	57.1	42.9
12:00 AM - 01:00 AM	43.5	53.1	42.5
01:00 AM - 02:00 AM	44.2	67.9	42.4
02:00 AM - 03:00 AM	48.6	71.3	42.3
03:00 AM - 04:00 AM	53.5	72.9	42.3
04:00 AM - 05:00 AM	59.2	82.9	41.7
05:00 AM - 06:00 AM	56.7	73.5	42.0
06:00 AM - 07:00 AM	58.4	74.9	44.3
07:00 AM - 08:00 AM	53.6	71.7	44.5
08:00 AM - 09:00 AM	53.6	74.7	44.6
09:00 AM - 10:00 AM	61.3	79.2	46.8
10:00 AM - 11:00 AM	62.0	80.7	44.4
11:00 AM - 12:00 PM	63.1	79.4	50.0
Leq Average 24 hrs. (dB(A))	55.9		
Lmax (dB(A))		84.0	
L90 (dB(A))			43.5
Ldn (dB(A))	61.1		
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 Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by Supot S.
Supot Salamteh
Section Head

ALS

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496112
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115561-1

Sample Number 2496112-5
Parameter Noise (Leq 24 hrs.)
Location กลุ่มบ้านบุ่มชนพยูน (บ้านคุณสมจิตร) (GPS 47P 0727177, 1404390)
Measurement Date Sep 09 - Sep 10, 2024
Measurement by Santi Chaichana
Sound Level meter Serial No. 296518

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	62.2	87.2	49.2
01:00 PM - 02:00 PM	62.1	89.8	49.2
02:00 PM - 03:00 PM	60.3	86.3	45.2
03:00 PM - 04:00 PM	54.8	82.1	44.5
04:00 PM - 05:00 PM	50.8	71.9	43.3
05:00 PM - 06:00 PM	54.2	81.2	43.5
06:00 PM - 07:00 PM	47.4	71.1	43.3
07:00 PM - 08:00 PM	44.7	63.7	43.2
08:00 PM - 09:00 PM	44.9	63.6	43.7
09:00 PM - 10:00 PM	46.4	68.8	43.8
10:00 PM - 11:00 PM	47.0	74.6	43.1
11:00 PM - 12:00 AM	48.9	82.4	43.2
12:00 AM - 01:00 AM	44.9	70.6	43.5
01:00 AM - 02:00 AM	45.1	70.8	43.0
02:00 AM - 03:00 AM	43.8	55.4	42.6
03:00 AM - 04:00 AM	47.6	73.3	42.0
04:00 AM - 05:00 AM	45.1	70.1	41.7
05:00 AM - 06:00 AM	52.2	74.9	41.6
06:00 AM - 07:00 AM	61.2	80.2	42.6
07:00 AM - 08:00 AM	56.0	78.1	43.6
08:00 AM - 09:00 AM	58.1	82.0	44.2
09:00 AM - 10:00 AM	58.3	84.7	42.7
10:00 AM - 11:00 AM	54.8	88.9	42.6
11:00 AM - 12:00 PM	51.8	75.1	43.8
Leq Average 24 hrs. (dB(A))	55.8		
Lmax (dB(A))		89.8	
L90 (dB(A))			43.3
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 Chontichak
Chonticha Subongkoch
Scientist (3)

Approved by Supot S.
Supot Salamteh
Section Head

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496112
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115562-1

Sample Number	2496112-6
Parameter	Noise (Leq 24 hrs.)
Location	กลุ่มบ้านชุมชนหนุน (บ้านคุณสมจิตร) (GPS 47P 0727177, 1404390)
Measurement Date	Sep 10 - Sep 11, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296518

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	57.6	90.0	43.1
01:00 PM - 02:00 PM	49.8	73.7	42.9
02:00 PM - 03:00 PM	48.4	71.8	43.5
03:00 PM - 04:00 PM	58.1	82.0	43.6
04:00 PM - 05:00 PM	56.3	81.6	43.4
05:00 PM - 06:00 PM	48.3	77.2	43.5
06:00 PM - 07:00 PM	46.3	72.3	42.8
07:00 PM - 08:00 PM	47.2	73.5	43.6
08:00 PM - 09:00 PM	44.3	62.0	43.2
09:00 PM - 10:00 PM	44.9	61.1	42.9
10:00 PM - 11:00 PM	47.7	56.0	46.8
11:00 PM - 12:00 AM	47.1	68.0	45.2
12:00 AM - 01:00 AM	45.3	53.7	44.5
01:00 AM - 02:00 AM	49.6	73.7	44.2
02:00 AM - 03:00 AM	47.8	84.1	44.3
03:00 AM - 04:00 AM	55.1	80.6	43.7
04:00 AM - 05:00 AM	51.9	76.1	42.3
05:00 AM - 06:00 AM	58.1	80.2	42.4
06:00 AM - 07:00 AM	58.9	78.8	42.7
07:00 AM - 08:00 AM	55.8	77.0	43.9
08:00 AM - 09:00 AM	52.9	77.7	42.9
09:00 AM - 10:00 AM	51.3	74.5	42.9
10:00 AM - 11:00 AM	54.1	82.4	42.8
11:00 AM - 12:00 PM	50.8	74.0	43.1
Leq Average 24 hrs. (dB(A))	53.5		
Lmax (dB(A))		90.0	
L90 (dB(A))			43.2
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 Chontichak
Chontichа Subongkoch
Scientist (3)

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496112
Date Received : Sep 16, 2024
Date Reported : Sep 19, 2024
Report Number: 3115563-1

Sample Number	2496112-7
Parameter	Noise (Leq 24 hrs.)
Location	กลุ่มบ้านชุมชนหนุน (บ้านคุณสมจิตร) (GPS 47P 0727177, 1404390)
Measurement Date	Sep 11 - Sep 12, 2024
Measurement by	Santi Chaichana
Sound Level meter	Serial No. 296518

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	52.1	80.0	45.0
01:00 PM - 02:00 PM	58.6	84.3	45.3
02:00 PM - 03:00 PM	63.6	87.9	43.1
03:00 PM - 04:00 PM	53.1	75.7	42.6
04:00 PM - 05:00 PM	53.6	75.8	42.4
05:00 PM - 06:00 PM	48.6	77.3	42.9
06:00 PM - 07:00 PM	52.1	73.2	43.2
07:00 PM - 08:00 PM	53.6	80.3	43.1
08:00 PM - 09:00 PM	49.2	73.9	43.4
09:00 PM - 10:00 PM	46.1	73.7	42.7
10:00 PM - 11:00 PM	45.0	53.1	43.0
11:00 PM - 12:00 AM	44.9	61.5	43.4
12:00 AM - 01:00 AM	44.7	64.5	44.0
01:00 AM - 02:00 AM	47.3	70.4	43.3
02:00 AM - 03:00 AM	44.4	49.7	43.8
03:00 AM - 04:00 AM	46.8	71.4	44.1
04:00 AM - 05:00 AM	46.6	59.1	45.4
05:00 AM - 06:00 AM	56.4	77.3	46.1
06:00 AM - 07:00 AM	61.2	81.2	45.9
07:00 AM - 08:00 AM	57.7	77.6	44.4
08:00 AM - 09:00 AM	55.1	77.4	43.0
09:00 AM - 10:00 AM	53.4	76.9	42.5
10:00 AM - 11:00 AM	52.4	71.1	44.2
11:00 AM - 12:00 PM	53.6	73.5	43.8
Leq Average 24 hrs. (dB(A))	55.1		
Lmax (dB(A))		87.9	
L90 (dB(A))			43.4
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 Chontichak
Chontichа Subongkoch
Scientist (3)

Approved by Supot S.
Supot Salamteh
Section Head

ADDRESS 616/10 Moo 5 T. Maenam Khu A. Pluakdaeng Rayong 21140 Thailand PHONE +66 0 3304 8555 FAX +66 0 3304 8556
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คุณภาพน้ำทิ้ง

Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2472321
Date Received :Jul 04, 2024
Date Reported :Jul 12, 2024
Report Number :3053266-1

Sample Number	2472321-2
Sampled Date	Jul 04, 2024 10:40 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Jul 04, 2024
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	511	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	1196	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	19	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	22	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C		-	-	7.6	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Temperature *	Degree C	-	-	38.8	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	1210	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	64	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Sampling By : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-จ-9457 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-จ-0002

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 Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-9446

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2472321
Date Received :Jul 04, 2024
Date Reported :Jul 12, 2024
Report Number :3053266-2

Sample Number	2472321-2
Sampled Date	Jul 04, 2024 10:40 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Jul 06, 2024
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	-	0.01	12.7	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6200 B, 6200B	Bangkok

Sampling By : Wanlop Hunchainaow , Pattarapol Sawangjaitam

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by Suwimon C.
Suwimon Chairuangwut
Scientist (3)

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 : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485629
Date Received :Aug 07, 2024
Date Reported :Aug 15, 2024
Report Number :3083659-1

Sample Number	2485629-2
Sampled Date	Aug 07, 2024 10:15 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Aug 07, 2024
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	758	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	2847	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	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	8	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Rayong
pH at 25 degree C		-	-	6.9	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong
Temperature *	Degree C	-	-	38.6	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	1920	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	35	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Sampling By : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-จ-9457 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-จ-0002

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 Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-9446

Approved by D. Changchon
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-9442

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485629
Date Received :Aug 07, 2024
Date Reported :Aug 20, 2024
Report Number :3083659-2

Sample Number	2485629-2
Sampled Date	Aug 07, 2024 10:15 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Aug 08, 2024
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	-	0.01	4.14	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6200 B	Bangkok

Sampling By : Wanlop Hunchainaow , Pattarapol Sawangjaitam

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by Siriluk P.
Siriluk Bunnak
Section Head

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 : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496245
Date Received :Sep 04, 2024
Date Reported :Sep 12, 2024
Report Number :3108885-1

Sample Number	2496245-2
Sampled Date	Sep 04, 2024 10:35 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Sep 04, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

Analyte	Unit	LOD	LOQ (LOR)	Result	Method	Testing Location
Water Testing						
BOD (5 days at 20 Degree C)	mg/L	-	2.0	574	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	1531	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	9	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 (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	2120	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	29	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Rayong

Note : Ambient Temperature is 33.1 degree celsius.

Sampling By : Surawit Narapong ทะเบียนเลขที่ ว-323-จ-0011 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-จ-0002

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 Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-0028

Approved by
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-0001

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2496245
Date Received :Sep 04, 2024
Date Reported :Sep 13, 2024
Report Number :3108885-2

Sample Number	2496245-2
Sampled Date	Sep 04, 2024 10:35 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Sep 05, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

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	-	0.01	<0.01	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 6200 B	Bangkok

Note : Ambient Temperature is 33.1 degree celsius.

Sampling By : Surawit Narapong , Pattarapol Sawangjaitam

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Approved by
Nanthawadee Somboon
Specialist 2

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 : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received :Oct 03, 2024
Date Reported :Oct 11, 2024
Report Number :3135080-1

Sample Number	24107124-2
Sampled Date	Oct 03, 2024 9:39 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Oct 03, 2024
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	1204	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	3025	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	11	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	7	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C		-	-	6.8	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (B)	Rayong
Temperature *	Degree C	-	-	34.4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1490	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	19	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 D	Rayong

Note : Ambient Temperature is 28.5 degree celsius.

Sampling By : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-จ-0038 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-จ-0002

Remark :
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- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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- The laboratory has been accepted as an accredited laboratory complying with the ISO/IEC 17025.

Technical Management Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-0028

Approved by
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-0001

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received :Oct 03, 2024
Date Reported :Oct 11, 2024
Report Number :3135080-2

Sample Number	24107124-2
Sampled Date	Oct 03, 2024 9:39 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Oct 04, 2024
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	-	0.01	57.5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 6200 B	Bangkok

Note : Ambient Temperature is 28.5 degree celsius.

Sampling By : Wanlop Hunchainaow , Pattarapol Sawangjaitam

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Approved by
Nanthawadee Somboon
Specialist 2

Analysis / Test Report

TESTING
No.0042

Lot ID: 24122917
Date Received :Nov 06, 2024
Date Reported :Nov 14, 2024
Report Number :3166100-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Sample Number	24122917-2
Sampled Date	Nov 06, 2024 10:06 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Nov 06, 2024
Condition of Sample	Contained in two 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	1584	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	2357	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	28	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	27	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	5	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C		-	-	6.7	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (B)	Rayong
Temperature *	Degree C	-	-	33.7	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1520	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	16	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 D	Rayong

Note : Ambient Temperature is 32.0 degree celsius.

Sampling By : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-จ-0038 , Thanasoun Namakunna ทะเบียนเลขที่ ว-204-จ-0101

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 Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-0028

Approved by
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ก-0001

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Lot ID: 24122917
Date Received :Nov 06, 2024
Date Reported :Nov 14, 2024
Report Number :3166100-2

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Sample Number	24122917-2
Sampled Date	Nov 06, 2024 10:06 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Nov 07, 2024
Condition of Sample	Contained in two 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 8015 B	Bangkok
Water Testing						
Methanol	mg/L	-	0.01	8.42	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 6200 B	Bangkok

Sampling By : Wanlop Hunchainaow , Thanasoun Namakunna

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by Siriluk P.
Siriluk Bunnak
Section Head

Analysis / Test Report

TESTING
No.0042

Lot ID: 24133850
Date Received :Dec 04, 2024
Date Reported :Dec 13, 2024
Report Number :3193210-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Sample Number	24133850-2
Sampled Date	Dec 04, 2024 9:45 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Dec 04, 2024
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	1085	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	3394	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	31	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	30	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Oil & Grease	mg/L	-	3	7	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5520 B	Rayong
pH at 25 degree C		-	-	7.3	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500 - H (B)	Rayong
Temperature *	Degree C	-	-	34.7	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	2110	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 2540 D	Rayong

Note : Ambient Temperature is 30.1 degree celsius.

Sampling By : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-จ-0038 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-จ-0002

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 Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-0028

Approved by
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ก-0001

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Lot ID: 24133850
Date Received :Dec 04, 2024
Date Reported :Dec 13, 2024
Report Number :3193210-2

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location : AIE_HPPO-TPO Plant

Sample Number	24133850-2
Sampled Date	Dec 04, 2024 9:45 AM
Sample Description	Wastewater
Location	PUI_EQ Tank
Date Analysis Commenced	Dec 06, 2024
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	-	0.01	37.1	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 6200 B	Bangkok

Note : Ambient Temperature is 30.1 degree celsius.

Sampling By : Wanlop Hunchainaow , Pattarapol Sawangjaitam

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by Siriluk P.
Siriluk Bunnak
Section Head

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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053265-1

Sample Number	2472321-1
Sampled Date	Jul 04, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Jul 04, 2024
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, part 4500 - O G	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	10	≤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	10	≤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	0.008	≤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		-	-	8.4	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong

Technical Management Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-ว-9446

Approved by D. Changchon
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-9442

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

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 : 4515544212
Project Name : Water Testing
Project Location AIE_HPPO-TPO Plant

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053265-1

Sample Number	2472321-1
Sampled Date	Jul 04, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Jul 04, 2024
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							
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 D	Rayong
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	-	-	33.1	≤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	960	≤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	2.0	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (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 26.5 degree celsius.

Sampling By : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-ว-9457 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-ว-0002

Remark :
- LOD : Limit of Detection

Technical Management Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-ว-9446

Approved by D. Changchon
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-9442

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053265-1

- "<" : 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 Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-ว-9446

Approved by D. Changchon
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-9442

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053265-2

Sample Number	2472321-1
Sampled Date	Jul 04, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Jul 05, 2024
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							
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 Suwimon C.
Suwimon Chairuangwut
Scientist (3)
ทะเบียนเลขที่ ว-204-ว-0018

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053265-2

Sample Number	2472321-1
Sampled Date	Jul 04, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Jul 05, 2024
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 Suwimon C.
Suwimon Chairuangwut
Scientist (3)
ทะเบียนเลขที่ ว-204-จ-0018

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053265-2

Sample Number	2472321-1
Sampled Date	Jul 04, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Jul 05, 2024
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
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 26.5 degree celsius.

Sampling By : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-จ-9457 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-จ-0002

Remark :
- LOD : Limit of Detection

Technical Management Suwimon C.
Suwimon Chairuangwut
Scientist (3)
ทะเบียนเลขที่ ว-204-จ-0018

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053265-2

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

Technical Management Suwimon C.
Suwimon Chairuangwut
Scientist (3)
ทะเบียนเลขที่ ว-204-จ-0018

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053265-3

Sample Number	2472321-1
Sampled Date	Jul 04, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Jul 04, 2024
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	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
Water Testing							
Chlorine	mg/L	-	0.01	0.37	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 26.5 degree celsius.

Sampling By : Wanlop Hunchainaow , Pattarapol Sawangjaitam

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Approved by Suwimon C.
Suwimon Chairuangwut
Scientist (3)

Analysis / Test Report

TESTING
No.0009

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053267-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2472321-3
Sampled Date	Jul 04, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Jul 05, 2024
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	0.12	≤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	0.001	≤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
Iron	mg/L	0.003	0.005	0.08	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Technical Management Chanattagarn Imchom, Section Head, ทะเบียนเลขที่ ว-204-ง-0008

Approved by Kanokkorn Anek, Assistant General Manager, ทะเบียนเลขที่ ว-204-ง-0004

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Analysis / Test Report

TESTING
No.0009

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053267-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2472321-3
Sampled Date	Jul 04, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Jul 05, 2024
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							
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	0.04	≤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	0.004	≤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	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
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

Technical Management Chanattagarn Imchom, Section Head, ทะเบียนเลขที่ ว-204-ง-0008

Approved by Kanokkorn Anek, Assistant General Manager, ทะเบียนเลขที่ ว-204-ง-0004

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Analysis / Test Report

TESTING
No.0009

Lot ID: 2472321
Date Received : Jul 04, 2024
Date Reported : Jul 12, 2024
Report Number : 3053267-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2472321-3
Sampled Date	Jul 04, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Jul 05, 2024
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							
Zinc	mg/L	0.003	0.005	0.61	≤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 : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-ง-9457 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-ง-0002

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 Chanattagarn Imchom, Section Head, ทะเบียนเลขที่ ว-204-ง-0008

Approved by Kanokkorn Anek, Assistant General Manager, ทะเบียนเลขที่ ว-204-ง-0004

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Analysis / Test Report

TESTING
No.0042

Lot ID: 2485629
Date Received : Aug 07, 2024
Date Reported : Aug 15, 2024
Report Number : 3083658-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2485629-1
Sampled Date	Aug 07, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Aug 07, 2024
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, part 4500 - O G	Rayong
COD	mg/L	1.5	25	68	≤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	10	≤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-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		-	-	8.4	5.5-9.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Rayong

Technical Management Photchana S., Scientist (4), ทะเบียนเลขที่ ว-323-ง-9446

Approved by Dej Changchon, Senior Manager, ทะเบียนเลขที่ ว-323-ง-9442

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Analysis / Test Report

TESTING
No.0042

Lot ID: 2485629
Date Received : Aug 07, 2024
Date Reported : Aug 15, 2024
Report Number : 3083658-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2485629-1
Sampled Date	Aug 07, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Aug 07, 2024
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							
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 D	Rayong
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	-	-	34.8	≤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	1070	≤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	1.6	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (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 32.5 degree celsius.
Sampling By : Wanlop Hunchalnaow หมายเลขที่ ว-323-ว-9457 , Pattarapol Sawangjaitam หมายเลขที่ ว-204-ว-0002

Remark :
- LOD : Limit of Detection

Technical Management Photchana S.
Photchana Seeda
Scientist (4)
หมายเลขที่ ว-323-ว-9446

Approved by
Dej Changchon
Senior Manager
หมายเลขที่ ว-323-ว-9442

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Analysis / Test Report

TESTING
No.0042

Lot ID: 2485629
Date Received : Aug 07, 2024
Date Reported : Aug 15, 2024
Report Number : 3083658-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

- "<" : 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 Photchana S.
Photchana Seeda
Scientist (4)
หมายเลขที่ ว-323-ว-9446

Approved by
Dej Changchon
Senior Manager
หมายเลขที่ ว-323-ว-9442

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Analysis / Test Report

Lot ID: 2485629
Date Received : Aug 07, 2024
Date Reported : Aug 20, 2024
Report Number : 3083658-2

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2485629-1
Sampled Date	Aug 07, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Aug 09, 2024
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							
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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Siriluk P.
Siriluk Bunnak
Section Head

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Analysis / Test Report

Lot ID: 2485629
Date Received : Aug 07, 2024
Date Reported : Aug 20, 2024
Report Number : 3083658-2

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2485629-1
Sampled Date	Aug 07, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Aug 09, 2024
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
Atrazine	ug/L	0.1	0.5	<0.5	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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Siriluk Bunnak
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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2485629
Date Received : Aug 07, 2024
Date Reported : Aug 20, 2024
Report Number : 3083658-2

Sample Number	2485629-1
Sampled Date	Aug 07, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Aug 09, 2024
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							
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
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 32.5 degree celsius.

Sampling By : Wanlop Hunchainaow , Pattarapol Sawangjaitam

Remark :
- LOD : Limit of Detection

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full

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Siriluk Bunnak
Section Head

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2485629
Date Received : Aug 07, 2024
Date Reported : Aug 20, 2024
Report Number : 3083658-2

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

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2485629
Date Received : Aug 07, 2024
Date Reported : Aug 20, 2024
Report Number : 3083658-3

Sample Number	2485629-1
Sampled Date	Aug 07, 2024 1:45 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Aug 07, 2024
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							
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	0.56	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 32.5 degree celsius.

Sampling By : Wanlop Hunchainaow , Pattarapol Sawangjaitam

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full

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Siriluk Bunnak
Section Head

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Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2485629
Date Received : Aug 07, 2024
Date Reported : Aug 16, 2024
Report Number : 3083660-1

Sample Number	2485629-3
Sampled Date	Aug 07, 2024 1:49 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Aug 08, 2024
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	0.14	≤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	0.004	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	0.09	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok

Technical Management Sawitree N.
Sawitree Noisangiam
Manager
หมายเลขบัตร 1-204-1-0007

Approved by Kanokporn Anek
Kanokporn Anek
Assistant General Manager
หมายเลขบัตร 1-204-n-0004

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Analysis / Test Report

TESTING
No.0009

Lot ID: 2485629

Date Received : Aug 07, 2024
Date Reported : Aug 16, 2024
Report Number : 3083660-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2485629-3
Sampled Date	Aug 07, 2024 1:49 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Aug 08, 2024
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							
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	0.04	≤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

Technical Management Sawitree N.
Sawitree Noisangiam
Manager
ทะเบียนเลขที่ ว-204-ง-0007

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ง-0004

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Analysis / Test Report

TESTING
No.0009

Lot ID: 2485629

Date Received : Aug 07, 2024
Date Reported : Aug 16, 2024
Report Number : 3083660-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2485629-3
Sampled Date	Aug 07, 2024 1:49 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Aug 08, 2024
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							
Zinc	mg/L	0.003	0.005	0.64	≤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 : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-ง-9457 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-ง-0002

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantation) / 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 N.
Sawitree Noisangiam
Manager
ทะเบียนเลขที่ ว-204-ง-0007

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ง-0004

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Analysis / Test Report

TESTING
No.0042

Lot ID: 2496245

Date Received : Sep 04, 2024
Date Reported : Sep 12, 2024
Report Number : 3108884-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2496245-1
Sampled Date	Sep 04, 2024 2:10 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Sep 04, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

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, part 4500 - O G	Rayong
COD	mg/L	1.5	25	45	≤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	10	≤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	0.008	≤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	<0.1	≤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 (B)	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 Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-ง-0028

Approved by Dej Changchon
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ง-0001

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

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Analysis / Test Report

TESTING
No.0042

Lot ID: 2496245

Date Received : Sep 04, 2024
Date Reported : Sep 12, 2024
Report Number : 3108884-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	2496245-1
Sampled Date	Sep 04, 2024 2:10 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Sep 04, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

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	-	-	34.6	≤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	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	2.0	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Norg (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 32.0 degree celsius.

Sampling By : Surawit Narapong ทะเบียนเลขที่ ว-323-ง-0011 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-ง-0002

Remark :
- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantation) / 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 Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-ง-0028

Approved by Dej Changchon
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ง-0001

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2496245
Date Received : Sep 04, 2024
Date Reported : Sep 13, 2024
Report Number : 3108884-2

Sample Number	2496245-1
Sampled Date	Sep 04, 2024 2:10 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Sep 06, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

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

Technical Management
Nanthawadee Somboon
Specialist 2
ทะเบียนเลขที่ ว-204-ง-0010

Approved by
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0004

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2496245
Date Received : Sep 04, 2024
Date Reported : Sep 13, 2024
Report Number : 3108884-2

Sample Number	2496245-1
Sampled Date	Sep 04, 2024 2:10 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Sep 06, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

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	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
Nanthawadee Somboon
Specialist 2
ทะเบียนเลขที่ ว-204-ง-0010

Approved by
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0004

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2496245
Date Received : Sep 04, 2024
Date Reported : Sep 13, 2024
Report Number : 3108884-2

Sample Number	2496245-1
Sampled Date	Sep 04, 2024 2:10 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Sep 06, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

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
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
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).

Technical Management
Nanthawadee Somboon
Specialist 2
ทะเบียนเลขที่ ว-204-ง-0010

Approved by
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0004

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2496245
Date Received : Sep 04, 2024
Date Reported : Sep 13, 2024
Report Number : 3108884-2

Note : Ambient Temperature is 32.0 degree celsius.

Sampling By : Surawit Narapong ทะเบียนเลขที่ ว-323-ง-0011 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-ง-0002

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

Technical Management
Nanthawadee Somboon
Specialist 2
ทะเบียนเลขที่ ว-204-ง-0010

Approved by
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0004

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2496245
Date Received : Sep 04, 2024
Date Reported : Sep 13, 2024
Report Number : 3108884-3

Sample Number	2496245-1
Sampled Date	Sep 04, 2024 2:10 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Sep 04, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Pesticides - Organochlorine Group							
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
Water Testing							
Chlorine	mg/L	-	0.01	0.82	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 32.0 degree celsius.
Sampling By : Surawit Narapong , Pattarapol Sawangjaitam

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

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Approved by Nanthawadee Somboon
Specialist 2

Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2496245
Date Received : Sep 04, 2024
Date Reported : Sep 12, 2024
Report Number : 3108886-1

Sample Number	2496245-3
Sampled Date	Sep 04, 2024 2:10 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Sep 05, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

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	0.13	≤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	0.002	≤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
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

Technical Management Sawitree Noisangiam
Manager
ทะเบียนเลขที่ ว-204-ง-0007

Approved by Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ง-0004

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Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2496245
Date Received : Sep 04, 2024
Date Reported : Sep 12, 2024
Report Number : 3108886-1

Sample Number	2496245-3
Sampled Date	Sep 04, 2024 2:10 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Sep 05, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
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
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	0.004	≤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	<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	0.57	≤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 : Surawit Narapong ทะเบียนเลขที่ ว-323-ง-0011 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-ง-0002

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 Sawitree Noisangiam
Manager
ทะเบียนเลขที่ ว-204-ง-0007

Approved by Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ง-0004

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Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2496245
Date Received : Sep 04, 2024
Date Reported : Sep 12, 2024
Report Number : 3108886-2

Sample Number	2496245-3
Sampled Date	Sep 04, 2024 2:10 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Sep 05, 2024
Condition of Sample	Contained in Yellow, some odour, solid and no turbid

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.25	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 : Surawit Narapong , Pattarapol Sawangjaitam

Remark :
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Approved by Sawitree Noisangiam
Manager

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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135079-1

Sample Number	24107124-1
Sampled Date	Oct 03, 2024 1:58 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Oct 03, 2024
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							
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, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	47	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	13	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2120 F	Rayong
Color (at pH 7.0)	ADMI	-	5	12	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 4500-CN (C, E)	Rayong
Formaldehyde	mg/L	0.03	0.1	<0.1	≤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, 24th ed., 2023, part 5520 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, 24th ed., 2023, part 4500 - H (B)	Rayong

Technical Management Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-ง-0028

Approved by Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ก-0001

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

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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135079-1

Sample Number	24107124-1
Sampled Date	Oct 03, 2024 1:58 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Oct 03, 2024
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							
Phenol	mg/L	0.005	0.01	Not Detected	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5530 D	Rayong
Residual Free Chlorine *	mg/L	-	0.1	<0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 4500-S2 (C, F)	Rayong
Temperature *	Degree C	-	-	34.4	≤40	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1030	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	1.9	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500-Norg (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, 24th ed., 2023, 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 29.8 degree celsius.
Sampling By : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-ง-0038 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-ง-0002
Remark :
* LOD : Limit of Detection

Technical Management Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-ง-0028

Approved by Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ก-0001

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

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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135079-1

- "<" : 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 Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-ง-0028

Approved by Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ก-0001

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

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135079-2

Sample Number	24107124-1
Sampled Date	Oct 03, 2024 1:58 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Oct 04, 2024
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							
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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 6630 D, part 6410 B	Bangkok

Technical Management Nant Somb
Nanthawadee Somboon
Specialist 2
ทะเบียนเลขที่ ว-204-ง-0010

Approved by Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0004

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

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135079-2

Sample Number	24107124-1
Sampled Date	Oct 03, 2024 1:58 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Oct 04, 2024
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							
alpha-BHC	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 6630 D, part 6410 B	Bangkok

Technical Management Nanthawadee Somboon, Specialist 2, ทะเบียนเลขที่ ว-204- จ-0010

Approved by Kanokkorn Anek, Assistant General Manager, ทะเบียนเลขที่ ว-204-ค-0004

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135079-2

Sample Number	24107124-1
Sampled Date	Oct 03, 2024 1:58 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Oct 04, 2024
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							
Endrin	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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 29.8 degree celsius.

Sampling By : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-จ-0038 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-จ-0002

Remark :
- LOD : Limit of Detection

Technical Management Nanthawadee Somboon, Specialist 2, ทะเบียนเลขที่ ว-204-จ-0010

Approved by Kanokkorn Anek, Assistant General Manager, ทะเบียนเลขที่ ว-204-ค-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand PHONE +66 0 2760 3000 FAX +66 0 2760 3197
ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company
Life Sciences www.alsglobal.com
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8525-208/EMAIL

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135079-2

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

Technical Management Nanthawadee Somboon, Specialist 2, ทะเบียนเลขที่ ว-204-จ-0010

Approved by Kanokkorn Anek, Assistant General Manager, ทะเบียนเลขที่ ว-204-ค-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

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ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company
Life Sciences www.alsglobal.com
RIGHT SOLUTIONS RIGHT PARTNER
8525-208/EMAIL

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135079-3

Sample Number	24107124-1
Sampled Date	Oct 03, 2024 1:58 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Oct 03, 2024
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	<0.5	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 6630 D, part 6410 B	Bangkok
Water Testing							
Chlorine	mg/L	-	0.01	0.59	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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 29.8 degree celsius.

Sampling By : Wanlop Hunchainaow , Pattarapol Sawangjaitam

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Approved by Nanthawadee Somboon, Specialist 2

ADDRESS 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand PHONE +66 0 2760 3000 FAX +66 0 2760 3197
ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company
Life Sciences www.alsglobal.com
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8525-208/EMAIL

Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135081-1

Sample Number	24107124-3
Sampled Date	Oct 03, 2024 1:58 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Oct 04, 2024
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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 3500-Cr B	Bangkok
Iron	mg/L	0.003	0.005	0.15	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 3125 B,3030 F	Bangkok

Technical Management Chanatt L.
Chanattagarn Imchom
Section Head
ทะเบียนเลขที่ ว-204-จ-0008

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135081-1

Sample Number	24107124-3
Sampled Date	Oct 03, 2024 1:58 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Oct 04, 2024
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							
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 3125 B,3030 F	Bangkok
Mercury *	mg/L	0.0001	0.0005	<0.0005	≤0.005	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 3125 B,3030 F	Bangkok

Technical Management Chanatt L.
Chanattagarn Imchom
Section Head
ทะเบียนเลขที่ ว-204-จ-0008

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24107124
Date Received : Oct 03, 2024
Date Reported : Oct 11, 2024
Report Number : 3135081-1

Sample Number	24107124-3
Sampled Date	Oct 03, 2024 1:58 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Oct 04, 2024
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							
Zinc	mg/L	0.003	0.005	0.64	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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 : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-จ-0038 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-จ-0002

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 Chanatt L.
Chanattagarn Imchom
Section Head
ทะเบียนเลขที่ ว-204-จ-0008

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166099-1

Sample Number	24122917-1
Sampled Date	Nov 06, 2024 2:08 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Nov 06, 2024
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, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	59	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	10	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 4500-CN (C, E)	Rayong
Formaldehyde	mg/L	0.03	0.1	<0.1	≤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, 24th ed., 2023, 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, 24th ed., 2023, part 4500 - H (B)	Rayong

Technical Management Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-0028

Approved by D. Changchon
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-0001

TESTING
No.0042

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166099-1

Sample Number	24122917-1
Sampled Date	Nov 06, 2024 2:08 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Nov 06, 2024
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							
Phenol *	mg/L	0.005	0.01	Not Detected	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5530 D	Rayong
Residual Free Chlorine *	mg/L	-	0.1	0.2	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 4500-S2 (C, F)	Rayong
Temperature *	Degree C	-	-	33.5	≤40	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1260	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	1.7	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500-Norg (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, 24th ed., 2023, 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 32.5 degree celsius.

Sampling By : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-จ-0038 , Thanasoun Namakunna ทะเบียนเลขที่ ว-204-จ-0101

Remark :
- LOD : Limit of Detection

Technical Management Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-0028

Approved by
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-0001

TESTING
No.0042

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166099-1

- "<" : 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 Photchana S.
Photchana Seeda
Scientist (4)
ทะเบียนเลขที่ ว-323-จ-0028

Approved by
Dej Changchon
Senior Manager
ทะเบียนเลขที่ ว-323-ค-0001

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166099-2

Sample Number	24122917-1
Sampled Date	Nov 06, 2024 2:08 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Nov 08, 2024
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							
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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 6630 D, part 6410 B	Bangkok

Technical Management Siriluk P.
Siriluk Bunnak
Section Head
ทะเบียนเลขที่ ว-204-จ-0013

Approved by
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166099-2

Sample Number	24122917-1
Sampled Date	Nov 06, 2024 2:08 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Nov 08, 2024
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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 6630 D, part 6410 B	Bangkok

Technical Management Siriluk P.
Siriluk Bunnak
Section Head
ทะเบียนเลขที่ ว-204-จ-0013

Approved by
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166099-2

Sample Number	24122917-1
Sampled Date	Nov 06, 2024 2:08 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Nov 08, 2024
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							
Endosulfan II	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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).

Technical Management Siriluk P.
Siriluk Bunnak
Section Head
ทะเบียนเลขที่ ว-204-ง-0013

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0004

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166099-2

Sampling By : Wanlop Hunchainaow หะเบียนเลขที่ ว-323-ง-0038 , Thanasoun Namakunna หะเบียนเลขที่ ว-204-ง-0101

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

Technical Management Siriluk P.
Siriluk Bunnak
Section Head
ทะเบียนเลขที่ ว-204-ง-0013

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0004

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166099-3

Sample Number	24122917-1
Sampled Date	Nov 06, 2024 2:08 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Nov 06, 2024
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							
Hexachlorobenzene	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 6630 D, part 6410 B	Bangkok
Water Testing							
Chlorine	mg/L	-	0.01	0.31	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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).
Sampling By : Wanlop Hunchainaow , Thanasoun Namakunna

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

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Approved by Photchana S.
Photchana Seeda
Scientist (4)

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Analysis / Test Report

TESTING
No 0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166101-1

Sample Number	24122917-3
Sampled Date	Nov 06, 2024 2:08 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Nov 07, 2024
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	0.006	≤0.25	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 3500-Cr B	Bangkok
Iron	mg/L	0.003	0.005	0.07	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 3125 B,3030 F	Bangkok

Technical Management Chanattagam Imchom
Chanattagam Imchom
Section Head
ทะเบียนเลขที่ ว-204-ง-0008

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ก-0004

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Analysis / Test Report

TESTING
No.0009

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166101-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	24122917-3
Sampled Date	Nov 06, 2024 2:08 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Nov 07, 2024
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							
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 3125 B,3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.04	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 3125 B,3030 F	Bangkok
Mercury *	mg/L	0.0001	0.0005	<0.0005	≤0.005	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 3125 B,3030 F	Bangkok

Technical Management Chanattagarn Imchom, Section Head, หมายเลขที่ ว-204-ง-0008

Approved by Kanokkorn Anek, Assistant General Manager, หมายเลขที่ ว-204-ง-0004

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Analysis / Test Report

TESTING
No.0009

Lot ID: 24122917
Date Received : Nov 06, 2024
Date Reported : Nov 14, 2024
Report Number : 3166101-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	24122917-3
Sampled Date	Nov 06, 2024 2:08 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Nov 07, 2024
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							
Zinc	mg/L	0.003	0.005	0.63	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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 : Wanlop Hunchainaow หมายเลขที่ ว-323-ง-0038 , Thanasoun Namakunna หมายเลขที่ ว-204-ง-0101

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 Chanattagarn Imchom, Section Head, หมายเลขที่ ว-204-ง-0008

Approved by Kanokkorn Anek, Assistant General Manager, หมายเลขที่ ว-204-ง-0004

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Analysis / Test Report

TESTING
No.0042

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193209-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	24133850-1
Sampled Date	Dec 04, 2024 2:00 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Dec 04, 2024
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, 24th ed., 2023, part 5210 B, part 4500 - O G	Rayong
COD	mg/L	1.5	25	56	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5220 D	Rayong
Color (at Original pH)	ADMI	-	5	13	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 2120 F	Rayong
Cyanide as CN	mg/L	0.001	0.005	0.011	≤0.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500-CN (C, E)	Rayong
Formaldehyde	mg/L	0.03	0.1	0.2	≤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, 24th ed., 2023, part 5520 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, 24th ed., 2023, part 4500 - H (B)	Rayong

Technical Management Photchana S., Photchana Seeda, Scientist (4), หมายเลขที่ ว-323-ง-0028

Approved by Dej Changchon, Senior Manager, หมายเลขที่ ว-323-ง-0001

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Analysis / Test Report

TESTING
No.0042

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193209-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Sample Number	24133850-1
Sampled Date	Dec 04, 2024 2:00 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Dec 04, 2024
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							
Phenol	mg/L	0.005	0.01	<0.010	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 5530 D	Rayong
Residual Free Chlorine *	mg/L	-	0.1	0.1	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, part 4500-S2 (C, F)	Rayong
Temperature *	Degree C	-	-	32.7	≤40	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2550 B	Rayong
Total Dissolved Solids Dried at 180 degree C	mg/L	-	5	1280	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 2540 C	Rayong
Total Kjeldahl Nitrogen as N	mg/L	-	1.0	1.7	≤100	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 4500-Norg (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, 24th ed., 2023, 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 33.7 degree celsius.
Sampling By : Wanlop Hunchainaow หมายเลขที่ ว-323-ง-0038 , Pattarapol Sawangjaitam หมายเลขที่ ว-204-ง-0002

Remark :

Technical Management Photchana S., Photchana Seeda, Scientist (4), หมายเลขที่ ว-323-ง-0028

Approved by Dej Changchon, Senior Manager, หมายเลขที่ ว-323-ง-0001

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TESTING
No.0042

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193209-1

- 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 Photchana Seeda, Scientist (4), ทะเบียนเลขที่ ว-323-ว-0028

Approved by Dej Changchon, Senior Manager, ทะเบียนเลขที่ ว-323-ค-0001

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193209-2

Sample Number	24133850-1
Sampled Date	Dec 04, 2024 2:00 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Dec 06, 2024
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							
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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 6630 D, part 6410 B	Bangkok

Technical Management Siriluk Bunnak, Section Head, ทะเบียนเลขที่ ว-204-ว-0013

Approved by Kanokkorn Anek, Assistant General Manager, ทะเบียนเลขที่ ว-204-ค-0004

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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 : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193209-2

Sample Number	24133850-1
Sampled Date	Dec 04, 2024 2:00 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Dec 06, 2024
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, 24th ed., 2023, part 6630 D, part 6410 B	Bangkok
Atrazine	ug/L	0.1	0.5	<0.5	Not Detected	In - house method : STM 04-101 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 6630 D, part 6410 B	Bangkok

Technical Management Siriluk Bunnak, Section Head, ทะเบียนเลขที่ ว-204-ว-0013

Approved by Kanokkorn Anek, Assistant General Manager, ทะเบียนเลขที่ ว-204-ค-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193209-2

Sample Number	24133850-1
Sampled Date	Dec 04, 2024 2:00 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Dec 06, 2024
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							
Endosulfan II	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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).

Technical Management Siriluk Bunnak, Section Head, ทะเบียนเลขที่ ว-204-ว-0013

Approved by Kanokkorn Anek, Assistant General Manager, ทะเบียนเลขที่ ว-204-ค-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193209-2

Note : Ambient Temperature is 33.7 degree celsius.
Sampling By : Wanlop Hunchainaow หมายเลขที่ ว-323-ว-0038 , Pattarapol Sawangjaitam หมายเลขที่ ว-204-ว-0002

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

Technical Management Siriluk P.
Siriluk Bunnak
Section Head
หมายเลขที่ ว-204-ว-0013

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
หมายเลขที่ ว-204-ว-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193209-3

Sample Number	24133850-1
Sampled Date	Dec 04, 2024 2:00 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Dec 04, 2024
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							
Hexachlorobenzene	ug/L	0.01	0.02	Not Detected	Not Detected	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 6630 D, part 6410 B	Bangkok
Water Testing							
Chlorine	mg/L	-	0.01	0.58	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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 33.7 degree celsius.
Sampling By : Wanlop Hunchainaow , Pattarapol Sawangjaitam

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

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by Siriluk P.
Siriluk Bunnak
Section Head

LABORATORY ACCREDITATION ISO/IEC 17025
TESTING
No.0009

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193211-1

Sample Number	24133850-3
Sampled Date	Dec 04, 2024 2:00 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Dec 06, 2024
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	0.006	≤0.25	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 3125 B,3030 F	Bangkok
Barium	mg/L	0.0003	0.0005	0.17	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 3500-Cr B	Bangkok
Iron	mg/L	0.003	0.005	0.07	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 3125 B,3030 F	Bangkok

Technical Management Sawitree N.
Sawitree Noisangiam
Manager
หมายเลขที่ ว-204-ว-0007

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
หมายเลขที่ ว-204-ว-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

LABORATORY ACCREDITATION ISO/IEC 17025
TESTING
No.0009

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193211-1

Sample Number	24133850-3
Sampled Date	Dec 04, 2024 2:00 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Dec 06, 2024
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							
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.2	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, part 3125 B,3030 F	Bangkok
Manganese	mg/L	0.0003	0.0005	0.05	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, 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, 24th ed., 2023, part 3125 B,3030 F	Bangkok

Technical Management Sawitree N.
Sawitree Noisangiam
Manager
หมายเลขที่ ว-204-ว-0007

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
หมายเลขที่ ว-204-ว-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515544212
Project Name : Water Testing
Project Location: AIE_HPPO-TPO Plant

Lot ID: 24133850
Date Received : Dec 04, 2024
Date Reported : Dec 13, 2024
Report Number : 3193211-1

Sample Number	24133850-3
Sampled Date	Dec 04, 2024 2:00 PM
Sample Description	Wastewater
Location	Inspection Manhole
Date Analysis Commenced	Dec 06, 2024
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							
Zinc	mg/L	0.003	0.005	0.73	≤5.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 24th ed., 2023, 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 : Wanlop Hunchainaow ทะเบียนเลขที่ ว-323-ฉ-0038 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-ฉ-0002

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 Sawitree N.
Sawitree Noisangiam
Manager
ทะเบียนเลขที่ ว-204-ฉ-0007

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ฉ-0004

Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of the report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that the report is not reproduced except in full.

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ระดับความร้อน

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong
Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485495
Date Received : Aug 06, 2024
Date Reported : Aug 14, 2024
Report Number: 3065540-1

Sample Number 2485495-1
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Aug 06, 2024
Measurement by Natthapon Jiengwareewong
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณหน่วย TOX (ERU)	120	30.5	27.1	38.5	38.1
Average (WBGT)		30.5			
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 Environmentin relation to Heat,Light and Noise, B.E.2559

Technical Management

Supot Salamteh
Section Head

Approved by

Wichan Choonharat
Assistant Manager

ADDRESS 616/10 Moo 5 T. Maenam Khu A. Pluakdaeng Rayong 21140 Thailand ! PHONE +66 0 3304 8555 ! FAX +66 0 3304 8556
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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122863
Date Received : Nov 18, 2024
Date Reported : Nov 22, 2024
Report Number: 3148501-1

Sample Number	24122863-1
Parameter	Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date	Nov 18, 2024
Measurement by	Natthapon Jiengwareewong
Location	ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณหน่วย TOX (ERU)	120	31.1	28.6	36.9	36.8
Average (WBGT)		31.1			
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 Environmentin relation to Heat,Light and Noise, B.E.2559

Technical Management

Supot Salamteh
Section Head

Approved by

Wichan Choonharat
Assistant Manager

ADDRESS 616/10 Moo 5 T. Maenam Khu A. Pluakdaeng Rayong 21140 Thailand | PHONE +66 0 3304 8555 | FAX +66 0 3304 8556
ALS LABORATORY GROUP (THAILAND) CO., LTD. An ALS Limited Company

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485498
Date Received : Aug 07, 2024
Date Reported : Aug 09, 2024
Report Number: 3079208-1

Sample Number 2485498-1
Parameter Noise (Leq 8 hrs.)
Location Compressor Area
Measurement Date Aug 06, 2024
Measurement by Natthapon Jiengwareewong

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:34 AM - 10:34 AM	79.4	86.3	78.7
10:34 AM - 11:34 AM	79.1	85.8	78.6
11:34 AM - 12:34 PM	79.4	84.7	78.6
12:34 PM - 01:34 PM	79.5	83.9	78.7
01:34 PM - 02:34 PM	79.2	84.0	78.7
02:34 PM - 03:34 PM	79.3	81.0	78.8
03:34 PM - 04:34 PM	79.1	86.0	78.4
04:34 PM - 05:34 PM	78.9	84.2	78.1
Leq Average 8 hrs. (dB(A))	79.2		
Lmax (dB(A))		86.3	
Standard (dB(A))	90	140	

Reference Method : ISO1996-1 and 1996-2
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖

Technical Management Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by Supot S. — Supot Salamteh, Section Head

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485498
Date Received : Aug 07, 2024
Date Reported : Aug 09, 2024
Report Number: 3079209-1

Sample Number 2485498-2
Parameter Noise (Leq 8 hrs.)
Location Cooling Tower
Measurement Date Aug 06, 2024
Measurement by Natthapon Jiengwareewong

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:28 AM - 10:28 AM	77.4	91.9	77.1
10:28 AM - 11:28 AM	76.8	77.6	76.5
11:28 AM - 12:28 PM	76.7	77.5	76.5
12:28 PM - 01:28 PM	76.6	77.4	76.4
01:28 PM - 02:28 PM	76.5	77.3	76.3
02:28 PM - 03:28 PM	76.6	77.2	76.3
03:28 PM - 04:28 PM	76.7	77.4	76.6
04:28 PM - 05:28 PM	76.9	77.4	76.7
Leq Average 8 hrs. (dB(A))	76.8		
Lmax (dB(A))		91.9	
Standard (dB(A))	90	140	

Reference Method : ISO1996-1 and 1996-2
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖

Technical Management Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by Supot S. — Supot Salamteh, Section Head

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485498
Date Received : Aug 07, 2024
Date Reported : Aug 09, 2024
Report Number: 3079210-1

Sample Number 2485498-3
Parameter Noise (Leq 8 hrs.)
Location TOX Area (ERU)
Measurement Date Aug 06, 2024
Measurement by Natthapon Jiengwareewong

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:31 AM - 10:31 AM	80.8	83.5	80.2
10:31 AM - 11:31 AM	80.9	82.6	80.1
11:31 AM - 12:31 PM	80.9	83.1	80.3
12:31 PM - 01:31 PM	80.8	82.9	80.1
01:31 PM - 02:31 PM	81.4	83.3	80.6
02:31 PM - 03:31 PM	80.5	82.6	79.8
03:31 PM - 04:31 PM	81.0	83.7	80.4
04:31 PM - 05:31 PM	80.4	83.1	79.8
Leq Average 8 hrs. (dB(A))	80.8		
Lmax (dB(A))		83.7	
Standard (dB(A))	90	140	

Reference Method : ISO1996-1 and 1996-2
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖

Technical Management Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by Supot S. — Supot Salamteh, Section Head

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122866
Date Received : Nov 18, 2024
Date Reported : Nov 23, 2024
Report Number: 3174098-1

Sample Number 24122866-1
Parameter Noise (Leq 8 hrs.)
Location Compressor Area
Measurement Date Nov 18, 2024
Measurement by Natthapon Jiengwareewong

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:30 AM - 10:30 AM	79.4	94.6	78.4
10:30 AM - 11:30 AM	79.1	82.0	78.3
11:30 AM - 12:30 PM	79.0	82.7	78.3
12:30 PM - 01:30 PM	78.9	82.2	78.3
01:30 PM - 02:30 PM	79.1	81.8	78.5
02:30 PM - 03:30 PM	79.2	81.2	78.7
03:30 PM - 04:30 PM	79.1	82.0	78.3
04:30 PM - 05:30 PM	78.9	82.2	78.3
Leq Average 8 hrs. (dB(A))	79.1		
Lmax (dB(A))		94.6	
Standard (dB(A))	90	140	

Reference Method : ISO1996-1 and 1996-2
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะแวดล้อมในการทำงาน พ.ศ.๒๕๔๖

Technical Management Chontichak — Chonticha Subongkoch, Scientist (3)
Approved by Supot S. — Supot Salamteh, Section Head

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122866
Date Received : Nov 18, 2024
Date Reported : Nov 23, 2024
Report Number: 3174099-1

Sample Number 24122866-2
Parameter Noise (Leq 8 hrs.)
Location Cooling Tower
Measurement Date Nov 18, 2024
Measurement by Natthapon Jiengwareewong

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:35 AM - 10:35 AM	79.4	82.2	79.3
10:35 AM - 11:35 AM	79.4	79.9	79.2
11:35 AM - 12:35 PM	79.9	95.3	79.4
12:35 PM - 01:35 PM	79.4	79.8	79.2
01:35 PM - 02:35 PM	79.2	79.6	79.1
02:35 PM - 03:35 PM	79.2	79.7	79.1
03:35 PM - 04:35 PM	79.4	79.6	79.2
04:35 PM - 05:35 PM	79.4	79.9	79.2
Leq Average 8 hrs. (dB(A))	79.4		
Lmax (dB(A))		95.3	
Standard (dB(A))	90	140	

Reference Method : ISO1996-1 and 1996-2
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
ในการประกอบกิจการโรงงานเกี่ยวกับสภาวะเกาะล้อนในการทำงาน พ.ศ.๒๕๓๖

Technical Management Chontichak
Chontcha Subongkoch
Scientist (3)

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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 24122866
Date Received : Nov 18, 2024
Date Reported : Nov 23, 2024
Report Number: 3174100-1

Sample Number 24122866-3
Parameter Noise (Leq 8 hrs.)
Location TOX Area (ERU)
Measurement Date Nov 18, 2024
Measurement by Natthapon Jiengwareewong

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
09:46 AM - 10:46 AM	80.4	81.8	80.0
10:46 AM - 11:46 AM	80.4	84.2	80.0
11:46 AM - 12:46 PM	80.4	81.7	80.0
12:46 PM - 01:46 PM	80.4	81.5	80.0
01:46 PM - 02:46 PM	80.3	81.8	79.8
02:46 PM - 03:46 PM	80.2	81.4	79.7
03:46 PM - 04:46 PM	80.4	81.6	79.9
04:46 PM - 05:46 PM	80.4	81.7	80.0
Leq Average 8 hrs. (dB(A))	80.4		
Lmax (dB(A))		84.2	
Standard (dB(A))	90	140	

Reference Method : ISO1996-1 and 1996-2
Standard : ประกาศกระทรวงอุตสาหกรรม เรื่อง มาตรการคุ้มครองความปลอดภัย
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Technical Management Chontichak
Chontcha Subongkoch
Scientist (3)

Approved by Supot S
Supot Salamteh
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Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485501
Date Received : Aug 22, 2024
Date Reported : Aug 30, 2024
Report Number : 3096429-1

Sample Number	2485501-5
Sampled Date	Aug 22, 2024 11:23 AM
Sample Description	Groundwater
Location	MW-1 (GW1)
Date Analysis Commenced	Aug 23, 2024
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	<0.0005	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Organic Compounds							
Propylene oxide *	mg/L	-	10	<10	No Standard	In-house method based on United States Environmental Protection Agency, EPA Method 8015 B	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 : Sansoen Khuiyoksui , 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.
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Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. No part of this report may be reproduced in any form without written consent from the laboratory. ALS Laboratory Group (Thailand) strongly recommends that this report is not reproduced except in full.

Approved by Suwimon C.
Suwimon Chairuangwut
Scientist (3)

Analysis / Test Report

TESTING
No.0009

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand
21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location : AIE_HPPO-TPO Plant

Lot ID: 2485501
Date Received : Aug 22, 2024
Date Reported : Sep 03, 2024
Report Number : 3096425-1 C9

Sample Number	2485501-1
Sampled Date	Aug 22, 2024 11:23 AM
Sample Description	Groundwater
Location	MW-1 (GW1)
Date Analysis Commenced	Aug 23, 2024
Condition of Sample	Contained in two amber glass bottles, 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							
Zinc	mg/L	0.003	0.005	Not Detected	10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	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 : Sansoen Khuiyoksui ทะเบียนเลขที่ ว-323-จ-0005 , Thanasoun Namakunna ทะเบียนเลขที่ ว-204-จ-0101

Remark :
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Technical Management Suwimon C.
Suwimon Chairuangwut
Scientist (3)
ทะเบียนเลขที่ ว-204-จ-0018

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

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Analysis / Test Report

TESTING
No.0009

Lot ID: 2485501

Date Received : Aug 22, 2024
Date Reported : Aug 30, 2024
Report Number : 3096430-1

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Sample Number	2485501-6
Sampled Date	Aug 22, 2024 11:25 AM
Sample Description	Groundwater
Location	MW-6 (GW2)
Date Analysis Commenced	Aug 23, 2024
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	0.0007	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Organic Compounds							
Propylene oxide *	mg/L	-	10	<10	No Standard	In-house method based on United States Environmental Protection Agency, EPA Method 8015 B	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 : Sansoen Khuiyoksui , Thanasoun Namakunna

Remark :
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Approved by Suwimon C.
Suwimon Chairuangwut
Scientist (3)

Analysis / Test Report

TESTING
No.0009

Lot ID: 2485501

Date Received : Aug 22, 2024
Date Reported : Sep 03, 2024
Report Number : 3096426-1 C9

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Sample Number	2485501-2
Sampled Date	Aug 22, 2024 11:25 AM
Sample Description	Groundwater
Location	MW-6 (GW2)
Date Analysis Commenced	Aug 23, 2024
Condition of Sample	Contained in two amber glass bottles, 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							
Zinc	mg/L	0.003	0.005	0.010	10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	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 : Sansoen Khuiyoksui ทะเบียนเลขที่ ว-323-จ-0005 , Thanasoun Namakunna ทะเบียนเลขที่ ว-204-จ-0101

Remark :
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Technical Management Suwimon C.
Suwimon Chairuangwut
Scientist (3)
ทะเบียนเลขที่ ว-204-จ-0018

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

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คุณภาพดิน

Analysis / Test Report

Client : Dow Chemical Thailand Ltd.
10 Moo 2, Asia Industrial Estate, Tambol Banchang, Amphur Banchang, Rayong Thailand 21130
P/O : 4515619665
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2469009
Date Received : Jun 19, 2024
Date Reported : Jul 05, 2024
Report Number : 3038605-1 C1

Sample Number	2469009-1
Sampled Date	Jun 19, 2024 2:20 PM
Sample Description	Soil
Location	MW-1 (GW1)
Date Analysis Commenced	Jun 20, 2024
Condition of Sample	Packed in one plastic bag and two glass bottles, refrigerated

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	11.4	1000	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	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
Note : Analysis Results expressed on dry basis
Sampling By : Wanlop Hunchalnaow ทะเบียนเลขที่ ว-323-จ-9457 , Pattarapol Sawangjaitam ทะเบียนเลขที่ ว-204-จ-0002

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

Technical Management
Sawitree Noisangiam
Manager
ทะเบียนเลขที่ ว-204-จ-0007

Approved by
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2469009
Date Received : Jun 19, 2024
Date Reported : Jun 27, 2024
Report Number : 3038610-1

Sample Number	2469009-6
Sampled Date	Jun 19, 2024 2:20 PM
Sample Description	Soil
Location	MW-1 (GW1)
Date Analysis Commenced	Jun 20, 2024
Condition of Sample	Packed in one plastic bag and two glass bottles, refrigerated

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/kg	-	1.00	3.26	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Organic Compounds							
Propylene Oxide	mg/kg	-	20	<20	No Standard	In-house method based on United States Environmental Protection Agency, EPA Method 5035 and GC/FID	Bangkok
Physical Parameters							
Moisture	%	-	0.1	5.2	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	Bangkok

Guideline :
Note : Analysis Results expressed on dry basis
Sampling By : Wanlop Hunchainaow , Pattarapol Sawangjaitam

Remark :
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Approved by
Sawitree Noisangiam
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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2470038
Date Received : Jun 20, 2024
Date Reported : Jul 05, 2024
Report Number : 3038725-1 C1

Sample Number	2470038-1
Sampled Date	Jun 20, 2024 10:25 AM
Sample Description	Soil
Location	MW-6 (GW2)
Date Analysis Commenced	Jun 21, 2024
Condition of Sample	Packed in one plastic bag, one glass bottle, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Zinc	mg/kg	-	1.00	2.78	1000	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	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
Note : Analysis Results expressed on dry basis
Sampling By : Thanasoun Namakunna ทะเบียนเลขที่ ว-204-จ-0101

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

Technical Management Sawitree N.
Sawitree Noisangiam
Manager
ทะเบียนเลขที่ ว-204-จ-0007

Approved by Kanokkorn Anek
Kanokkorn Anek
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-0004

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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 : 4515619665
Project Name : Environmental Quality Monitoring
Project Location: AIE_HPPO-TPO Plant

Lot ID: 2470038
Date Received : Jun 20, 2024
Date Reported : Jun 28, 2024
Report Number : 3038728-1

Sample Number	2470038-4
Sampled Date	Jun 20, 2024 10:25 AM
Sample Description	Soil
Location	MW-6 (GW2)
Date Analysis Commenced	Jun 21, 2024
Condition of Sample	Packed in one plastic bag, one glass 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/kg	-	1.00	2.31	No Standard	United States Environmental Protection Agency, EPA Method 3050 B and 6010 D	Bangkok
Organic Compounds							
Propylene Oxide	mg/kg	-	20	<20	No Standard	In-house method based on United States Environmental Protection Agency, EPA Method 5035 and GC/FID	Bangkok
Physical Parameters							
Moisture	%	-	0.1	7.3	No Standard	In-house method based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 G	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
Note : Analysis Results expressed on dry basis.
Sampling By : Thanasoun Namakunna

Remark :
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Approved by Sawitree N.
Sawitree Noisangiam
Manager

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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

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Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Ambient	Total Suspended Particulate	High Volume	RYG_FS0393		-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0291			On site Calibration
Ambient	Total Suspended Particulate	High Volume	RYG_FS0396		-	On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	RYG_EN0001	22-Feb-24	22-Feb-25	12
Ambient	Nitrogen Dioxide	NO_2 Analyzer	RYG_FS0264	2-Jul-24	2-Jan-25	6
Ambient	Nitrogen Dioxide	NO_2 Analyzer	RYG_FS0281	2-Jul-24	2-Jan-25	6
Ambient	Nitrogen Dioxide	NO_2 Analyzer	[illegible]	2-Jul-24	2-Jan-25	6
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	[illegible]	26-Jun-24	26-Dec-25	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0545	21-Jul-23	21-Jan-25	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0544	21-Jul-23	21-Jan-25	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0811	10-Feb-23	10-Aug-24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0128	18-Aug-23	18-Feb-25	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0450	20-Jun-23	20-Dec-24	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	RYG_FS0817	7-Oct-24	7-Apr-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	[illegible]	[illegible]	[illegible]	18
Ambient	[illegible]	GC-MSD	RYG_EN0136	5-Jan-24	4-Jul-25	18
Ambient	[illegible]	GC-MSD	RYG_EN0136	5-Jan-24	4-Jul-25	18
Ambient	[illegible]	GC-MSD	RYG_EN0136	5-Jan-24	4-Jul-25	18
Ambient	[illegible]	GC-MSD	RYG_EN0136	5-Jan-24	4-Jul-25	18
Ambient	[illegible]	GC-MSD	RYG_EN0136	5-Jan-24	4-Jul-25	18
Ambient	Toluene	GC-MSD	RYG_EN0136	5-Jan-24	4-Jul-25	18
Ambient	Propylene Oxide	Field Rotameter	RYG_FS0657	1-Apr-24	1-Jul-24	3
Ambient	Propylene Oxide	Field Rotameter	BAK_FS1006	2-Jul-24	2-Oct-24	3
Ambient	Propylene Oxide	Field Rotameter	RYG_FS1199	2-Jul-24	2-Oct-24	3
Ambient	Propylene Oxide	DRYCAL FLOWMETER	BAK_FS1346	29-Jan-24	28-Jan-25	12
Ambient	Propylene Oxide	GC-FID	BAK_EN0126	21-Apr-23	21-Oct-24	18
Ambient	Propylene Oxide	GC-FID	[illegible]	22-Oct-24	22-Apr-26	18
Ambient	Hydrogen Peroxide	Field Rotameter	[illegible]	1-Jul-24	1-Oct-24	3
Ambient	Hydrogen Peroxide	Field Rotameter	RYG_FS1197	1-Jul-24	1-Oct-24	3
Ambient	Hydrogen Peroxide	Field Rotameter	RYG_FS1198	1-Jul-24	1-Oct-24	3
Ambient	Hydrogen Peroxide	DRYCAL FLOWMETER	BAK_FS1346	29-Jan-24	28-Jan-25	12
Ambient	Hydrogen Peroxide	Spectrophotometer	BAK_EN0210	15-Sep-23	15-Sep-24	12
Ambient	Hydrogen Peroxide	Spectrophotometer	[illegible]	13-Sep-24	13-Sep-25	12
Stack (CEMS)	Oxides of Nitrogen	Analyzer , System calibration, [illegible]	-	-	-	-
Stack (CEMS)	Oxygen	Analyzer , System calibration, [illegible]	-	-	-	-
Stack	Total Suspended Particulate	Console Control Unit	[illegible]	10-Jul-24	10-Jan-25	6
Stack	Total Suspended Particulate	Pitot Tube	[illegible]	10-Jul-24	10-Jan-25	6
Stack	Total Suspended Particulate	Digital Balance	RYG_EN0001	22-Feb-24	22-Feb-25	12
Workplace	Propylene Oxide	DRYCAL FLOWMETER	BAK_FS1346	29-Jan-24	29-Jan-25	12
Workplace	Propylene Oxide	GC-FID	BAK_EN0126	21-Apr-23	21-Oct-24	18
Workplace	Propylene Oxide	GC-FID	BAK_EN0126	22-Oct-24	22-Apr-26	18
Workplace	Non Methane Hydrocarbon as Propane	DRYCAL FLOWMETER	BAK_FS1346	29-Jan-24	29-Jan-25	12
Workplace	Non Methane Hydrocarbon as Propane	Total Hydrocarbon Analyzer	[illegible]	25-Jul-24	25-Jul-25	12
Workplace	Total Hydrocarbon as Propane	DRYCAL FLOWMETER	BAK_FS1346	29-Jan-24	29-Jan-25	12
Workplace	Total Hydrocarbon as Propane	Total Hydrocarbon Analyzer	[illegible]	25-Jul-24	25-Jul-25	12
Noise	Leq 24 hrs	Sound Calibrator	[illegible]	26-Jan-24	25-Jan-25	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0434	22-Feb-24	21-Feb-25	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0437	19-Oct-23	18-Oct-24	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0433	22-Feb-24	21-Feb-25	12
Noise	Leq 24 hrs	Sound Level Meter	[illegible]	22-Feb-24	21-Feb-25	12
Noise	Leq 8 hrs	Sound Calibrator	[illegible]	28-Feb-24	27-Feb-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0615	5-Jan-24	4-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0616	5-Jan-24	4-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0617	12-Jan-24	11-Jan-25	12
Noise	Leq 8 hrs	Sound Calibrator	RYG_FS0215	22-Oct-24	22-Oct-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0022	25-Jan-24	24-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	RYG_FS0018	22-Jan-24	21-Jan-25	12
Noise	Leq 8 hrs	Sound Level Meter	[illegible]	23-Feb-24	22-Feb-25	12
Heat	Heat Stress	Heat Stress Monitor	[illegible]	8-Jan-24	7-Jan-25	12
Heat	Heat Stress	Heat Stress Monitor	[illegible]	15-Jan-24	14-Jan-25	12

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

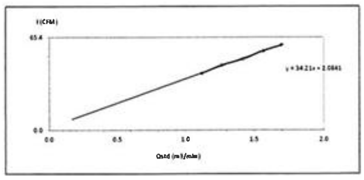
right solutions. right partner.

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Rayong Lab	[illegible]	pH Meter	[illegible]	18-Dec-23	18-Jun-25	18
Rayong Lab	BOD	DO meter with Sensor	[illegible]	24-Jul-23	24-Jan-25	18
Rayong Lab	BOD	Incubator	RYG_EN0164	1-Nov-24	1-May-26	18
Rayong Lab	BOD	Burette	RYG_EN0234	24-Sep-24	24-Sep-25	12
Rayong Lab	COD	Spectrophotometer	[illegible]	18-Sep-23	18-Mar-25	18
Rayong Lab	Total Suspended Solids	Electronic Balance	RYG_EN0002	22-Feb-24	22-Feb-25	12
Rayong Lab	Total Suspended Solids	Hot Air Oven	RYG_EN0013	21-Mar-24	21-Sep-25	18
Rayong Lab	Total Dissolved Solids 180°C	Electronic Balance	RYG_EN0002	22-Feb-24	22-Feb-25	12
Rayong Lab	Total Dissolved Solids 180°C	Hot Air Oven	RYG_EN0013	21-Mar-24	21-Sep-25	18
Rayong Lab	Oil & Grease	Electronic Balance	RYG_EN0002	22-Feb-24	22-Feb-25	12
Rayong Lab	Oil & Grease	Hot Air Oven	RYG_EN0013	21-Mar-24	21-Mar-25	12
Rayong Lab	Oil & Grease	Water Bath	[illegible]	21-Mar-24	21-Sep-25	18
Rayong Lab	Temperature	pH Meter	[illegible]	2-Feb-24	2-Feb-25	12
Rayong Lab	Color (at Original pH)	Spectrophotometer	[illegible]	18-Sep-23	18-Mar-25	18
Rayong Lab	Color (at pH 7.0)	Spectrophotometer	[illegible]	18-Sep-23	18-Mar-25	18
Water Lab	Methanol	Gas Chromatography	[illegible]	26-Jun-23	26-Dec-24	18
Water Lab	Silver	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Silver	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Silver	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18
Water Lab	Barium	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Barium	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Barium	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18
Water Lab	Lead	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Lead	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Lead	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18
Water Lab	Chromium	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Chromium	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Chromium	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18
Water Lab	Manganese	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Manganese	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Manganese	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18
Water Lab	Nickel	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Nickel	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Nickel	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18
Water Lab	Arsenic	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Arsenic	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Arsenic	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18
Water Lab	Selenium	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Selenium	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Selenium	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18
Water Lab	Cadmium	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Cadmium	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Cadmium	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18
Water Lab	Mercury	Mercury Analyzer	[illegible]	6-Dec-24	6-Dec-25	12
Water Lab	Propylene Oxide	Gas Chromatography (FID)	[illegible]	22-Oct-24	22-Apr-26	18
Water Lab	Copper	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Copper	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Copper	Chamber (Cold Room)	[illegible]	6-Dec-23	6-Jun-25	18
Water Lab	Zinc	ICP-MS	BKK_EL0026	12-Dec-23	12-Jun-25	18
Water Lab	Zinc	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Water Lab	Zinc	Chamber (Cold Room)	[illegible]	6-Dec-23	6-Jun-25	18
Soil	Propylene Oxide	Gas Chromatography (FID)	[illegible]	21-Apr-23	21-Oct-24	12
Soil	Copper	ICP-OES	[illegible]	29-Feb-24	28-Feb-25	12
Soil	Copper	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Soil	Copper	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18
Soil	Zinc	ICP-OES	[illegible]	29-Feb-24	28-Feb-25	12
Soil	Zinc	Hot Block	BKK_EL0054	22-Sep-23	22-Mar-25	18
Soil	Zinc	Chamber (Cooling Room)	[illegible]	6-Dec-23	6-Jun-25	18

High Volume Air Sampler Calibration Worksheet

Project Site :	Dow Chemical Thailand Ltd	Barometric Pressure (mm Hg) :	754.2
Calibrate Location :	[illegible]	Temperature (°C) :	31.4
Calibrate Date :	5-Sep-24	High Volume ID :	RYG_FS0393
CalibrationSheet No.:	C-050924-RYG_FS0393	High Volume Model :	TE-5170D
Calibrator ID:	RYG_FS0305	High Volume S/N :	5682
Calibrator Model :	TE-5028A	Calibrator Slope :	1.52567
Calibrator S/N :	1166	Calibrator Intercept :	-0.03613

Test No.	Delta H_2O (inch)	Q_{std} (m^3/min)	I : Chart (CFM)	Linear Regression
1	2.8	1.1172	40	Slope : 34.2105
2	3.6	1.2619	46	Intercept : 2.0841
3	4.6	1.4217	50	Correlation Coefficient : 0.9974
4	5.6	1.5649	56	
5	6.6	1.6958	60	



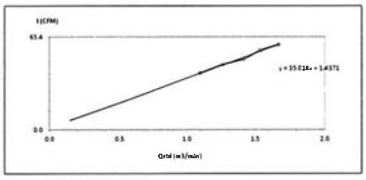
Calibrated by ____ (Mr.Santi Chaichana) Field Scientist(2)

Approved by : ____ (Mr. Noppong Juntarupan) Enviro Field Coordinator Scientist (3)

High Volume Air Sampler Calibration Worksheet

Project Site :	Dow Chemical Thailand Ltd	Barometric Pressure (mm Hg) :	754.2
Calibrate Location :	[illegible]	Temperature (°C) :	31.4
Calibrate Date :	5-Sep-24	High Volume ID :	RYG_FS0291
CalibrationSheet No.:	C-050924-RYG_FS0291	High Volume Model :	TE-5170D
Calibrator ID:	RYG_FS0305	High Volume S/N :	5333
Calibrator Model :	TE-5028A	Calibrator Slope :	1.52567
Calibrator S/N :	1166	Calibrator Intercept :	-0.03613

Test No.	Delta H_2O (inch)	Q_{std} (m^3/min)	I : Chart (CFM)	Linear Regression
1	2.7	1.0977	40	Slope : 35.0276
2	3.6	1.2619	46	Intercept : 1.4371
3	4.6	1.4217	50	Correlation Coefficient : 0.9956
4	5.4	1.5374	56	
5	6.4	1.6705	60	



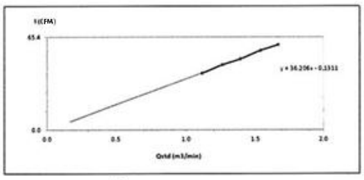
Calibrated by ____ (Mr.Santi Chaichana) Field Scientist(2)

Approved by : ____ (Mr. Noppong Juntarupan) Enviro Field Coordinator Scientist (3)

High Volume Air Sampler Calibration Worksheet

Project Site :	Dow Chemical Thailand Ltd	Barometric Pressure (mm Hg) :	754.2
Calibrate Location :	[illegible]	Temperature (°C) :	31.4
Calibrate Date :	5-Sep-24	High Volume ID :	RYG_FS0396
CalibrationSheet No.:	C-050924-RYG_FS0396	High Volume Model :	TE-5170D
Calibrator ID:	RYG_FS0305	High Volume S/N :	5698
Calibrator Model :	TE-5028A	Calibrator Slope :	1.52567
Calibrator S/N :	1166	Calibrator Intercept :	-0.03613

Test No.	Delta H_2O (inch)	Q_{std} (m^3/min)	I : Chart (CFM)	Linear Regression
1	2.8	1.1172	40	Slope : 36.2063
2	3.6	1.2619	46	Intercept : -0.1311
3	4.4	1.3913	50	Correlation Coefficient : 0.9986
4	5.4	1.5374	56	
5	6.4	1.6705	60	



Calibrated by ____ (Mr.Santi Chaichana) Field Scientist(2)

Approved by : ____ (Mr. Noppong Juntarupan) Enviro Field Coordinator Scientist (3)

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel. +66 2643 8361-6, e-mail: service.thailand@sartorius.com

SARTORIUS

NSC-ISO/IEC 17025 CALIBRATION 0428

Certificate of Calibration

Model Number :	LA130S-F	Certificate No. :	24BCI0068
Description :	Analytical Balance	Issued Date :	Friday, February 23, 2024
Serial Number :	25409664	Reference No. :	229196
ID No. :	RYG_EN0001		
Manufacturer :	Sartorius	Page No. :	1 of 2

REVIEW BY : [signature]
APPROVED BY : [signature]
NEXT CAL. DATE 22/02/2025

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.Pluak Daeng, Rayong 21140, Thailand.

Calibrated By : Mr.Chonchai Inthana
Calibration Date : Thursday, February 22, 2024

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 : 150 g Readability : 0.0001 g

Ambients Conditions:
Temperature : 23.6 °C ± 5.0 °C
Humidity : 54.0 % RH ± 10.0 % RH
Pressure : ____ ± ____

Reasons for calibration
☐ New Installation ☐ Service / Repaired ☑ Re-calibration / 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	TCS	M23081975	23-Aug-2025
MHB-382SD	Humidity/Barometer/Temp. Lutron MHB-382SD	DKSH	C19231845	23-Aug-2024

This certificate relate and apply this equipment only.
This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division Sartorius (Thailand) Co., Ltd.

Mr.chonchai Inthana(Technical Manager)

STAMP

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel. +66 2643 8361-6 Fax. +66 2643-8367, e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number :	LA130S-F	Certificate No :	24BCI0068
Description :	Analytical Balance	Issued Date :	Friday, February 23, 2024
Serial Number :	25409664	Reference No. :	229196
ID No. :	RYG_EN0001		
Manufacturer :	Sartorius	Page No :	2 of 2

Calibration Results : Without Adjustment

Repeatability

The reproducibility is the ability of a weighing instrument to display nearly identical readouts 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 reproducibility quantitatively

Nominal Value : (Low Load) 10 g, Tolerance 0.0001 g
Nominal Value : (High Load) 100 g, Tolerance 0.0001 g

Low Load	High Load
10.0000	99.9999
10.0000	100.0000
10.0000	100.0001
10.0000	100.0001
9.9999	100.0000
10.0000	100.0001
10.0000	100.0000
10.0000	100.0001
9.9999	100.0002
9.9999	100.0001
Standard Deviation 0.00005	0.00008

Eccentricity (Off-center loading error)

The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).

Nominal value : 50 g
Tolerance 0.0004 g

	Difference
1	-
2	-0.0001
3	0.0001
4	0.0002
5	0.0000
6	-

Linearity

The linearity, also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear range.

Tolerance 0.0002 g

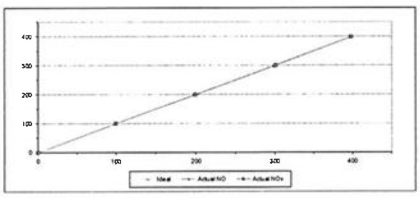
Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.0100	0.0100	0.0000	0.00020
0.05	0.0500	0.0500	0.0000	0.00021
0.1	0.1000	0.1000	0.0000	0.00021
0.5	0.5000	0.5000	0.0000	0.00021
1	1.0000	1.0000	0.0000	0.00021
2	2.0000	2.0000	0.0000	0.00021
5	5.0000	5.0000	0.0000	0.00021
10	10.0000	10.0001	0.0001	0.00024
20	20.0000	20.0001	0.0001	0.00021
100	100.0000	99.9999	-0.0001	0.00024

End of Report

MULTIPOINT CALIBRATION REPORT

Calibration Date	2-Jul-24	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	8G314J3K	Equipment ID	RYG_FS0264
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	0.05	0.05	0.05	0.10	0.10	0.10
1	100.00	99.20	-0.80	-0.80	100.10	0.10	0.10
2	200.00	198.50	-1.50	-0.75	199.30	-0.70	-0.35
3	300.00	298.60	-1.40	-0.47	301.40	1.40	0.47
4	400.00	398.20	-1.80	-0.45	398.00	-2.00	-0.50
AVERAGE (%)				-0.48			-0.04



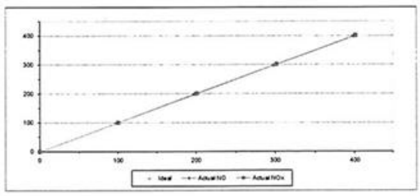
Calibrated By (Mr.Jirasut Saksam) Field Environmental Scientist (3)

Approved By (Mr.Sareyuth Jitramont) Assistant General Manager

MULTIPOINT CALIBRATION REPORT

Calibration Date	2-Jul-24	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	100.20	0.20	0.20
2	200.00	197.70	-2.30	-1.15	201.20	1.20	0.60
3	300.00	298.10	-1.90	-0.63	302.00	2.00	0.67
4	400.00	398.50	-1.50	-0.38	401.40	1.40	0.35
AVERAGE (%)				-0.67			0.38



Calibrated By (Mr.Jirasut Saksam) Field Environmental Scientist (3)

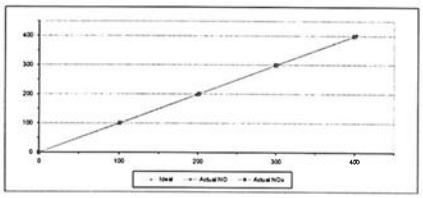
Approved By (Mr.Sareyuth Jitramont) Assistant General Manager

ALS

MULTIPOINT CALIBRATION REPORT

Calibration Date	2-Jul-24	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	H7SKYD1M	Equipment ID	BKK_F80787
Calibrator Manufacturer	Teledyne API	Model	700
Serial No.	847		
Std. Gas Concentration (PPM)	55.58	Cylinder No.	GN0027222
Cylinder Pressure (psi)	1800	Certified By	Airgas Inc.
Certified Date	8-Feb-22	Expired Date	8-Feb-30

Point	CALIBRATION RESULTS						
	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	99.70	-0.30	-0.30	101.00	1.00	1.00
2	200.00	198.60	-1.40	-0.70	201.30	1.30	0.65
3	300.00	299.10	-0.90	-0.30	299.70	-0.30	-0.10
4	400.00	402.10	2.10	0.53	399.50	-0.50	-0.13
AVERAGE (%)				-0.19			0.31



Calibrated By

(Mr.Anusit Sakorn)
Field Environmental Scientist (3)

Approved By

(Mr.Sarayuth Jitranont)
Assistant General Manager

ALS Laboratory Group

FORM NO. F 06-056 REVISION NO. - ISSUE DATE 02/04/12

NAC

ilac-MRA NSC - TSI - TS 17025 CALIBRATION 0167

CERTIFICATE OF CALIBRATION

Certificate Number

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 EQUIPMENT USED

Calibration procedure

Traceability

Uncertainty of Measurement

Procedure

Measurement Condition

TABULATION OF RESULTS

Calibrated by

Approved signatory

Remark

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Certificate Number

Page 2 of 2 Pages

MEASUREMENT RESULTS

Nominal	Error		

Remark

Calibrated by

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Certificate Number

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
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CONDITION AS RECEIVED
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ISSUE DATE

ENVIRONMENTAL CONDITIONS

PLACE OF CALIBRATION

CALIBRATION EQUIPMENT USED

Calibration procedure

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TABULATION OF RESULTS

Calibrated by

Approved signatory

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CERTIFICATE OF CALIBRATION

Certificate No. CDT-024-67

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS RECEIVED
CUSTOMER

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

Calibration procedure

Traceability

Uncertainty of Measurement

DESCRIPTION OF THE REVISED CALIBRATION

Instrument	Model	Serial No.	Certificate No.	Due Date

Calibrated by

Approved signatory

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CERTIFICATE OF CALIBRATION

Certificate No. CDT-024-67

Page 2 of 2 Pages

MEASUREMENT RESULTS

CALIBRATION IN THE RANGE OF

STD (mbar)	READ* (mbar)	Error (mbar)	Uncertainty (mbar)

Note

End of Certificate

NAC

ilac-MRA NSC - TSI - TS 17025 CALIBRATION 0167

CERTIFICATE OF CALIBRATION

Certificate No. CDT-024-67

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

NOTE: The certificate is valid only for the item calibrated at date of issue of calibration.

TABULATION OF RESULTS

Calibration procedure

Traceability

Reference Used During Calibration

Uncertainty of Measurement

Calibrated by

Approved signatory

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Continuation of Certificate of Calibration Number CDT-024-67

Page 2 of 2 Pages

Result of Calibration: ☐ Without Adjustment ☐ With Adjustment

Calibration Range: 30 % to 80 %

Function

Table 1: This equipment was connected with temperature sensor Model: HMT337 S/N: U0012243
Dimension: Diameter 32 mm, Length 80 mm

Reference Dew/Frost Point (mm)	Measured Reading (°C)	UUT Response (°C)	Error (°C)	Uncertainty (°C)
80	23.04	23.0	-0.1	0.09
80	23.04	23.0	-0.1	0.09
80	23.04	23.0	-0.1	0.09
80	23.03	23.0	-0.1	0.09
80	23.03	23.0	-0.1	0.09

UUT = Unit Under Calibration

Remark: The measurement uncertainty of measurement is 0.14 based on standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

End of Certificate of Calibration

Jiranatee Associates Co., Ltd.

NAC

CERTIFICATE OF CALIBRATION

Certificate No. [illegible]

Page 1 of 2 Pages

MEASUREMENT ITEM: Relative humidity with data logger
MANUFACTURER: Novasina
MODEL/TYPE: Data logger: LOG-RH-2S2-D
Sensor: NAF-RH
SERIAL NUMBER: Data logger: 20012
Sensor: 20012241
ID NUMBER: RHD-13013
CONDITION AS RECEIVED: Used item
CUSTOMER: AD laboratory group (Thailand) Co., Ltd.
[illegible]

RECEIVED DATE: [illegible] 2024
MEASUREMENT DATE: [illegible] 2024
ISSUE DATE: [illegible] 2024

ENVIRONMENTAL CONDITIONS
Ambient condition in the laboratory as follow:
Temperature: [illegible] °C
Relative Humidity: [illegible] %RH

NOTICE: The certificate is valid only for the calibrated item and is not a guarantee.

TABULATION OF RESULTS
[illegible]

Calibration procedure
The Relative Humidity and the Temperature calibration are done by the NAC Calibration Method as follows: [illegible] Calibration Method with Standard Digital Temperature and Humidity generator chamber.

Traceability
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology (Thailand) [illegible] Certificate number [illegible]

Uncertainty of Measurement
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The reported uncertainty has been determined in accordance with the GUM (Guide to the Expression of Uncertainty of Measurement).

Calibrated by
[illegible]

Approved signatory
[illegible]
Certificate Department Manager

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NAC

Continuation of Certificate of Calibration No. [illegible]

Page 1 of 1 Pages

Measurement Results

The results of calibration are as follows:

Point of Calibration: ☑ Without Adjustment ☐ With Adjustment

Table [illegible] Results of Calibration [illegible]
Calibration Range: [illegible]

Air Temperature (°C)	Standard Reading (%RH)	UUT Reading (%RH)	Error (%RH)	Uncertainty (%RH)
25.0C	55.0C	55.6	0.6	0.31
25.0C	50.0C	50.0	0.0	0.8
25.0C	35.0C	35.8	0.8	1.2

UUT = Unit Under Calibration

End of Certificate of Calibration

NAC

NAC

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

Certificate Number
[illegible]

MEASUREMENT ITEM: Temperature
MANUFACTURER: Novasina
MODEL/TYPE: Data logger: LOG-RH-2S2-D
Sensor: [illegible]
SERIAL NUMBER: Data logger: [illegible]
Sensor: [illegible]
ID NUMBER: RHD-13013
CONDITION AS RECEIVED: Used item
CUSTOMER: AD laboratory group (Thailand) Co., Ltd.
[illegible]

RECEIVED DATE: [illegible] 2023
MEASUREMENT DATE: [illegible] 2023
ISSUE DATE: [illegible] 2023

ENVIRONMENTAL CONDITIONS
Ambient condition in the laboratory as follow:
Temperature: [illegible] °C
Relative Humidity: [illegible] %RH
Atmospheric Pressure: [illegible] hPa

PLACE OF CALIBRATION: [illegible]

CALIBRATION CONDITIONS
Working area [illegible] (L): [illegible] cm
Working area [illegible] (W): [illegible] cm
Distance of measuring point: [illegible] mm
Mounting Hole of [illegible]: [illegible] (Y)

Process Monitoring
Measurement Condition: [illegible]

TABULATION OF RESULTS
[illegible]

Calibration procedure
The [illegible] calibration was performed using standard [illegible] method. During calibration, the process moment was carried out in an [illegible] environment and electromagnetic disturbance, after which adjustment was been made. The time spent to each same quantity point, a total minutes and in the series, is based on stated in certificates. The results of calibration and associated measurement uncertainties are reported in the table below.

Traceability
The measurement results are traceable to the International System of Units (SI) through National Institute of Metrology (Thailand) [illegible] Certificate number [illegible]

Uncertainty of Measurement
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. The reported uncertainty has been determined in accordance with the GUM (Guide to the Expression of Uncertainty of Measurement).

Calibrated by
[illegible]

Approved signatory
[illegible]
Calibration Department Manager

Remark
* [illegible]
* [illegible]
* [illegible]
* [illegible]

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Certificate Number
[illegible]

Page 2 of 2 Pages

MEASUREMENT RESULTS

Air Speed (m/s)	P_{ref} (kg/m²)	P_{cal} (kg/m²)	Error (kg/m²)	U (k=2) (kg/m²)
	41.000	42	1	1.4
	84.000	87	3	1.4
	125.000	128	3	1.4
	165.000	167	2	1.4
5.00	225.000	227	2	1.4
	270.000	273	3	1.4
	315.000	317	2	1.4
	360.000	359	-1	1.4

Remark
* Calibration results are valid for the test equipment [illegible] and under specified conditions only and calibration [illegible]
* Uncertainty is expanded
* Standard of Air Speed Calibrator

End of Certificate of Calibration

NAC

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CERTIFICATE OF CALIBRATION

Certificate No. [illegible]
Page 1 of 2

Equipment Name: Data Logger with Temperature sensor
Manufacturer: Novasina
Model: LOG-RH-2S2-D
Serial No.: 12F8[illegible]
ID No.: RHD-[illegible]

Customer
Name: AD laboratory group (Thailand) Co., Ltd.
Address: 106 Phaphon [illegible] Road, Phanthong District, Khlong Sam Tawang, Khlong Luang, Pathum Thani 12120 Thailand

Received date: [illegible] 2023
Calibration date: [illegible] 2023
Issue date: [illegible] 2023

Reference Used During Calibration
1. Standard Temperature and Humidity Generator (Model: [illegible])
Traceability: [illegible]
2. Digital Temperature and Humidity Meter (Model: [illegible])
Traceability: [illegible]

Calibration Condition
Temperature: [illegible] °C
Relative Humidity: [illegible] %

Calibration Procedure
The temperature calibration was made by in-house calibration method as [illegible] according to [illegible] with standard digital temperature and humidity generator chamber, [illegible] Calibration Method.

Traceability
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology (Thailand) [illegible] Certificate number [illegible] Serial number [illegible] 22

Remark: The certificate is valid only for the calibrated or date of issue of calibration.

Calibrated by
[illegible]

Approved Signatory
[illegible]
Calibration Department Manager

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Certificate No. [illegible]
Page 1 of 2

Results of Calibration: ☑ Without Adjustment ☐ With Adjustment
Calibration Range: [illegible]

Equipment
This equipment was connected with temperature sensor Model: HMP60 S/N: 12320595

Dimension: Diameter 12 mm. Length 30 mm.

Reference Depth (mm)	Standard Reading (°C)	UUT Reading (°C)	Error (°C)	Uncertainty (°C)
10	[illegible]	19.6	0.6	0.[illegible]
20	25.0[illegible]	25.0	0.4	0.13
30	30.0[illegible]	[illegible]	0.4	0.[illegible]
40	35.0[illegible]	[illegible]	0.5	0.[illegible]
50	40.0[illegible]	[illegible]	0.5	0.[illegible]

UUT = Unit Under Calibration
The reported 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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CERTIFICATE OF CALIBRATION

Calibration No. [illegible]
Page 1 of 1 Pages

Measurement Item: Relative humidity with data logger
Manufacturer: Novasina
Model/Type: LOG-RH-2S2-D
Serial Number: 12F8[illegible]
ID No.: RHD-[illegible]
Customer: AD laboratory group (Thailand) Co., Ltd.
106 Phaphon [illegible] Road, Khlong Sam Tawang, Khlong Luang, Pathum Thani 12120 Thailand

Environmental Condition
The measurement was carried out in an ambient temperature of 23±3°C and relative humidity of 50±15%

Measurement Method
NAC Under Calibration EN/IC was calibrated by comparison method with standard digital temperature model: [illegible] in the humidity generator chamber to determine the errors.

Traceability
The equipment was calibrated using standard equipment whose traceable to humidity through National Institute of Metrology and Technology in the international system of units (SI) at MSE Calibration Inc. Certificate number: 24P26 [illegible]

Measurement Date: [illegible] 2023
Issue Date: [illegible] 2023

Measurement Results
The equipment was connected with [illegible] on humidity probe and Displayed RH on display. Model: HMP60, Serial number: [illegible]
Calibration was performed in the range of 20%RH to 80%RH.
The results of calibration are recording as below table:

Calibrated Point (%RH)	Standard Reading (%RH)	UUT Reading (%RH)	Error (%RH)	Uncertainty (±%RH)
20	20.0[illegible]	21.6	1.6	0.42
50	50.0[illegible]	49.5	-0.7	0.41
80	80.0[illegible]	78.5	-1.5	0.41

Calibrated by
☑ Mr. [illegible] Thachakul
☐ Miss. [illegible] Lertkongkul
☐ Miss. [illegible] Phuchinit

Approved Signatory
[illegible]
Calibration Department Manager

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NAC

Certificate Number

CAL-001-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM	Digital Thermometer
MANUFACTURER	Testo
MODEL/TYPE	Testo 950/T
SERIAL NUMBER	Data logger: 110 WS 250L D Sensor: 00341
ID NUMBER	8-05_P00-66
CONDITION AS RECEIVED	Good Condition
CUSTOMER	[illegible]

Calibration procedure:

Traceability:

RECEIVED DATE	[illegible]
MEASUREMENT DATE	[illegible]
ISSUE DATE	[illegible]

ENVIRONMENTAL CONDITIONS

Ambient condition at the laboratory are as follow

Temperature	23.0 ± 3 °C	
Relative Humidity	50.0 ± 15 %	RH
Atmospheric Pressure	1000 ± 30	hPa

Uncertainty of Measurement

PLACE OF CALIBRATION

CALIBRATION CONDITIONS

Area of immersion surface area	531	mm^2
Area of immersion depth area	7304	mm^2
Diameter of immersion point	3	mm
Immersion depth	0.1 ± 0.1	m

Pre-conditioning

Measurement Condition

TABULATION OF RESULTS

Calibrated by

Approved signatory

Remarks

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Certificate Number

CAL-001-66

Page 2 of 2 Pages

MEASUREMENT RESULTS

Nominal (mV)	Temp. sensor (°C)	Temp. room (°C)	Nominal (mV)	Error (mV)	U (mV) (k=2)
0.00	23.06	23.05	0.0	0.2	0.2
10.00	23.05	23.05	10.0	0.0	0.2
20.00	23.04	23.05	20.0	0.2	0.2
30.00	23.03	23.05	30.0	0.3	0.2
40.00	23.02	23.05	40.0	0.3	0.2
50.00	23.02	23.05	50.0	0.3	0.2
60.00	23.01	23.05	60.0	0.4	0.2
70.00	23.00	23.05	70.0	0.5	0.2
80.00	22.99	23.05	80.0	0.6	0.2
90.00	22.98	23.05	90.0	0.7	0.2
100.00	22.97	23.05	100.0	0.8	0.2
110.00	22.96	23.05	110.0	0.9	0.2
120.00	22.95	23.05	120.0	1.0	0.2
130.00	22.94	23.05	130.0	1.1	0.2
140.00	22.93	23.05	140.0	1.2	0.2
150.00	22.92	23.05	150.0	1.2	0.2
160.00	22.91	23.05	160.0	1.3	0.2

Remark

PHOTO OF CALIBRATION SETUP

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Certificate Number

CAL-001-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM	Wind Direction Sensor
MANUFACTURER	Nokeval
MODEL/TYPE	Sensor: WS-02T Data logger: 110 WS 250L D
SERIAL NUMBER	Sensor: 10341-00001 Data logger: 00401
ID NUMBER	8-05_P00-66
CONDITION AS RECEIVED	Good Condition
CUSTOMER	[illegible]

Calibration procedure:

Traceability:

RECEIVED DATE	[illegible]
MEASUREMENT DATE	[illegible]
ISSUE DATE	[illegible]

ENVIRONMENTAL CONDITIONS

Ambient condition at the laboratory are as follow

Temperature	23.0 ± 3	°C
Relative Humidity	50.0 ± 15	%RH
Atmospheric Pressure	1000 ± 30	hPa

Uncertainty of Measurement

PLACE OF CALIBRATION

CALIBRATION CONDITION

Area of immersion surface area	900	mm^2
Area of immersion depth area	7	mm^2
Diameter of immersion point	3	mm
Immersion depth	0.1 ± 1	

Pre-conditioning

Measurement Condition

TABULATION OF RESULTS

Calibrated by

Approved signatory

Remarks

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Certificate Number

CAL-001-66

Page 1 of 2 Pages

MEASUREMENT RESULTS

Air speed m/s	D'_{max} Degree (°)	D'_{min} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
0.30	45.000	41	4	1.0
	90.000	87	3	1.0
	135.000	132	3	1.0
	180.000	180	0	1.0
	225.000	228	3	1.0
	270.000	274	4	1.0
	315.000	319	4	1.0
	360.000	359	1	1.0

Remark

End of Page of Calibration

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ISO-9001 ISO-17025

CERTIFICATE OF CALIBRATION

Certificate No. CAL-001-66
Page 1 of 2

Equipment Name: Data Logger with Temperature Sensor
Manufacturer: Testo
Model: 175 H1-D
Serial No.: [illegible]
ID No.: P00-66

Customer
Name: [illegible]
Address: [illegible]

Received date: [illegible] 2023
Calibration date: [illegible] 2023
Issue date: [illegible] 2023

Reference Used During Calibration

Calibration Condition

Calibration Procedure

Traceability

Calibrated by

Approved Signatory

Calibration Department Manager

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ISO-9001 ISO-17025

Certificate No. CAL-001-66
Page 2 of 2

Result of Calibration: ☒ Within requirement ☐ With Adjustment

Calibration Range: 20-40 °C

Further:
This equipment was connected with temperature sensor Model: HMP60 S/N: [illegible]

Dimension: Diameter 12 mm. Length 60 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUT Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.000	19.5	-0.5	0.029
70	21.554	21.0	-0.5	0.030
70	[illegible]	[illegible]	-0.3	[illegible]
70	31.043	31.5	0.5	0.030
70	40.010	39.5	-0.5	[illegible]

UUT = Unit under Calibration
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%.

* End of Certificate *

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CERTIFICATE OF CALIBRATION

Calibration No. CAL-001-66
Page 1 of 1 Pages

Measurement Item	Relative Humidity with data logger
Manufacturer	Nokeval
Model/Type	110 WS 250L D
Serial Number	[illegible]
ID No.	[illegible]
Customer	[illegible]

Environmental Condition

Measurement Method

Traceability

Measurement Date: [illegible] 2023
Issued Date: [illegible] 2023

Measurement Result

Calibrated (%RH)	Monitor sensor (%RH)	UUT sensor (%RH)	Error (%RH)	Uncertainty (%RH)
20	20.00	19.8	-0.2	0.61
50	[illegible]	49.0	-1.1	0.61
80	[illegible]	78.5	-2.2	0.61

Calibrated by

Approved signatory

Calibration Department Manager

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NAC

Certificate Number

CL-018-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM	[illegible]
MANUFACTURER	[illegible]
MODEL/TYPE	[illegible]
SERIAL NUMBER	[illegible]
ID NUMBER	[illegible]
CONDITION AS RECEIVED	[illegible]
CUSTOMER	[illegible]

Calibration procedure:

Traceability:

RECEIVED DATE	[illegible]
MEASUREMENT DATE	[illegible]
ISSUE DATE	[illegible]

ENVIRONMENTAL CONDITIONS

Ambient condition at the laboratory are as follow

Temperature	23 ± 3	°C
Relative Humidity	50 ± 15	%RH
Atmospheric Pressure	[illegible]	hPa

Uncertainty of Measurement

PLACE OF CALIBRATION

CALIBRATION CONDITIONS

Area of immersion surface area	[illegible]	mm^2
Area of immersion depth area	[illegible]	mm^2
Diameter of immersion point	[illegible]	mm
Immersion depth	[illegible]	m

Pre-conditioning

Measurement Condition

TABULATION OF RESULTS

Calibrated by

Approved signatory

Remarks

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Certificate Number

CL-018-66

Page 2 of 2 Pages

MEASUREMENT RESULTS

Nominal (mV)	Temp. sensor (°C)	Temp. room (°C)	Nominal (mV)	Error (mV)	U (mV) (k=2)
0.00	23.00	23.05	0.0	-0.0	0.2
10.00	23.00	23.05	10.0	-0.2	0.2
20.00	23.00	23.05	20.0	-0.2	0.2
30.00	23.00	23.05	30.0	-0.1	0.2
40.00	23.00	23.05	40.0	-0.1	0.2
50.00	23.00	23.05	50.0	-0.1	0.2
60.00	23.00	23.05	60.0	-0.1	0.2
70.00	23.00	23.05	70.0	-0.1	0.2
80.00	23.00	23.05	80.0	-0.1	0.2
90.00	23.00	23.05	90.0	-0.1	0.2
100.00	23.00	23.05	100.0	-0.1	0.2
110.00	23.00	23.05	110.0	-0.1	0.2
120.00	23.00	23.05	120.0	-0.1	0.2
130.00	23.00	23.05	130.0	-0.1	0.2
140.00	23.00	23.05	140.0	-0.1	0.2
150.00	23.00	23.05	150.0	-0.1	0.2
160.00	23.00	23.05	160.0	-0.1	0.2

Remark

PHOTO OF CALIBRATION SETUP

Jinnatee Associates Co., Ltd.

JNAC
JIRANATEE ASSOCIATES CO.,LTD.

Accredited calibration laboratory
ISO/IEC 17025:2017
CALIBRATION 0067

Air speed measurement laboratory
Calibration services department

Certificate Number
[illegible]

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Wind Direction Sensor
MANUFACTURER: [illegible]
MODEL/TYPE: Sensor: WS-[illegible]; Data logger: [illegible]
SERIAL NUMBER: Sensor: [illegible]; Data logger: AS100
ID NUMBER: [illegible]
CONDITION AS RECEIVED: Used item
CUSTOMER: ALS laboratory group (Thailand) Co., Ltd. [illegible], Bangkok 10250 Thailand

RECEIVED DATE: [illegible]
MEASUREMENT DATE: [illegible]
ISSUE DATE: [illegible]

ENVIRONMENTAL CONDITIONS
Ambient condition in the laboratory are as follow:
Temperature: [illegible] °C
Relative Humidity: [illegible] %RH
Atmospheric Pressure: [illegible] hPa

PLACE OF CALIBRATION: Eiffel type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITION:
Wind tunnel cross section area: 500 cm²
Wind direction frontal area: 123 cm²
Diameter of mounting pipe: - mm
Blockage ratio of test object: 0.[illegible]

Preconditioning: 24 hours at ambient conditions
Measurement Condition: The average values during measurement are [illegible]

TABULATION OF RESULTS:
The table on next page give the measured values.

Calibrated by: [illegible]

Approved signatory: [illegible], 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] Area [2]/[1]

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Certificate Number
[illegible]

Page 2 of 2 Pages

MEASUREMENT RESULTS [1]

The wind direction sensor was calibrated against standard rotary encoder by comparison method. [illegible]

Air speed (m/s)	θ_{ref} Degree (°)	θ_{uuc} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.00	0.000	0	[illegible]	[illegible]
	45.000	41	-4	[illegible]
	90.000	87	-3	[illegible]
	135.000	135	0	[illegible]
	180.000	18[illegible]	[illegible]	[illegible]
	225.000	230	[illegible]	[illegible]
	270.000	275	[illegible]	[illegible]
	315.000	320	[illegible]	[illegible]

Remark:
[illegible]

End of Certificate of Calibration

JNAC
JIRANATEE ASSOCIATES CO.,LTD.

Certificate Number
CWS 034-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Cup anemometer
MANUFACTURER: [illegible]
MODEL/TYPE: Sensor: WS-[illegible]; Data logger: [illegible]
SERIAL NUMBER: Sensor: [illegible] AS191; Data logger: AS191
ID NUMBER: [illegible]
CONDITION AS RECEIVED: Used item
CUSTOMER: ALS laboratory group (Thailand) Co., Ltd. [illegible] Bangkok 10250 Thailand

RECEIVED DATE: [illegible] Aug 2023
MEASUREMENT DATE: [illegible] Aug 2023
ISSUE DATE: [illegible] Aug 2023

PLACE OF CALIBRATION: Eiffel type wind tunnel of Jiranatee Associates Co., Ltd.

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JIRANATEE ASSOCIATES CO.,LTD.

Certificate Number
CWD 035-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Wind Direction Sensor
MANUFACTURER: [illegible]
MODEL/TYPE: Sensor: WS-[illegible]; Data logger: [illegible] WS 2S[illegible]
SERIAL NUMBER: Sensor: WSD AS191; Data logger: AS191
ID NUMBER: [illegible]
CONDITION AS RECEIVED: Used item
CUSTOMER: ALS laboratory group (Thailand) Co., Ltd. 104 Phatthanakan 43, Phatthanakan Rd. Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand

PLACE OF CALIBRATION: Eiffel type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITION:
Wind tunnel cross section area: 500 cm²
Wind direction frontal area: 129 cm²
Diameter of mounting pipe: - mm
Blockage ratio of test object: 0.[illegible]

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Certificate Number
CWD 035-66

Page 2 of 2 Pages

MEASUREMENT RESULTS [1]

Air speed (m/s)	θ_{ref} Degree (°)	θ_{uuc} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.00	45.000	42	-3	[illegible]
	90.000	87	-3	[illegible]
	135.000	133	-2	[illegible]
	180.000	182	[illegible]	[illegible]
	225.000	229	[illegible]	[illegible]
	270.000	275	[illegible]	[illegible]
	315.000	320	[illegible]	[illegible]
	360.000	[illegible]	[illegible]	[illegible]

End of Certificate of Calibration

JNAC
JIRANATEE ASSOCIATES CO.,LTD.

Certificate Number
[illegible]

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Cup anemometer
MANUFACTURER: [illegible]
MODEL/TYPE: Sensor: WS-[illegible]; Data logger: [illegible]
SERIAL NUMBER: Sensor: [illegible]; Data logger: AS9[illegible]
CONDITION AS RECEIVED: New item
CUSTOMER: ALS laboratory group (Thailand) Co., Ltd. [illegible] Bangkok 10250 Thailand

PLACE OF CALIBRATION: Eiffel type wind tunnel of Jiranatee Associates Co., Ltd.

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Certificate Number
[illegible]

Page 2 of 2 Pages

MEASUREMENT RESULTS [1]

[illegible]

V_{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V_{uuc} (m/s)	Error (m/s)	U (k=2) (m/s)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Remark:
[illegible]

PHOTO OF CALIBRATION SET-UP

End of Certificate of Calibration

JNAC
JIRANATEE ASSOCIATES CO.,LTD.

Certificate Number
[illegible]

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Wind Direction Sensor
CONDITION AS RECEIVED: New item
CUSTOMER: ALS laboratory group (Thailand) Co., Ltd. [illegible] Bangkok 10250 Thailand

PLACE OF CALIBRATION: Eiffel type wind tunnel of Jiranatee Associates Co., Ltd.

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Certificate Number
[illegible]

Page 2 of 2 Pages

MEASUREMENT RESULTS [1]

Air speed (m/s)	θ_{ref} Degree (°)	θ_{uuc} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.00	0.000	0	[illegible]	[illegible]
	45.000	42	[illegible]	[illegible]
	90.000	87	[illegible]	[illegible]
	135.000	14[illegible]	[illegible]	[illegible]
	180.000	179	[illegible]	[illegible]
	225.000	227	[illegible]	[illegible]
	270.000	27[illegible]	[illegible]	[illegible]
	315.000	[illegible]	[illegible]	[illegible]

End of Certificate of Calibration

NAC
63/14 15,17/35-36, Soi Petchkasem7,7/1, Petchkasem Rd.
Wathepha, Bangkoksai,Bangkok 10600 Thailand
Tel: (66) 02 868081213 Fax: (66) 02 8680860 www.jiranatec.com

ilac-MRA
NSC-TGI-TS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. [illegible]
Page 1 of 2

Equipment Name: Data Logger and Temperature and
Manufacturer: [illegible]
Model: [illegible]
Serial No.: [illegible]
ID No.: [illegible]

Customer
Name: [illegible]
Address: [illegible]

Received date: [illegible]
Calibration date: [illegible]
Issue date: [illegible]

Reference Used During Calibration
1. Standard Temperature Probe Model: [illegible]
Serial No.: [illegible]
2. Digital temperature indicator Model: [illegible]
Serial No.: [illegible]

Calibration Condition
Temperature: [illegible]
Relative Humidity: [illegible]

Calibration Procedure
[illegible]

Traceability
[illegible]

Remark: This certificate is valid only for the item on present in date and place of calibration.

Calibrated by
1. Mr. [illegible]
2. Mr. [illegible]
3. Miss [illegible]

Approved Signatory
Mr. [illegible]
Calibration Department Manager

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Wathepha, Bangkoksai,Bangkok 10600 Thailand
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Certificate No. [illegible]
Page 2 of 2

Result of Calibration: ☑ Within Acceptance ☐ Within Adjustment
Calibration Range: 20-40 °C

Function:
This equipment was connected with temperature sensor Model: HM760 S/N: V1920235

Dimension: Diameter: 12 mm. Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	25.057	25.0	0.1	0.009
70	25.053	25.5	-0.2	0.010
70	30.048	[illegible]	-0.2	0.010
70	35.039	[illegible]	-0.2	0.005
70	40.034	[illegible]	-0.3	0.009

UUC* : Unit under Calibration
The reported expanded uncertainty has been based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%.

★ End of Certificate ★

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CERTIFICATE OF CALIBRATION

Calibration No. [illegible]
Page 1 of 1 Pages

Measurement Item: Relative humidity with data logger
Manufacturer: [illegible]
Model/Type: [illegible]
Serial Number: [illegible]
ID No.: [illegible]
Customer: ALE Laboratory group (Thailand) Co., Ltd.
104 Petchkasem 42, Petchkasem Rd. Khwaeng Sam Liang, Khet Sam Liang, Bangkok 10100 Thailand

Environmental Condition
The measurement was carried out in an ambient temperature at (25±3)°C and relative humidity at (50±10)%

Measurement Method
Lab Grade Calibration (LGC) was calibrated by comparison method with standard digital sensor Testo model 1800 in the humidity generator chamber to determine the errors.

Traceability
This instrument was calibrated using standard equipment whose accuracy is traceable through national measurement institute or Metrology Institute of Thailand (NIMT) Certificate number: [illegible] Exp. date: Sep 26, 2024.

Measurement Date: Jul 20, 2023
Issue Date: Jul 27, 2023

Measurement Results
The equipment was connected with indoor air quality probe and displayed RH on display. Model: HM750 Serial number: V1920235
Calibration was performed in the range of 20-90% in 10-60%
The results of calibration are reported in table below.

Determined (%RH)	Standard Value (%RH)	UUC Reading (%RH)	Error (%RH)	Uncertainty (%RH)
20	20.03	19.2	0.9	0.50
40	40.04	39.5	0.5	0.52
60	60.05	60.5	-0.2	0.52

Calibrated by
1. Mr. [illegible]
2. Mr. [illegible]
3. Miss [illegible]

Approved Signatory
Mr. [illegible]
Calibration Department Manager

THIS CALIBRATION REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

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Accredited Calibration Laboratory
ISO/IEC 17025:2017
No. 0367
Calibration Laboratory
Pressure Measurement Laboratory
Calibration Services Department

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NSC-TGI-TS 17025
CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. [illegible]
Page 1 of 2 Pages

MEASUREMENT ITEM: Digital pressure gauge
MANUFACTURER: [illegible]
MODEL/TYPE: [illegible]
SERIAL NUMBER: [illegible]
ID NUMBER: [illegible]
CONDITION AS RECEIVED: [illegible]
CUSTOMER: [illegible]

Calibration procedure
[illegible]

Traceability
[illegible]

RECEIVED DATE: 25 Jul 2021
MEASUREMENT DATE: 27 Jul 2021
ISSUE DATE: 27 Jul 2021

CONDITION OF THE SESULT OF CALIBRATION:
1. Reference Standard Instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

2. [illegible]
3. Environmental Condition
A. Condition: ☑ Normal ☐ Abnormal
Pressure transmitting medium: [illegible]
Temperature: [illegible] °C
Humidity: [illegible] %
Place: [illegible]
4. The certificate is valid only for the item on present in date and place of calibration

Calibrated by
1. Mr. [illegible]
2. Miss [illegible]

Approved Signatory
Mr. [illegible]
Calibration Department Manager

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CALIBRATION 0367

CERTIFICATE OF CALIBRATION

Certificate No. [illegible]
Page 2 of 2 Pages

MEASUREMENT RESULTS: ☑ Without adjustment ☐ With adjustment
CALIBRATION IN THE RANGE OF: [illegible] mbar to [illegible] mbar
The results of calibration are tabulated measurement uncertainties and reported in the table below.

STD (mbar)	UUC* (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Note: UUC* : Unit under Calibration
[illegible]

END OF CERTIFICATE

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No. 0367
Calibration Laboratory
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Calibration Services Department

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CALIBRATION 0367

Certificate Number
[illegible]

CERTIFICATE OF CALIBRATION

Page 1 of 1 Pages

MEASUREMENT ITEM: [illegible]
MANUFACTURER: [illegible]
MODEL/TYPE: [illegible]
SERIAL NUMBER: [illegible]
ID NUMBER: [illegible]
CONDITION AS RECEIVED: [illegible]
CUSTOMER: [illegible]

Calibration procedure
[illegible]

Traceability
[illegible]

RECEIVED DATE: [illegible]
MEASUREMENT DATE: [illegible]
ISSUE DATE: [illegible]

ENVIRONMENTAL CONDITION
[illegible]

PLACE OF CALIBRATION: [illegible]

CALIBRATION CONDITION: [illegible]

Uncertainty of Measurement
[illegible]

REVIEW BY
APPROVED BY
NEXT CAL DATE

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No. 0367
Calibration Laboratory
Temperature Measurement Laboratory
Calibration Services Department

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CALIBRATION 0367

Certificate Number
[illegible]

CERTIFICATE OF CALIBRATION

Page 1 of 1 Pages

MEASUREMENT ITEM: [illegible]
MANUFACTURER: [illegible]
MODEL/TYPE: [illegible]
SERIAL NUMBER: [illegible]
ID NUMBER: [illegible]
CONDITION AS RECEIVED: [illegible]
CUSTOMER: [illegible]

Calibration procedure
[illegible]

Traceability
[illegible]

RECEIVED DATE: [illegible]
MEASUREMENT DATE: [illegible]
ISSUE DATE: [illegible]

ENVIRONMENTAL CONDITION
[illegible]

PLACE OF CALIBRATION: [illegible]

CALIBRATION CONDITION: [illegible]

Uncertainty of Measurement
[illegible]

TRANSLATION OF RESULTS
[illegible]

Remarks
[illegible]

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Certificate Number
[illegible]

Page 2 of 2 Pages

MEASUREMENT RESULTS
[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Remark
[illegible]

Jiranatee Associates Co., Ltd.

JNAC
JIRANATEE ASSOCIATES CO., LTD.

Accredited calibration laboratory

Air speed measurement laboratory
Calibration services department

Certificate Number
[illegible]

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Cup anemometer
MANUFACTURER: [illegible]
MODEL/TYPE: Sensor WS-027 / Data logger [illegible]
SERIAL NUMBER: Sensor [illegible] / Data logger AS191
ID NUMBER: [illegible]
CONDITION AS-RECEIVED: Used item
CUSTOMER: ALS laboratory group (Thailand) Co., Ltd. 104 Phatthanakan 43, Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE: 11 Aug 2023
MEASUREMENT DATE: [illegible] Aug 2023
ISSUE DATE: [illegible] Aug 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: [illegible] hPa

PLACE OF CALIBRATION: Eiffel type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITIONS
Wind tunnel cross section area[1]: 500 cm²
Wind direction frontal area[2]: [illegible] cm²
Diameter of mounting pipe[3]: [illegible] mm
Blockage ratio of the object[4]: 0.11[illegible]

Calibration procedure: [illegible]

Traceability: [illegible]

Uncertainty of Measurement: [illegible]

Preconditioning: 24 hours at ambient conditions.
Measurement Condition: [illegible]

TABULATION OF RESULTS:
The table on next page give the measured values

Calibrated by: [illegible]

Approved signatory: [illegible]
Calibration Department Manager

Remarks
[1] [illegible]
[2] [illegible]
[3] Diameter of mounting pipe
[4] [illegible]

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Accredited calibration laboratory

Air speed measurement laboratory
Calibration services department

Certificate Number
[illegible]

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM: Wind Direction Sensor
MANUFACTURER: [illegible]
MODEL/TYPE: Sensor WS-47[illegible] / Data logger [illegible]
SERIAL NUMBER: Sensor [illegible] / Data logger AS191
ID NUMBER: [illegible]
CONDITION AS-RECEIVED: Used item
CUSTOMER: ALS laboratory group (Thailand) Co., Ltd. 104 Phatthanakan 43, Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand

RECEIVED DATE: 11 Aug 2023
MEASUREMENT DATE: 14 Aug 2023
ISSUE DATE: [illegible] Aug 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: [illegible] hPa

PLACE OF CALIBRATION: Eiffel type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITION
Wind tunnel cross section area: 500 cm²
Wind direction frontal area[1]: [illegible] cm²
Diameter of mounting pipe[2]: - mm
Blockage ratio of the object[3]: 0.14[illegible]

Calibration procedure: [illegible]

Traceability: [illegible]

Uncertainty of Measurement: [illegible]

Preconditioning: [illegible]
Measurement Condition: [illegible]

TABULATION OF RESULTS:
The table on next page give the measured values

Calibrated by: [illegible]

Approved signatory: [illegible]
Calibration Department Manager

Remarks
[1] [illegible]
[2] [illegible]
[3] Diameter of mounting pipe
[4] [illegible]

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Certificate Number
[illegible]

Page 2 of 2 Pages

MEASUREMENT RESULTS[4]

[illegible]

Air speed m/s	[illegible] Degree (°)	[illegible] Degree (°)	Error Degree (°)	[illegible] Degree (°)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]

Remark
[illegible]

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 Khu, Pluak Daeng, Rayong 21140, Thailand

Date: January 5, 2024 10:53:24 AM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.54, GCMS.02.54
Overall Qualification Status: Pass

REVIEW BY [signature]
APPROVED BY [signature]
NEXT CAL DATE 4/01/2025

CDS Logon Verification - GC
Logon: [illegible]

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

	Setpoint		Actual	
Inlet Pressure:	25.0	psi	25	psi
Accuracy:			0.0	psi
Agilent Recommended:		<=	1.2	

Overall Inlet Pressure Accuracy Test Status
Pass

GC Oven Temperature Accuracy

Name: 7890
Setpoint Status: Pass
Zone: Oven

	Setpoint/Actual						
Temperature:	230.0		229	°C			
Accuracy:			-1.0	°C			
Agilent Recommended:		>=	-1.0	% setpoint in K	(-4.0	°C	)
		<=	1.0	% setpoint in K	(5.0	°C	)

Setpoint Status: Pass
Zone: Oven

	Setpoint/Actual						
Temperature:	100.0		100.8	°C			
Accuracy:			0.8	°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	100.0167	°C
Stability:		0.1	°C
Agilent Recommended:	<=	0.5	

Overall GC Oven Temperature Stability Test Status
Pass

Log Amp

Tested Combination1: Front SSL / External SQ
Name: 5977B
Setpoint Status: Pass

Overall Log Amp Test Status
Pass

RFPA

Tested Combination1: Front SSL / External SQ
Name: 5977B
Setpoint Status: Pass

Amu:	1050	m/z	Drift After Five Minutes:				RFPA Voltage:	
			6	mV			509	mV
Agilent Recommended:			>= -100	and	<= 100		<= 1100	

Overall RFPA 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

Scouting Run

Tested Combination1: Front SSL / External SQ
Manual Injection
Name: Not applicable
Source: EI - Extractor

Setpoint Status: Completed
Injection Volume on Column: 1.0 uL

Overall Scouting Run Status
Completed

Signal to Noise EI

Tested Combination1: Front SSL / External SQ
Name: 5977B

Source: EI - Extractor — Filament: 1
Setpoint Status: Pass
Signal to Noise: 5113
Agilent Recommended: >= 1200

Source: EI - Extractor — Filament: 2
Setpoint Status: Pass
Signal to Noise: 4456
Agilent Recommended: >= 1200

Overall Signal to Noise EI Test Status
Pass

NOTE: This test's 2 comment(s) and 3 deviation(s) are available in the Attachments section.

Instrument Details

Purpose
This section describes the as found system configuration.

Details

System
- System ID: RYG_EN0136
- Manufacturer: Agilent Technologies
- Name: 7890
- 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: 7890
- Model Number: G3442B
- Serial Number: CN16403236
- Firmware Revision: B.02.04.3
- Component ID/Asset No: 081117000236
- Oven Type: Standard

Inlet 1
- 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
- Model Number: G7077B
- Serial Number: US1701M008
- Firmware Revision: 5977 6.00.34
- High Vacuum System: Turbo Pump
- Scouting Run Standard: OFN Std
- Component ID/Asset No.: 081117000236

MS EI Source 1
- Manufacturer: Agilent Technologies
- Source Type: EI - Extractor
- Number of filaments: 2

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Electronic Signature

Purpose

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Full Name of Signer:	Eaknarin Puangsopa
Logged On User Name:	eaknarin_puangsopa@agilent.com
Signature Creation Date	January 5, 2024
Reason for Signature	Executed protocol and published the original version of document

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User Name: eaknarin_puangsopa System Id: RYG_EN0136
Report Generated by Hostname: ASRYGN4074 Print Date: January 5, 2024 10:53:25 AM

ALS_OQ_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 4, 2024 10:27:21 AM	Audit	Session Created	Session	None
January 4, 2024 10:17:31 AM	Start	Configuration	Session	None
January 4, 2024 10:27:31 AM	Audit	Entitlement	Licensing	[illegible]
January 4, 2024 10:28:28 AM	Audit	Duplicated	Session	EQP details for primary technique [illegible]
January 4, 2024 10:28:40 AM	End	Configuration	Session	None
January 4, 2024 10:32:44 AM	Start	Qualification	Session	OQ
January 4, 2024 10:39:44 AM	Start	Execution	CDS Logon Verification - GC - TRID - Qualitative test	None
January 4, 2024 10:40:00 AM	End	Execution	CDS Logon Verification - GC - TRID - Qualitative test	Run Count : 1

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User Name: eaknarin_puangsopa System Id: RYG_EN0136
Report Generated by Hostname: ASRYGN4074 Print Date: January 5, 2024 10:53:25 AM

ALS_OQ_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 4, 2024 10:46:05 AM	Start	Execution	System Inspection and Basic Safety and Operation - TRID - Qualitative Test - No setpoints associated	None
January 4, 2024 10:46:15 AM	End	Execution	System Inspection and Basic Safety and Operation - TRID - Qualitative Test - No setpoints associated	Run Count : 1
January 4, 2024 10:46:22 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
January 4, 2024 10:48:42 AM	End	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
January 4, 2024 10:49:54 AM	Start	Execution	GC Oven Temperature Accuracy - TRID - Temperature - Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
January 4, 2024 10:51:00 AM	Audit	Data	GC Oven Temperature Accuracy - TRID - Temperature - Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry
January 4, 2024 10:51:08 AM	End	Execution	GC Oven Temperature Accuracy - TRID - Temperature - Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
January 4, 2024 10:51:43 AM	Start	Execution	GC Oven Temperature Accuracy - TRID - Temperature - Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None
January 4, 2024 10:58:43 AM	Audit	Data	GC Oven Temperature Accuracy - TRID - Temperature - Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Manual Data Entry

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User Name: eaknarin_puangsopa System Id: RYG_EN0136
Report Generated by Hostname: ASRYGN4074 Print Date: January 5, 2024 10:53:25 AM

ALS_OQ_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 4, 2024 10:58:48 AM	End	Execution	GC Oven Temperature Accuracy - TRID - Temperature - Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	Run Count : 1
January 4, 2024 10:58:59 AM	Start	Execution	GC Oven Temperature Stability - TRID - Temperature - Oven - S: 100.0°C - L: <= 0.5°C	None
January 4, 2024 11:23:26 AM	Audit	Data	GC Oven Temperature Stability - TRID - Temperature - Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry
January 4, 2024 11:23:29 AM	End	Execution	GC Oven Temperature Stability - TRID - Temperature - Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
January 4, 2024 11:23:30 AM	Start	Execution	Log Amp - 5977B SQ - Source: EI - Extractor	None
January 4, 2024 11:41:33 AM	End	Execution	Log Amp - 5977B SQ - Source: EI - Extractor	Run Count : 1
January 4, 2024 11:41:39 AM	Start	Execution	RFPA - 5977B SQ - Source: EI - Extractor	None
January 4, 2024 11:53:23 AM	End	Execution	RFPA - 5977B SQ - Source: EI - Extractor	Run Count : 1
January 4, 2024 11:53:28 AM	Start	Execution	Tune EI - 5977B SQ - Source: EI - Extractor Filament 1 (Qualitative - No setpoints associated)	None
January 4, 2024 1:37:26 PM	End	Execution	Tune EI - 5977B SQ - Source: EI - Extractor Filament 1 (Qualitative - No setpoints associated)	Run Count : 1
January 4, 2024 1:37:29 PM	Start	Execution	Tune EI - 5977B SQ - Source: EI - Extractor Filament 2 (Qualitative - No setpoints associated)	None

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User Name: eaknarin_puangsopa System Id: RYG_EN0136
Report Generated by Hostname: ASRYGN4074 Print Date: January 5, 2024 10:53:25 AM

ALS_OQ_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 4, 2024 1:48:58 PM	End	Execution	Tune EI - 5977B SQ - Source: EI - Extractor Filament 2 (Qualitative - No setpoints associated)	Run Count : 1
January 4, 2024 1:49:02 PM	Start	Execution	Scouting Run - Manual Injection, Front SSL, SQ - Source: EI - Extractor. Part of GCMS System Preparation	None
January 4, 2024 2:20:35 PM	Audit	AutoClosed	Session	None
January 5, 2024 8:29:18 AM	Audit	AutoReloaded	Session	None
January 5, 2024 8:29:18 AM	Audit	Session Reloaded	Session	None
January 5, 2024 8:29:29 AM	Start	Qualification	Session	OQ
January 5, 2024 8:29:29 AM	Start	Execution	Scouting Run - Manual Injection, Front SSL, SQ - Source: EI - Extractor. Part of GCMS System Preparation	None
January 5, 2024 9:21:29 AM	Audit	Data	Scouting Run - Manual Injection, Front SSL, SQ - Source: EI - Extractor. Part of GCMS System Preparation	Data files Path: D:\GCMSData\[illegible]
January 5, 2024 9:21:32 AM	End	Execution	Scouting Run - Manual Injection, Front SSL, SQ - Source: EI - Extractor. Part of GCMS System Preparation	Run Count : 1
January 5, 2024 9:21:58 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	None

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User Name: eaknarin_puangsopa System Id: RYG_EN0136
Report Generated by Hostname: ASRYGN4074 Print Date: January 5, 2024 10:53:25 AM

ALS_OQ_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 5, 2024 9:25:38 AM	End	Qualification	Session	OQ
January 5, 2024 9:25:38 AM	Start	Reporting	Session	None
January 5, 2024 9:27:44 AM	End	Reporting	Session	None
January 5, 2024 9:27:44 AM	Start	Qualification	Session	OQ
January 5, 2024 9:27:44 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	None
January 5, 2024 9:33:18 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	Data files Path: D:\GCMSData\[illegible]
January 5, 2024 9:49:32 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 1 - L: >= 1200	Run Count : 1
January 5, 2024 9:49:32 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	None
January 5, 2024 9:56:16 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path: D:\GCMSData\[illegible]
January 5, 2024 10:00:19 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 1

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User Name: eaknarin_puangsopa System Id: RYG_EN0136
Report Generated by Hostname: ASRYGN4074 Print Date: January 5, 2024 10:53:25 AM

ALS_OQ_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 5, 2024 10:03:53 AM	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
January 5, 2024 10:03:53 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	None
January 5, 2024 10:13:48 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path: D:\GCMSData\[illegible]
January 5, 2024 10:17:38 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 2
January 5, 2024 10:22:04 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Deviation filed for Run Count : 2
January 5, 2024 10:22:04 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	None
January 5, 2024 10:22:18 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path: D:\GCMSData\[illegible]
January 5, 2024 10:25:37 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 3

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User Name: eaknarin_puangsopa System Id: RYG_EN0136
Report Generated by Hostname: ASRYGN4074 Print Date: January 5, 2024 10:53:25 AM

ALS_OQ_RYG_EN0136 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
January 5, 2024 10:29:11 AM	Audit	TestUnlocked	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Deviation filed for Run Count : 3
January 5, 2024 10:29:11 AM	Start	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	None
January 5, 2024 10:42:05 AM	Audit	Data	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Data files Path: D:\GCMSData\[illegible]
January 5, 2024 10:48:34 AM	End	Execution	Signal to Noise EI - Liquid Injection, Front SSL, SQ - Source: EI - Extractor using Filament 2 - L: >= 1200	Run Count : 4
January 5, 2024 10:48:41 AM	End	Qualification	Session	OQ
January 5, 2024 10:48:41 AM	Start	Reporting	Session	None
January 5, 2024 10:50:27 AM	Audit	Reporting	Session	Report Generated : Certificate
January 5, 2024 10:51:07 AM	Audit	Reporting	Session	Report Generated : Report
January 5, 2024 10:51:25 AM	Audit	Reporting	Session	Report Generated : Certificate
January 5, 2024 10:52:05 AM	Audit	Reporting	Session	Report Generated : Report

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ALS

ROTA METER CALIBRATION RESULT APRIL 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R^2)
BKK_FS0585	23 Apr 24	Y = 1.0322x + 2.25	0.9997
BKK_FS0587	23 Apr 24	Y = 1.0111x + 16.357	0.9984
BKK_FS0592	23 Apr 24	Y = 1.001x + 14.551	1.0000
BKK_FS0594	23 Apr 24	Y = 1.0048x + 4.9762	1.0000
BKK_FS1004	01 Apr 24	Y = 0.9826x + 12.32	0.9998
BKK_FS1005	01 Apr 24	Y = 1.0183x + 0.0633	0.9998
BKK_FS1006	01 Apr 24	Y = 1.1534x - 3.3241	[illegible]
BKK_FS1007	23 Apr 24	Y = 1.1084x + 2.9017	0.9994
BKK_FS1008	06 May 24	Y = 1.1347x + 2.1915	0.9996
BKK_FS1011	07 May 24	Y = 1.3995x - 7.1671	0.9994
BKK_FS1012	07 May 24	Y = 1.0488x - 26.533	0.9998
BKK_FS1013	07 May 24	Y = 1.0255x - 57.741	1.0000
BKK_FS1017	04 Apr 24	Y = 1.0213x + 0.1156	1.0000
BKK_FS1018	04 Apr 24	Y = 1.0007x + 1.3933	0.9999
BKK_FS1019	04 Apr 24	Y = 1.0038x - 1.3381	1.0000
BKK_FS1020	04 Apr 24	Y = 1.003x + 5.7656	1.0000
BKK_FS1021	04 Apr 24	Y = 1.0096x - 25.605	0.9926
BKK_FS1022	04 Apr 24	Y = 1.0937x - 103.66	0.9980
BKK_FS1023	07 May 24	Y = 1.1613x - 2.675	1.0000
BKK_FS1024	07 May 24	Y = 1.0157x - 4.3362	1.0000
BKK_FS1025	07 May 24	Y = 1.0018x - 4.6236	0.9998
BKK_FS1039	01 Apr 24	Y = 0.9909x + 11.357	0.9991
BKK_FS1040	01 Apr 24	Y = 1.0121x - 19.203	0.9996
BKK_FS1041	01 Apr 24	Y = 1.0176x + 1.4813	0.9996
BKK_FS1042	01 Apr 24	Y = 0.8927x + 10.76	0.9995
BKK_FS1043	01 Apr 24	Y = 0.9965x + 13.696	1.0000
BKK_FS1044	01 Apr 24	Y = 1.1159x - 0.9354	0.9978
PHK_FS0027	06 May 24	Y = 1.1281x + 0.4949	0.9997
PHK_FS0028	06 May 24	Y = 1.0332x - 1.8233	0.9999
PHK_FS0029	06 May 24	Y = 1.001x + 10.848	1.0000
RYG_FS0197	01 Apr 24	Y = 1.0045x + 10.275	1.0000
RYG_FS0198	01 Apr 24	Y = 1.0061x + 0.715	0.9999
RYG_FS0199	01 Apr 24	Y = 0.976x + 3.1497	0.9998
RYG_FS0654	01 Apr 24	Y = 1.0354x + 0.3361	0.9998
RYG_FS0655	01 Apr 24	Y = 0.978x + 13.603	0.9991
RYG_FS0656	01 Apr 24	Y = 1.0035x + 6.579	0.9999
RYG_FS0657	01 Apr 24	Y = 1.0233x + 0.8908	0.9982
RYG_FS0658	01 Apr 24	Y = 0.9905x + 9.8867	0.9996
RYG_FS0659	01 Apr 24	Y = 0.9994x + 13.924	1.0000

 ALS Laboratory Group

ROTA METER CALIBRATION RESULT APRIL 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R^2)
SGK_FS0135	23 Apr 24	Y = 1.0117x + 4.8833	1.0000
SGK_FS0136	23 Apr 24	Y = 1.0134x + 3.6467	1.0000
SGK_FS0138	04 Apr 24	Y = 1.0449x - 0.3684	0.9988
SGK_FS0139	04 Apr 24	Y = 1.0066x + 3.1267	0.9988
SGK_FS0140	04 Apr 24	Y = 1.0029x + 7.5181	1.0000
SGK_FS0141	23 Apr 24	Y = 1.1129x - 0.0619	0.9997
SGK_FS0142	23 Apr 24	Y = 1.0136x + 2.4267	0.9996
SGK_FS0143	23 Apr 24	Y = 1.0036x + 8.3162	1.0000

Review By : (Mr. Wichan Choonharat) Enviro Field Services Manager

Approved By : (Mr.Sarayuth Jitranont) Assistant General Manager

ROTA METER CALIBRATION RESULT JULY 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R^2)
BKK_FS0577	01 Jul 24	Y = 1.0001x + 0.0433	1.0000
BKK_FS0584	01 Jul 24	Y = 1.0056x - 2.7974	1.0000
BKK_FS0585	02 Jul 24	Y = 1.0315x + 3.0033	0.9998
BKK_FS0587	02 Jul 24	Y = 1.0294x + 0.71	1.0000
BKK_FS0588	01 Jul 24	Y = 0.9751x + 9.1452	0.9999
BKK_FS0591	01 Jul 24	Y = 1.0035x - 8.2303	1.0000
BKK_FS0592	02 Jul 24	Y = 1.002x + 14.273	1.0000
BKK_FS0594	02 Jul 24	Y = 1.0003x + 7.0095	1.0000
BKK_FS0595	01 Jul 24	Y = 1.0871x - 114.97	0.9985
BKK_FS1004	02 Jul 24	Y = 0.9826x + 13.51	0.9999
BKK_FS1005	02 Jul 24	Y = 1.0217x - 0.5833	0.9997
BKK_FS1006	02 Jul 24	Y = 1.149x - 1.0422	0.9981
BKK_FS1007	02 Jul 24	Y = 1.1116x + 3.3558	0.9994
BKK_FS1008	02 Jul 24	Y = 1.1273x + 0.4837	0.9999
BKK_FS1009	01 Jul 24	Y = 1.1044x - 0.8245	1.0000
BKK_FS1017	02 Jul 24	Y = 1.0488x + 2.2027	0.9998
BKK_FS1018	02 Jul 24	Y = 1.0173x - 0.1967	0.9999
BKK_FS1019	02 Jul 24	Y = 1.0022x + 5.619	1.0000
BKK_FS1026	01 Jul 24	Y = 1.072x - 2.4954	1.0000
BKK_FS1027	01 Jul 24	Y = 1.0104x - 4.4788	0.9999
BKK_FS1028	01 Jul 24	Y = 1.0009x - 3.7755	1.0000
BKK_FS1029	01 Jul 24	Y = 1.1118x - 4.4431	0.9985
BKK_FS1030	01 Jul 24	Y = 1.0159x - 6.395	1.0000
BKK_FS1031	01 Jul 24	Y = 0.9973x - 5.3371	0.9999
BKK_FS1039	02 Jul 24	Y = 0.9992x + 9.1833	0.9992
BKK_FS1040	01 Jul 24	Y = 1.0034x - 2.5343	1.0000
BKK_FS1041	02 Jul 24	Y = 1.0511x + 1.1272	0.9996
BKK_FS1042	02 Jul 24	Y = 1.0016x + 10.387	0.9995
BKK_FS1043	01 Jul 24	Y = 0.9965x + 9.3743	1.0000
BKK_FS1044	02 Jul 24	Y = 1.1237x - 0.4231	0.9981
BKK_FS1200	01 Jul 24	Y = 1.0337x - 0.1016	0.9994
BKK_FS1201	01 Jul 24	Y = 0.9871x + 5.0931	0.9986
BKK_FS1202	01 Jul 24	Y = 0.7978x + 301.39	0.9334
PHK_FS0027	02 Jul 24	Y = 1.0722x + 3.4395	0.9988
PHK_FS0028	02 Jul 24	Y = 1.0254x + 1.04	1.0000
PHK_FS0029	02 Jul 24	Y = 0.999x + 12.73	1.0000
RYG_FS0197	01 Jul 24	Y = 1.0045x + 10.291	1.0000
RYG_FS0198	01 Jul 24	Y = 1.0056x + 1.8883	1.0000
RYG_FS0199	02 Jul 24	Y = 1.0029x + 3.2381	0.9990

ROTA METER CALIBRATION RESULT JULY 2024

Rotameter ID.	Calibration Date	Regression Result	Coefficient (R^2)
RYG_FS0654	02 Jul 24	Y = 1.0421x + 1.4935	1.0000
RYG_FS0655	02 Jul 24	Y = 0.875x + 15.2	0.9994
RYG_FS0656	01 Jul 24	Y = 1.0042x + 7.1067	0.9999
RYG_FS0657	02 Jul 24	Y = 1.0337x + 1.6918	0.9998
RYG_FS0658	02 Jul 24	Y = 0.9921x + 10.87	0.9996
RYG_FS0659	01 Jul 24	Y = 1.0022x + 8.4152	1.0000
SGK_FS0135	02 Jul 24	Y = 1.0193x + 3.6833	0.9999
SGK_FS0136	02 Jul 24	Y = 1.0217x + 1.63	1.0000
SGK_FS0138	02 Jul 24	Y = 1.055x + 4.5833	0.9999
SGK_FS0139	02 Jul 24	Y = 1.0154x + 3.74	0.9998
SGK_FS0140	02 Jul 24	Y = 1.0008x + 13.353	1.0000
SGK_FS0141	02 Jul 24	Y = 1.1185x + 1.4867	0.9998
SGK_FS0142	02 Jul 24	Y = 1.0211x + 1.39	1.0000
SGK_FS0143	02 Jul 24	Y = 1.0045x + 5.6981	1.0000

Review By : (Mr. Wichan Choonharat) Enviro Field Services Manager

Approved By : (Mr.Sarayuth Jitranont) Assistant General Manager

INNOVATIVE ANAB

Certificate of Calibration

[illegible]

$$Q_{meas} = Q_{ref}\ x\ \frac{P_{ref}}{P_{ref}}\ x\ \frac{T_{meas}}{T_{ref}}$$

End of Certificate

BKK_FS0614

MesaLabs NVLAP NVLAP Lab Code 200661-0 Calibration

Calibration Certificate

Certificate No. 810583 Sold To:
Product 200-510M Defender 510 Medium Flow
Serial No. 151114
Cal. Date 21-May-2024

All calibrations are performed in accordance with ISO 17025 at Mesa Laboratories, Inc., 12100 W. 6th Ave. Lakewood, CO 80228, an ISO 17025:2017 accredited laboratory through NVLAP. This report shall not be reproduced except in full without the written approval of the laboratory. Results only relate to the items calibrated. This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

As Received Calibration Data

Technician Derek Delape Lab Pressure 614.2 mmHg Lab Temperature 24.3 °C

Instrument Reading	Lab Standard Reading	Deviation	Allowable Deviation	As Received
0 ccm	4504.61 ccm	-100.0%	1.00%	Out of Tolerance
0 ccm	1000.98 ccm	-100.0%	1.00%	Out of Tolerance
0 ccm	249.55 ccm	-100.0%	1.00%	Out of Tolerance

Mesa Laboratories Standards Used

Description	Standard Serial Number	Calibration Date	Calibration Due Date
ML-800-24	117991	13-Nov-2023	13-Nov-2024

MesaLabs NVLAP NVLAP Lab Code 200661-0 Calibration

As Shipped Calibration Data

Certificate No 810583 Technician Derek Delape Lab Pressure 617 mmHg Lab Temperature 24.0 °C

Instrument Reading	Lab Standard Reading	Deviation	Allowable Deviation	As Shipped
4482.47 ccm	4493.49 ccm	-0.25%	1.00%	In Tolerance
997.25 ccm	994.83 ccm	0.24%	1.00%	In Tolerance
248.51 ccm	248.67 ccm	-0.06%	1.00%	In Tolerance

Mesa Laboratories Standards Used

Description	Standard Serial Number	Calibration Date	Calibration Due Date
ML-800-24	211062	04 Oct 2023	04-Oct-2024

Calibration Notes

The expanded uncertainty of flow has a coverage factor of k = 2 for a confidence interval of approximately 95%.

Flow testing is in accordance with our test number MP-00672 with an expanded uncertainty of 0.27% using high-purity nitrogen or filtered laboratory air.

Traceability to the International System of Units (SI) is verified by accreditation to ISO/IEC 17025 by NVLAP under NVLAP Code 200661-0.

Technician Notes:

By: Approved By: Troy Thacker

Derek Delape, Production Assembler II — Troy Thacker, Quality Engineer

[illegible]

INNOVATIVE ANAB

Certificate of Calibration

[illegible]

INNOVATIVE ANAB

$$Q_{meas} = Q_{ref}\ x\ \frac{P_{ref}}{P_{ref}}\ x\ \frac{T_{meas}}{T_{ref}}$$

End of Certificate

INNOVATIVE INSTRUMENT CALIBRATION LAB

Certificate of Calibration

Customer

Name: ALS Laboratory Group Thailand Co., Ltd.

Address: 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang, Bangkok 10250

Certificate No : 24-AFM-032

Request No : Req-2024-0240

Unit Under Calibration Details

Measurement Item: Primary Flow Calibrator

Manufacturer: Bios

Model: Defender 530M

Serial Number: [illegible]

ID: [illegible]

Location of Calibration: LAB-FAIR VELOCITY METER

Sensor Model: -

Sensor Serial Number: -

Calibration Environment and Details

Temperature: [illegible]

Humidity: [illegible]

Barometric Pressure: 101.3 kPa ± 10 kPa

Received Date: 31 January 2024

Calibration Date: 13 February 2024

Calibration Procedure: In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	[illegible]	Sensidyne	12 July 2024
Air Flow Meter	Gilibrator 3 Standard flow	[illegible]	Sensidyne	12 July 2024
Temperature meter	[illegible]	[illegible]	Qualtech	21 February 2024
Pressure meter	[illegible]	[illegible]	TPA	9 November 2024

Traceability

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. [illegible]

Note :

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k = 2, providing a level of confidence approximately 95%.

Calibration By: Mr. [illegible] — Senior Calibration Engineer

Approved By: Mr. Pisit Mathawee — Calibration Engineer Supervisor

Issue Date: 13 February 2024

REVIEW BY: [signature]

APPROVED BY: [signature]

NEXT CAL. DATE: 13/2/25

FM-703-AFM-01 Rev.03 Issue date 25/01/24

INNOVATIVE INSTRUMENT CALIBRATION LAB

Page 2/2

Certificate No : 24-AFM-032

Request No : Req-2024-0240

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)
23.89	101.89	95	100.41	5.4	2.8
23.90	101.71	500	513.57	12.9	5.2
24.18	101.82	1006	1019.3	13	14
24.09	101.81	1997	2023.0	26	26
24.10	101.67	2999	3035.5	37	45
24.60	102.31	3944	3991.8	49	59
24.80	102.08	4749	4793.5	52	72

Note: STD : Standard UUC : Unit Under Calibration

- UUC Reference Condition : Atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{ref}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate, P = Absolute Pressure, T = Absolute Temperature, Meas = Measurement Condition, ref = Standard Condition

* Indicates not accredited

End of Certificate

FM-703-AFM-01 Rev.03 Issue date 25/01/24

INNOVATIVE INSTRUMENT CALIBRATION LAB

Certificate of Calibration

Customer

Name: ALS Laboratory Group Thailand Co., Ltd.

Address: 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang, Bangkok 10250

Certificate No : 24-AFM-174

Request No : Req-2024-[illegible]

Unit Under Calibration Details

Measurement Item: Air Flow Meter

Manufacturer: SensiLabs

Model: [illegible]

Serial Number: [illegible]

ID: [illegible]

Location of Calibration: LAB-FAIR VELOCITY METER

Accessory: Flow Reading

Sensor Model: -

Sensor Serial Number: -

Instrument Status: Used

Calibration Environment and Details

Temperature: [illegible]

Humidity: [illegible]

Barometric Pressure: [illegible]

Received Date: 22 August 2024

Calibration Date: [illegible] August 2024

Calibration Procedure: In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

REVIEW BY: [signature]

APPROVED BY: [signature]

NEXT CAL. DATE: 28/8/25

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	[illegible]	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	[illegible]	Sensidyne	2 August 2025
Temperature meter	GT-11	[illegible]	Qualtech	1 March 2025
Pressure meter	[illegible]	[illegible]	TPA	9 November 2024

Traceability

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. [illegible]

Note :

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k = 2, providing a level of confidence approximately 95%.

Calibration By: Mr. [illegible] — Senior Calibration Engineer

Approved By: Mr. Pisit Mathawee — Calibration Engineer Supervisor

Issue Date: [illegible] August 2024

FM-703-AFM-01 Rev.04 Issue date 27/6/24

INNOVATIVE INSTRUMENT CALIBRATION LAB

Certificate No : 24-AFM-174

Request No : Req-2024-[illegible]

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
22.50	100.37	100	99.526	-0.5	2.6	3	N.A
22.60	100.53	495	496.48	1.5	2.6	5	N.A
22.50	100.58	1003	1004.0	1	11	10	N.A
22.69	100.56	2008	2013.3	5	28	20	N.A
22.81	100.52	3454	3012.3	2	45	30	N.A
23.21	100.74	5002	4022.4	19	48	40	N.A
23.45	100.71	5067	5026.5	4	76	51	N.A

Note: STD : Standard UUC : Unit Under Calibration

- UUC Reference Condition : Atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{ref}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate, P = Absolute Pressure, T = Absolute Temperature, Meas = Measurement Condition, ref = Standard Condition

* Indicates not accredited

MPE = Maximum Permissible Error (Specified by Manufacturer's Specification)

N.A = Not Available : Customer does not require a statement of conformity

FM-703-AFM-01 Rev.04 Issue date 27/6/24

INNOVATIVE INSTRUMENT CALIBRATION LAB

Certificate No : 24-AFM-174

Request No : Req-2024-[illegible]

Decision Rule for Statements of Conformity

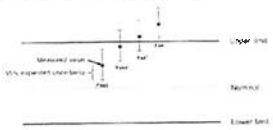
[illegible]

Pass : [illegible]

Pass* : [illegible]

Fail* : [illegible]

Fail : [illegible]



End of Certificate

FM-703-AFM-01 Rev.04 Issue date 27/6/24

INNOVATIVE INSTRUMENT CALIBRATION LAB

Certificate of Calibration

Customer

Name: ALS Laboratory Group Thailand Co., Ltd.

Address: 104 Soi Phatthanakan 40, Phatthanakan Road, Suan Luang, Bangkok 10250

Certificate No : 24-AFM-[illegible]

Request No : Req-2024-[illegible]

Unit Under Calibration Details

Measurement Item: Air Flow Meter

Manufacturer: Bios

Model: Defender 530

Serial Number: [illegible]

ID: [illegible]

Location of Calibration: LAB-FAIR VELOCITY METER

Accessory: Flow Reading

Sensor Model: -

Sensor Serial Number: -

Instrument Status: Used

Calibration Environment and Details

Temperature: [illegible]

Humidity: [illegible]

Barometric Pressure: [illegible]

Received Date: 22 August 2024

Calibration Date: 9 September 2024

Calibration Procedure: In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator

REVIEW BY: [signature]

APPROVED BY: [signature]

NEXT CAL. DATE: 9/9/25

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	[illegible]	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	[illegible]	Sensidyne	2 August 2025
Temperature meter	GT-11	[illegible]	[illegible]	1 March 2025
Pressure meter	[illegible]	[illegible]	TPA	9 November 2024

Traceability

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. [illegible]

Note :

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k = 2, providing a level of confidence approximately 95%.

Calibration By: Mr. [illegible] — Senior Calibration Engineer

Approved By: Mr. Pisit Mathawee — Calibration Engineer Supervisor

Issue Date: 9 September 2024

FM-703-AFM-01 Rev.04 Issue date 27/6/24

INNOVATIVE INSTRUMENT CALIBRATION LAB

Certificate No : 24-AFM-[illegible]

Request No : Req-2024-[illegible]

Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (cc/min)	UUC (cc/min)	Error (cc/min)	Uncertainty (cc/min)	MPE (cc/min)	Result
24.70	100.92	20	20.192	0.2	1.1	0.2	N.A
24.70	100.93	100	99.923	0.1	2.5	1.0	N.A
24.70	100.93	250	250.7	0.7	5.6	2.0	N.A
24.70	100.97	299	300.1	2.1	8.4	3.6	N.A
24.70	100.9[illegible]	400	399.1	-1	11	4.0	N.A
24.80	[illegible]	482	477.6	-4.4	6.9	3.1	N.A

Note: STD : Standard UUC : Unit Under Calibration

- UUC Reference Condition : Atmospheric pressure and room temperature condition
- Flow Rate was corrected for non-standard operating condition by using equation

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P_{ref}} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate, P = Absolute Pressure, T = Absolute Temperature, Meas = Measurement Condition, ref = Standard Condition

* Indicates not accredited

MPE = Maximum Permissible Error (Specified by Manufacturer's Specification)

N.A = Not Available : Customer does not require a statement of conformity

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INNOVATIVE INSTRUMENT CALIBRATION LAB

Certificate No : 24-AFM-[illegible]

Request No : Req-2024-[illegible]

Decision Rule for Statements of Conformity

[illegible]

Pass : [illegible]

Pass* : [illegible]

Fail* : [illegible]

Fail : [illegible]

End of Certificate

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Certificate of System Qualification

GC-OQ

REVIEW BY: [signature]

APPROVED BY: [signature]

NEXT CAL. DATE: [illegible]

System ID: CN11461005

Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.

Organization Location: 104 Soi 40 Phatthanakan Rd Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250

Date: April 21, 2023 3:26:38 PM

EQP Name: AgilentRecommended

EQP Revision: GC 02.02

Overall Qualification Status: Pass

CDS Logon Verification - OC

Logon: [illegible]

Overall CDS Logon Verification - OC 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 Decay

Name: 7890

Front: SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: [illegible] psi [illegible] minutes

Agilent Recommended: >= -2.0 and <= 1.5

Date: April 21, 2023 3:26:38 PM

System ID: CN11461005

Page 1 of 3

Overall Inlet Pressure Decay Test Status
Pass

Inlet Pressure Accuracy
Name: 7890 Front SSL
Setpoint Status: Pass
Setpoint / Actual
Inlet Pressure: 25.0 psi / 25.2 psi
Accuracy: 0.2 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 / Actual
Inlet Pressure: 25.0 psi / 24.8 psi
Accuracy: 0.2 psi
Agilent Recommended: <= 1.2

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: Air
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.

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: 24.1 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

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 / 100.0033 °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

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: 7890
Setpoint Status: Pass
Base Signal: 23.7 pA

	ASTM Noise	Drift
	pA	pA/hr
	0.04	0.05
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 uL
Area RSD: 0.32 % — Retention Time RSD: 0.07 %
Agilent Recommended: <= 3.00 — <= .50

Overall Injection Precision Test Status
Pass

Signal to Noise

Tested Combination1 Front SSL / Front FID
Injection Tower
Name: 7890
Setpoint Status: Pass
Signal to Noise: 721758
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: 7890
Setpoint Status: Pass
Base Signal: 22.8 pA

	ASTM Noise	Drift
	pA	pA/hr
	0.07	0.09
Agilent Recommended:	<= 0.10	<= 2.50
Status:	Pass	Pass

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: 1.25 % — Retention Time RSD: 0.03 %
Agilent Recommended: <= 3.00 — <= 1.00

Overall Injection Precision Test Status
Pass

Signal to Noise
Tested Combination2 Back SSL / Back FID
Injection Tower
Name: 7890
Setpoint Status: Pass
Signal to Noise: 2404356
Agilent Recommended: >= 300000

Overall Signal to Noise Test Status
Pass

Instrument Details

Purpose
This section describes the as found system configuration.

Details

System
- System ID: CN11461066
- Manufacturer: Agilent Technologies
- Name: 7890
- Flow Data Input: Manual Data
- Temperature Data Input: Manual Data or Other Data Logging

Tested Combination1
- Injection Technique: Injection Tower
- Sample Identifier: Sample 2
- Inlet: Front
- Detector: Front
- LTM Included? No

Tested Combination2
- Injection Technique: Injection Tower
- Sample Identifier: Sample 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.1.1.01
- Vial Heater: Not Installed

Sampler 2
- Manufacturer: Agilent Technologies
- Type: Injection Tower
- Name: 7693A
- Model Number: G4513A
- Serial Number: CN15280125
- Firmware Revision: A.10.09
- Usage: Sample Injection
- Location: Front
- Syringe Volume (uL): 10

Sampler 3
- Manufacturer: Agilent Technologies
- Type: Injection Tower
- Name: 7693A
- Model Number: G4513A
- Serial Number: CN13340103
- Firmware Revision: A.10.09
- Usage: Sample Injection
- Location: Back
- Syringe Volume (uL): 10

Mainframe 1
- Manufacturer: Agilent Technologies
- Name: 7890
- Model Number: G3440A
- Serial Number: CN11461066
- Firmware Revision: Version 4.27
- Oven Type: Standard

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
Adaptor	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Front
Makeup Gas	Nitrogen

Detector 2

Manufacturer	Agilent Technologies
Name	7890
Type	FID
Adaptor	Capillary
Control Type	Electronic Pressure Control (EPC)
Location	Back
Makeup Gas	Nitrogen

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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User Name: saenguthai.tarak
Hostname: LAPTOP-CQ3MKOWY
System Id: CN11461088
Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_DW127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:21:36 AM	Audit	SessionCreated	Session	None
April 21, 2023 11:21:38 AM	Start	Configuration	Session	None
April 21, 2023 11:21:39 AM	Audit	Entitlement	Licensing	User is Nonexpiring and does not require an unlock code
April 21, 2023 11:22:04 AM	Audit	SopLoaded	Session	SOP details for primary technique [Gc] - File path: [illegible], SOP File Name: [illegible], SOP Name: [AgilentRecommended],Protocol Version: [illegible]
April 21, 2023 11:22:06 AM	End	Configuration	Session	None
April 21, 2023 11:22:14 AM	Start	Qualification	Session	OQ
April 21, 2023 11:22:14 AM	Start	Execution	CDS Logon Verification - GC - Qualitative test	None
April 21, 2023 11:22:14 AM	End	Execution	CDS Logon Verification - GC - Qualitative test	Run Count : 1
April 21, 2023 11:22:16 AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	None
April 21, 2023 11:23:36 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	Run Count : 1
April 21, 2023 11:23:37 AM	Start	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: >= -3.0 psi and <= 0.5 psi	None

Page 1 / 11

User Name: saenguthai.tarak
Hostname: LAPTOP-CQ3MKOWY
System Id: CN11461088
Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_DW127_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: >= -3.0 psi and <= 0.5 psi	Run Count : 1
April 21, 2023 11:24:04 AM	Start	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
April 21, 2023 11:24:06 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: >= -3.0 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: >= -3.0 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: saenguthai.tarak
Hostname: LAPTOP-CQ3MKOWY
System Id: CN11461088
Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_DW127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:25:29 AM	Start	Execution	Detector Flow Accuracy - Front FID - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	None
April 21, 2023 11:25:40 AM	Audit	Data	Detector Flow Accuracy - Front FID - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Manual Data Entry
April 21, 2023 11:25:43 AM	End	Execution	Detector Flow Accuracy - Front FID - Type : Oxidizer - S: 400.0 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 11:26:06 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint	None
April 21, 2023 11:26:18 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 11:26:38 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: saenguthai.tarak
Hostname: LAPTOP-CQ3MKOWY
System Id: CN11461088
Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_DW127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:26:41 AM	End	Execution	Detector Flow Accuracy - Back FID - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint	Run Count : 1
April 21, 2023 11:26:45 AM	Start	Execution	Detector Flow Accuracy - Back FID - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint	None
April 21, 2023 11:27:01 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 11:27:26 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 11:27:27 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 11:27:36 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 11:27:37 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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User Name: saenguthai.tarak
Hostname: LAPTOP-CQ3MKOWY
System Id: CN11461088
Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_DW127_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 11:27:58 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 11:29:12 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 files Path : C:\Users\Public\Documents\ChemStation\3\Data\OQ_GC-6_ALS_2023-04-20OQ_GC-6_2023 2023-04-20 14-36-09\[illegible]
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	Noise and Drift - Front FID - Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.00 pA/hour	None

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User Name: saenguthai.tarak
Hostname: LAPTOP-CQ3MKOWY
System Id: CN11461088
Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_DW127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:31:41 AM	Audit	Data	Noise and Drift - Front FID - Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.00 pA/hour	Data files Path : C:\Users\Public\Documents\ChemStation\3\Data\OQ_GC-6_ALS_2023-04-20OQ_GC-6_2023 2023-04-20 14-36-09\[illegible]
April 21, 2023 11:32:00 AM	End	Execution	Noise and Drift - Front FID - Detector FID - L (Noise) <= 0.10 pA - L (Drift) <= 2.00 pA/hour	Run Count : 1
April 21, 2023 11:32:[illegible] AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%	None
April 21, 2023 11:32:23 AM	Start	Execution	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%	None
April 21, 2023 11:33:23 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%	Data files Path : C:\Users\Public\Documents\ChemStation\3\Data\OQ_GC-6_ALS_2023-04-20OQ_GC-6_2023 2023-04-20 14-36-09\[illegible]
April 21, 2023 11:33:55 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%	Data files Path : C:\Users\Public\Documents\ChemStation\3\Data\OQ_GC-6_ALS_2023-04-20OQ_GC-6_2023 2023-04-20 14-36-09\[illegible]

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User Name: saenguthai.tarak
Hostname: LAPTOP-CQ3MKOWY
System Id: CN11461088
Print Date: April 21, 2023 3:26:40 PM

GC-6_BKK_DW127_ALS Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
April 21, 2023 11:33:56 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%	Data files Path : C:\Users\Public\Documents\ChemStation\3\Data\OQ_GC-6_ALS_2023-04-20OQ_GC-6_2023 2023-04-20 14-36-09\[illegible]
April 21, 2023 11:33:58 AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%	Data files Path : C:\Users\Public\Documents\ChemStation\3\Data\OQ_GC-6_ALS_2023-04-20OQ_GC-6_2023 2023-04-20 14-36-09\[illegible]
April 21, 2023 11:[illegible] AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%	Data files Path : C:\Users\Public\Documents\ChemStation\3\Data\OQ_GC-6_ALS_2023-04-20OQ_GC-6_2023 2023-04-20 14-36-09\[illegible]
April 21, 2023 11:[illegible] AM	Audit	Data	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area) <= 3.00% - L (Ret. Time) <= 1.00%	Data files Path : C:\Users\Public\Documents\ChemStation\3\Data\OQ_GC-6_ALS_2023-04-20OQ_GC-6_2023 2023-04-20 14-36-09\[illegible]
April 21, 2023 11:35:00 AM	End	Execution	Injection Precision - Injection Tower, Front SSL, Front FID - GC - L (Area) <= 3.00% - L (Ret. 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: >= [illegible]	None

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Date: April 21, 2023 3:26:38 PM
System ID: CH11451056

Date: April 21, 2023 3:26:38 PM
System ID: CH11451056

Date: April 21, 2023 3:26:38 PM
System ID: CH11451056

Date: April 21, 2023 3:26:38 PM
System ID: CH11451056

Certificate of System Qualification

GC DQ

System ID	GC-6_CH11451056
Organization Name	ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location	184 Soi 43 Phatthanakan Rd., Khwang Suan Luang, Khet Suan Luang, Bangkok 10250
Date	October 22, 2024 9:27:00 AM
EDP Name	AgilentRecommended
EDP Reason	GC&LSU
Overall Qualification Status	Pass

REVIEW BY
APPROVED BY
NEXT CAL DATE 22 Apr 2025

CDS Logon Verification - LIF

Login: SampleTube

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 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

Date: October 22, 2024 9:27:00 AM
System ID: GC-6_CH11451056

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890
Front SSL

Setpoint Status: Pass

	Setpoint	Actual	
Inlet Pressure:	25.0 psi	25.07 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

Date: October 22, 2024 9:27:00 AM
System ID: GC-6_CH11451056

Setpoint Status: Pass

	Setpoint	Actual	
Inlet Pressure:	25.0 psi	25.00 psi	
Accuracy:		0.1	psi
Agilent Recommended:		<= 1.2	

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: 28.8 mL/min
Accuracy: 1.2 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: 393 mL/min
Accuracy: 8.0 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: 25.4 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).

Date: October 22, 2024 9:27:00 AM
System ID: GC-6_CH11451056

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: 30.8 mL/min
Accuracy: 0.8 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: 393 mL/min
Accuracy: 7.0 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: 25.2 mL/min
Accuracy: 0.2 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 22, 2024 9:27:00 AM
System ID: GC-6_CH11451056

Setpoint Status: Pass
Zone: Oven

	Setpoint	Actual	
Temperature:	230.0	230.3	°C
Accuracy:		0.3	°C
Agilent Recommended:	<= -1.0	% setpoint in K	(-6.0 °C)
	<= 1.0	% setpoint in K	(5.0 °C)

Setpoint Status: Pass
Zone: Oven

	Setpoint	Actual	
Temperature:	100.0	100.0	°C
Accuracy:		0.0	°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	100.0167	°C
Stability:		0.1	°C
Agilent Recommended:	<= 0.5		

Overall GC Oven Temperature Stability Test Status

Pass

Scouting Run

Tested Combination: Front SSL / Front FID
Injection Tower
Name: 7683A

Date: October 22, 2024 9:27:00 AM
System ID: GC-6_CH11451056

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:	7890			
Setpoint Status:	Pass			
Base Signal:	14.05 pA			

	ASTM Noise pA	Drift pA/Hr
	0.05	0.03
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 uL			
Area RSD:	0.30 %		Retention Time RSD:	0.63 %
Agilent Recommended:	<= 3.00			<= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1	Front Injection Tower	SSL	/ Front	FID
Name:	7890			
Setpoint Status:	Pass			
Signal to Noise:	11078526			
Agilent Recommended:	>= 300000			

Overall Signal to Noise Test Status

Pass

Scouting Run

Tested Combination2	Back Injection Tower	SSL	/ Back	FID
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:	7890			
Setpoint Status:	Pass			
Base Signal:	13.79 pA			

	ASTM Noise pA	Drift pA/Hr
	0.05	0.01
Agilent Recommended:	<= 0.10	<= 2.50
Status:	Pass	Pass

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:	1.06 %		Retention Time RSD:	0.93 %
Agilent Recommended:	<= 3.00			<= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination2	Back Injection Tower	SSL	/ Back	FID
Name:	7890			
Setpoint Status:	Pass			
Signal to Noise:	1771221			
Agilent Recommended:	>= 300000			

Overall Signal to Noise Test Status

Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System	
System ID	GC-6_CN11461066
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging
Tested Combination1	
Injection Technique	Injection Tower
Sampler Identifier	Sampler 1
Inlet	Front
Detector	Front
LTM Included?	No
Tested Combination2	
Injection Technique	Injection Tower
Sampler Identifier	Sampler 2
Inlet	Back
Detector	Back
LTM Included?	No
Sampler 1	
Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CNCN10340103
Firmware Revision	A.11.06
Usage	Sample Injection
Location	Front
Syringe Volume (µL)	10

Sampler 2	
Manufacturer	Agilent Technologies
Type	Injection Tower
Name	7693A
Model Number	G4513A
Serial Number	CN16280128
Firmware Revision	A.11.06
Usage	Sample Injection
Location	Back
Syringe Volume (µL)	10
Sampler 3	
Manufacturer	Agilent Technologies
Type	Tray
Name	7693A
Model Number	G4514A
Serial Number	CN15360030
Firmware Revision	A.11.03
Vial Heater	Not Installed
Mainframe 1	
Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN11461066
Firmware Revision	A.01.18
Oven Type	Standard

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

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 logon 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:	Saengutha Tarak
Logged On User Name:	saengutha.tarak@non.agilent.com
Signature Creation Date:	October 22, 2024
Reason for Signature:	Executed protocol and published this original version of document

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User Name: [illegible]
Report Generated by Hostname: LAPTOP-[illegible]

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQ/PV Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:16:06 PM	Audit	SessionCreated	Session	None
October 21, 2024 3:16:07 PM	Start	Configuration	Session	None
October 21, 2024 3:16:07 PM	Audit	Entitlement	Licensing	[illegible]
October 21, 2024 3:22:40 PM	Audit	[illegible]	Session	EOP [illegible]
October 21, 2024 3:22:44 PM	End	Configuration	Session	None
October 21, 2024 3:22:47 PM	Start	Qualification	Session	OQ
October 21, 2024 3:22:48 PM	Start	Execution	CDS Logon Verification - GC - 7890 - Qualification test	None
October 21, 2024 3:23:36 PM	End	Execution	CDS Logon Verification - GC - 7890 - Qualification test	Run Count : 1
October 21, 2024 3:23:46 PM	Start	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - [illegible]	None
October 21, 2024 3:23:59 PM	End	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - [illegible]	Run Count : 1

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User Name: [illegible]
Report Generated by Hostname: LAPTOP-[illegible]

System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQ/PV Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:24:01 PM	Start	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet - [illegible]	None
October 21, 2024 3:25:26 PM	End	Execution	Inlet Pressure Decay - Front SSL - Pressure Controlled Inlet - [illegible]	Run Count : 1
October 21, 2024 3:25:28 PM	Start	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - [illegible]	None
October 21, 2024 3:25:32 PM	End	Execution	Inlet Pressure Accuracy - Front SSL - Pressure Controlled Inlet - [illegible]	Run Count : 1
October 21, 2024 3:25:50 PM	Start	Execution	Inlet Pressure Decay - Back SSL - Pressure Controlled Inlet - [illegible]	None
October 21, 2024 3:28:01 PM	End	Execution	Inlet Pressure Decay - Back SSL - Pressure Controlled Inlet - [illegible]	Run Count : 1
October 21, 2024 3:28:05 PM	Start	Execution	Inlet Pressure Accuracy - Back SSL - Pressure Controlled Inlet - [illegible]	None
October 21, 2024 3:28:10 PM	End	Execution	Inlet Pressure Accuracy - Back SSL - Pressure Controlled Inlet - [illegible]	Run Count : 1
October 21, 2024 3:28:13 PM	Start	Execution	Detector Flow Accuracy - Front FID - Type : Fuel - [illegible]	None

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User Name: [illegible]
Report Generated by Hostname: LAPTOP-CO33AOMV
System Id: GC-6_CN11461066
Print Date: October 22, 2024 9:27:06 AM

2024_ALS_GC-6_CN11461066_OQ/PV Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:26:50 PM	Audit	Data	Detector Flow Accuracy : Front FID : Type : Fuel : S: 30.0 mL/min : L <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:26:53 PM	End	Execution	Detector Flow Accuracy : Front FID : Type : Fuel : S: 30.0 mL/min : L <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:26:54 PM	Start	Execution	Detector Flow Accuracy : Front FID : Type : Oxidizer : S: 400.0 mL/min : L <= 10.0% setpoint	None
October 21, 2024 3:27:10 PM	Audit	Data	Detector Flow Accuracy : Front FID : Type : Oxidizer : S: 400.0 mL/min : L <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:27:11 PM	End	Execution	Detector Flow Accuracy : Front FID : Type : Oxidizer : S: 400.0 mL/min : L <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:29:11 PM	Start	Execution	Detector Flow Accuracy : Front FID : Type : Makeup : S: 25.0 mL/min : L <= 10.0% setpoint	None
October 21, 2024 3:29:27 PM	Audit	Data	Detector Flow Accuracy : Front FID : Type : Makeup : S: 25.0 mL/min : L <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:29:29 PM	End	Execution	Detector Flow Accuracy : Front FID : Type : Makeup : S: 25.0 mL/min : L <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:29:30 PM	Start	Execution	Detector Flow Accuracy : Back FID : Type : Fuel : S: 30.0 mL/min : L <= 10.0% setpoint	None
October 21, 2024 3:29:47 PM	Audit	Data	Detector Flow Accuracy : Back FID : Type : Fuel : S: 30.0 mL/min : L <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:29:52 PM	End	Execution	Detector Flow Accuracy : Back FID : Type : Fuel : S: 30.0 mL/min : L <= 10.0% setpoint	Run Count : 1

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Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:29:54 PM	Start	Execution	Detector Flow Accuracy : Back FID : Type : Oxidizer : S: 400.0 mL/min : L <= 10.0% setpoint	None
October 21, 2024 3:30:07 PM	Audit	Data	Detector Flow Accuracy : Back FID : Type : Oxidizer : S: 400.0 mL/min : L <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:30:09 PM	End	Execution	Detector Flow Accuracy : Back FID : Type : Oxidizer : S: 400.0 mL/min : L <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:30:11 PM	Start	Execution	Detector Flow Accuracy : Back FID : Type : Makeup : S: 25.0 mL/min : L <= 10.0% setpoint	None
October 21, 2024 3:30:34 PM	Audit	Data	Detector Flow Accuracy : Back FID : Type : Makeup : S: 25.0 mL/min : L <= 10.0% setpoint	Manual Data Entry
October 21, 2024 3:30:37 PM	End	Execution	Detector Flow Accuracy : Back FID : Type : Makeup : S: 25.0 mL/min : L <= 10.0% setpoint	Run Count : 1
October 21, 2024 3:30:38 PM	Start	Execution	GC Oven Temperature Accuracy : 7890 : Temperature : Oven : S: 230.0°C : L <= ±1.0 AND <= 1.0 % setpoint in K	None
October 21, 2024 3:31:56 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
October 21, 2024 3:31:57 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

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Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 21, 2024 3:31:58 PM	Start	Execution	GC Oven Temperature Accuracy : 7890 : Temperature : Oven : S: 100.0°C : L <= ±1.0 AND <= 1.0 % setpoint in K	None
October 21, 2024 3:34:37 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
October 21, 2024 3:34:38 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
October 21, 2024 3:34:42 PM	Start	Execution	GC Oven Temperature Stability : 7890 : Temperature : Oven : S: 100.0°C : L <= 0.5°C	None
October 21, 2024 3:39:06 PM	Audit	Data	GC Oven Temperature Stability : 7890 : Temperature : Oven : S: 100.0°C : L <= 0.5°C	Manual Data Entry
October 21, 2024 3:39:07 PM	End	Execution	GC Oven Temperature Stability : 7890 : Temperature : Oven : S: 100.0°C : L <= 0.5°C	Run Count : 1
October 21, 2024 3:39:32 PM	Start	Execution	GC Scouting Run : Injection Tower, Front SSL, Front FID : Part of System Preparation : No limits associated	None
October 21, 2024 3:40:13 PM	Audit	AutoClosed	Session	None
October 22, 2024 8:55:47 AM	Audit	AutoRestored	Session	None
October 22, 2024 8:55:50 AM	Audit	SessionRefreshed	Session	None
October 22, 2024 8:56:02 AM	Start	Qualification	Session	OQ

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Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 8:56:02 AM	Start	Execution	GC Scouting Run : Injection Tower, Front SSL, Front FID : Part of System Preparation : No limits associated	None
October 22, 2024 8:56:46 AM	Audit	Data	GC Scouting Run : Injection Tower, Front SSL, Front FID : Part of System Preparation : No limits associated	Data files Path : G:\Data\Front\Front_SCR1\FID1A.ch
October 22, 2024 8:57:25 AM	End	Execution	GC Scouting Run : Injection Tower, Front SSL, Front FID : Part of System Preparation : No limits associated	Run Count : 1
October 22, 2024 8:57:26 AM	Start	Execution	Noise and Drift : Front FID : Detector: FID : L (Noise) <= 0.10 pA : L (Drift) <= 2.50 pA/hour	None
October 22, 2024 8:58:03 AM	Audit	Data	Noise and Drift : Front FID : Detector: FID : L (Noise) <= 0.10 pA : L (Drift) <= 2.50 pA/hour	Data files Path : G:\Data\Front\Front_ND1\FID1A.ch
October 22, 2024 8:58:37 AM	End	Execution	Noise and Drift : Front FID : Detector: FID : L (Noise) <= 0.10 pA : L (Drift) <= 2.50 pA/hour	Run Count : 1
October 22, 2024 8:58:40 AM	Start	Execution	Injection Precision : Injection Tower, Front SSL, Front FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	None
October 22, 2024 8:59:06 AM	Audit	Data	DataLogger	DataLogger was in a case verification state but the user chose to start over

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Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision : Injection Tower, Front SSL, Front FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Front\Front_IP01\DV\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision : Injection Tower, Front SSL, Front FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Front\Front_IP01\DV\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision : Injection Tower, Front SSL, Front FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Front\Front_IP01\DV\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision : Injection Tower, Front SSL, Front FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Front\Front_IP01\DV\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision : Injection Tower, Front SSL, Front FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Front\Front_IP01\DV\FID1A.ch
October 22, 2024 9:01:43 AM	Audit	Data	Injection Precision : Injection Tower, Front SSL, Front FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Front\Front_IP01\DV\FID1A.ch
October 22, 2024 9:02:11 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 22, 2024 9:02:16 AM	Start	Execution	Signal to Noise : Injection Tower, Front SSL, Front FID : Detector: FID : L >= 300000	None
October 22, 2024 9:02:34 AM	Audit	Data	Signal to Noise : Injection Tower, Front SSL, Front FID : Detector: FID : L >= 300000	Data files Path : G:\Data\Front\Front_SN01\FID1A.ch

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Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:02:54 AM	End	Execution	Signal to Noise : Injection Tower, Front SSL, Front FID : Detector: FID : L >= 300000	Run Count : 1
October 22, 2024 9:03:00 AM	Start	Execution	GC Scouting Run : Injection Tower, Back SSL, Back FID : Part of System Preparation : No limits associated	None
October 22, 2024 9:03:31 AM	Audit	Data	GC Scouting Run : Injection Tower, Back SSL, Back FID : Part of System Preparation : No limits associated	Data files Path : G:\Data\Back\Back_SCR1\FID2B.ch
October 22, 2024 9:04:03 AM	End	Execution	GC Scouting Run : Injection Tower, Back SSL, Back FID : Part of System Preparation : No limits associated	Run Count : 1
October 22, 2024 9:04:07 AM	Start	Execution	Noise and Drift : Back FID : Detector: FID : L (Noise) <= 0.10 pA : L (Drift) <= 2.50 pA/hour	None
October 22, 2024 9:08:58 AM	Audit	Data	Noise and Drift : Back FID : Detector: FID : L (Noise) <= 0.10 pA : L (Drift) <= 2.50 pA/hour	Data files Path : G:\Data\Back\Back_ND1\FID2B.ch
October 22, 2024 9:09:13 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 22, 2024 9:09:26 AM	Start	Execution	Injection Precision : Injection Tower, Back SSL, Back FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	None

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Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision : Injection Tower, Back SSL, Back FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Back\Back_IP01\DV\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision : Injection Tower, Back SSL, Back FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Back\Back_IP01\DV\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision : Injection Tower, Back SSL, Back FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Back\Back_IP01\DV\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision : Injection Tower, Back SSL, Back FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Back\Back_IP01\DV\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision : Injection Tower, Back SSL, Back FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Back\Back_IP01\DV\FID2B.ch
October 22, 2024 9:10:44 AM	Audit	Data	Injection Precision : Injection Tower, Back SSL, Back FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Data files Path : G:\Data\Back\Back_IP01\DV\FID2B.ch
October 22, 2024 9:11:15 AM	End	Execution	Injection Precision : Injection Tower, Back SSL, Back FID : GC : L (Area) <= 3.00% : L (Ret. Time) <= 1.00%	Run Count : 1
October 22, 2024 9:11:23 AM	Start	Execution	Signal to Noise : Injection Tower, Back SSL, Back FID : Detector: FID : L >= 300000	None
October 22, 2024 9:11:45 AM	Audit	Data	Signal to Noise : Injection Tower, Back SSL, Back FID : Detector: FID : L >= 300000	Data files Path : G:\Data\Back\Back_SN01\FID2B.ch

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Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
October 22, 2024 9:12:09 AM	End	Execution	Signal to Noise : Injection Tower, Back SSL, Back FID : Detector: FID : L >= 300000	Run Count : 1
October 22, 2024 9:12:15 AM	End	Qualification	Session	OQ
October 22, 2024 9:12:15 AM	Start	Reporting	Session	None
October 22, 2024 9:24:06 AM	Audit	Reporting	Session	Report Generated : Certificate
October 22, 2024 9:25:56 AM	Audit	Reporting	Session	Report Generated : Record

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Bara Scientific Co., Ltd.

Certificate of Calibration

Number of Pages: 1 of 2

Certificate No.	BSCC-UV-[illegible]
Equipment	UV/Vis Spectrophotometer
Model	[illegible]
Manufacturer	[illegible]
Serial No.	[illegible]
ID No.	[illegible]
Date of receipt	[illegible] September 2023
Date of calibration	15 September 2023
Date of issue	22 September 2023
Customer name	ALS Laboratory Group (Thailand) Co., Ltd.
Address	[illegible]
Temperature	(22.4 – 24.7) °C (On site)
Humidity	[illegible] %RH (On site)
Equipment condition	Good Operation
Calibration Location	[illegible]
Calibration Procedure	In-house method [illegible] based on ASTM E275-01
Traceability	Wavelength Accuracy is traceable to certificate No. [illegible]; Photometric Accuracy is traceable to certificate No. [illegible]; Stray Light is traceable to certificate No. [illegible]. The above certificate are traceable to SI units through [illegible] (UKAS accredited calibration laboratory [illegible])
Calibrated by	Mr. [illegible]

REVIEWED BY: [illegible]
APPROVED BY: [illegible]
NEXT CAL. DATE: [illegible]

Approved by

Mr. [illegible]
Technical Manager

Bara Scientific Co., Ltd.
[illegible]

Certificate of Calibration

Certificate No. BSCC-UV-367/23 Number of Page(s) 2 of 3

Calibration Results

1 Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
241.70	241.67	0.03	0.18
334.02	334.03	0.01	0.10
[illegible]	[illegible]	0.06	0.10
572.9[illegible]	572.[illegible]	0.15	0.18
879.41	879.21	-0.20	[illegible]

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	0.7460	-0.0007	0.0075
257	0.0000	0.0000	0.0000	0.0075
	0.8662	0.8646	-0.0016	0.0075
313	0.0000	0.0000	0.0000	0.0075
	0.2904	0.2905	0.0001	0.0075
350	0.0000	[illegible]	[illegible]	0.0075
	0.6429	[illegible]	[illegible]	0.0075

*CNR = Customer not request

[illegible]

Bara Scientific Co., Ltd
[illegible]

Certificate of Calibration

Certificate No. BSCC-UV-367/23 Number of Page(s) 3 of 3

Calibration Results

3 Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
420.0	[illegible]	[illegible]	[illegible]	[illegible]
440.0	[illegible]	[illegible]	[illegible]	[illegible]
465.0	[illegible]	[illegible]	[illegible]	[illegible]
546.1	[illegible]	[illegible]	[illegible]	[illegible]
590.0	[illegible]	[illegible]	[illegible]	[illegible]
635.0	[illegible]	[illegible]	[illegible]	[illegible]

*CNR = Customer not request

4.Stray Light*

Standard cut-off wavelength (nm)	Unit Under Calibration(UUC) Wavelength (nm)	Transmission (%T)	Absorbance (A)
200.26±0.11nm	269.55	0.5770	2.0138

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

[illegible]

Bara Scientific Co., Ltd.
968 U Chu Liang Building Floor7 Rama4 Road
Silom Bangrak Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com

Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No.	BSCC-UV-374/24
Equipment	UV/Vis Spectrophotometer
Model	UV-1800
Manufacturer	Shimadzu
Serial No.	A11454908533 CD
ID No.	BKK_EN0018
Date of receipt	13 September 2024
Date of calibration	13 September 2024
Date of issue	13 SEP 2024

REVIEWED BY Jirate K.
APPROVED BY Sak P.
NEXT CAL DATE 13/09/2025

Customer name	ALS Laboratory Group (Thailand) Co., Ltd.
Address	104 Soi Phattanakan 40, Phattanakan Road, Phattanakan, Suan Luang, Bangkok 10250
Temperature	(25.3 - 26.7) °C (On site)
Humidity	(50.4 - 55.9) %RH (On site)
Equipment condition	Good Operation
Calibration Location	Organic Preparation Lab
Calibration Procedure	In-house method WI-UV-702-01 based on ASTM E275-01
Traceability	Wavelength Accuracy is traceable to certificate No. 106372 and 106371 Photometric Accuracy is traceable to certificate No. 106304 and 111398 Stray Light is traceable to certificate No. 106377 The above certificate are traceble to SI unit through Starna Scientific Ltd (UKAS accredited calibration laboratory NO. 0659)
Calibrated by	Mr.Wanchana Janloey

Approved by

Somthi

Mr.Somthi Temboonsakdi
Service 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.
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Silom Bangrak Bangkok Thailand 10500
Tel : 02-6324300 Fax : 02-6375496-7
www.barascientific.com

Certificate of Calibration

Certificate No. BSCC-UV-374/24 Number of Page(s) 2 of 3

Calibration Results:

1.Wavelength Accuracy

Certified Wavelength (nm)	UUC (nm)	Error (nm)	Uncertainty (±nm)
241.70	241.55	-0.15	0.18
334.02	333.85	-0.17	0.18
418.53	418.57	0.04	0.18
572.99	572.97	-0.02	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
	0.7171	0.7169	-0.0002	0.0075
257	0.0000	0.0000	0.0000	0.0075
	0.8354	0.8345	-0.0009	0.0075
313	0.0000	0.0000	0.0000	0.0075
	0.2786	0.2781	-0.0005	0.0075
350	0.0000	0.0000	0.0000	0.0075
	0.6199	0.6194	-0.0005	0.0075

*CNR = Customer not request

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Certificate of Calibration

Certificate No. BSCC-UV-374/24 Number of Page(s) 3 of 3

Calibration Results:

3 Photometric Accuracy (Visible)

Wavelength (nm)	Certified Absorbance (A)	UUC (A)	Error (A)	Uncertainty (±A)
420.0	0.0000	0.0000	0.0000	0.0042
	0.5761	0.5765	0.0004	0.0042
	0.7119	0.7105	-0.0014	0.0042
	1.0189	1.0174	-0.0015	0.0042
440.0	0.0000	0.0000	0.0000	0.0042
	0.5610	0.5613	0.0003	0.0042
	0.7001	0.6984	-0.0017	0.0042
	1.0026	1.0011	-0.0015	0.0042
465.0	0.0000	0.0000	0.0000	0.0042
	0.5235	0.5232	-0.0003	0.0042
	0.6614	0.6598	-0.0016	0.0042
	0.9456	0.9444	-0.0012	0.0042
546.1	0.0000	0.0000	0.0000	0.0042
	0.5249	0.5245	-0.0004	0.0042
	0.6973	0.6956	-0.0019	0.0042
	1.0009	0.9994	-0.0015	0.0042
590.0	0.0000	0.0000	0.0000	0.0042
	0.5590	0.5586	-0.0004	0.0042
	0.7725	0.7708	-0.0017	0.0042
	1.1125	1.1114	-0.0011	0.0042
635.0	0.0000	0.0000	0.0000	0.0042
	0.5666	0.5666	0.0000	0.0042
	0.7620	0.7604	-0.0016	0.0042
	1.0982	1.0971	-0.0011	0.0042

*CNR = Customer not request

4.Stray Light*

Standard cut-off wavelenght (nm)	Unit Under Calibration(UUC) Wavelength (nm)	Transmission (%T)	Absorbance (A)
200.85±0.11nm	199.58	0.9520	2.0217

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.

ALS

Lot No 2498533-1

ANALYZER CALIBRATION DATA

Client : Dow Chemical Thailand Ltd. Location : TOX1 (ERU Stack)
Date : 09 Sep 24 Test Operator : Saihaporn T.

O_2 ANALYZER
Model : TELEDYNE API 200EH Serial No. : 735
Span (%) : 25

	Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.01	0.02	0.04
Low Level Gas	8.19	8.20	8.21	0.04
Span Gas	18.07	18.07	18.09	0.08

NO_x ANALYZER
Model : TELEDYNE API 200EH Serial No. : 735
Span (ppm) : 100

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.01	0.01	0.00
Low Level Gas	54.98	54.95	54.95	0.00
Span Gas	82.51	82.50	82.48	0.02

Calibrated by

Saihaporn.T

(Mr. Saihaporn Thakaew)

Environmental Field Scientist (3)

ALS

Lot No 2498533-1

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Client : Dow Chemical Thailand Ltd. Location : TOX1 (ERU Stack)
Date : 09 Sep 24 Test Operator : Saihaporn T.

O_2 ANALYZER
Cylinder Conc. (%) : 18.07 Span (%) : 25

	O_2 Analyzer Calibration Response	Initial Values System Calibration Response	Initial Values System Cal Bias (% of Span)	Final Values System Calibration Response	Final Values System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.01	0.03	0.08	0.03	0.08	0.00
Upscale Gas	18.07	18.12	0.20	18.12	0.20	0.00

NO_x ANALYZER
Cylinder Conc. (ppm) : 82.51 Span (ppm) : 100

	NO_x Analyzer Calibration Response	Initial Values System Calibration Response	Initial Values System Cal Bias (% of Span)	Final Values System Calibration Response	Final Values System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.01	0.02	0.01	0.02	0.01	0.00
Upscale Gas	82.50	82.45	0.05	82.45	0.05	0.00

Calibrated by

Saihaporn.T

(Mr. Saihaporn Thakaew)

Environmental Field Scientist (3)

ALS

EMISSION TEST RESULT

Client	Dow Chemical Thailand Ltd.	Run #	1
Date	09 Sep 24	Location	TOX1 (ERU Stack)
Start Time	11:50	Test Operator	Saihaporn T.
SO_2 Analyzer Model	-	Finish Time	12:10
NO_x/O_2 Analyzer Model	TELEDYNE API 200EH	Serial No.	-
CO/CO_2 Analyzer Model	TELEDYNE API 300EM	Serial No.	735
		Serial No.	426

Time (min)	O_2 (%)	CO_2 (%)	NOx (ppm)	SO_2 (ppm)	CO (ppm)	Remark
11:50	8.16	7.83	23.95	-	-	
11:51	8.15	7.87	24.03	-	-	
11:52	8.14	7.89	24.04	-	-	
11:53	8.17	7.87	23.91	-	-	
11:54	8.20	7.91	23.81	-	-	
11:55	8.13	7.89	23.78	-	-	
11:56	8.12	7.88	23.71	-	-	
11:57	8.16	7.86	23.70	-	-	
11:58	8.16	7.89	23.72	-	-	
11:59	8.18	7.89	23.76	-	-	
12:00	8.15	7.87	23.74	-	-	
12:01	8.11	7.88	23.74	-	-	
12:02	8.12	7.77	23.91	-	-	
12:03	8.13	7.80	23.96	-	-	
12:04	8.13	7.89	23.90	-	-	
12:05	8.18	7.85	23.68	-	-	
12:06	8.20	7.85	23.55	-	-	
12:07	8.20	7.82	23.57	-	-	
12:08	8.17	7.87	23.43	-	-	
12:09	8.14	7.85	23.58	-	-	
12:10	8.14	7.83	23.72	-	-	
Average	8.15	7.86	23.76	-	-	

Saihaporn.T

(Mr. Saihaporn Thakaew)

Environmental Field Scientist (3)

ALS

EMISSION TEST RESULT

Client	Dow Chemical Thailand Ltd.	Run #	2
Date	09 Sep 24	Location	TOX1 (ERU Stack)
Start Time	12:11	Test Operator	Saihaporn T.
SO_2 Analyzer Model	-	Finish Time	12:31
NO_x/O_2 Analyzer Model	TELEDYNE API 200EH	Serial No.	-
CO/CO_2 Analyzer Model	TELEDYNE API 300EM	Serial No.	735
		Serial No.	426

Time (min)	O_2 (%)	CO_2 (%)	NOx (ppm)	SO_2 (ppm)	CO (ppm)	Remark
12:11	8.11	7.82	23.73	-	-	
12:12	8.10	7.93	23.76	-	-	
12:13	8.12	7.91	23.86	-	-	
12:14	8.12	7.88	23.69	-	-	
12:15	8.05	7.84	23.94	-	-	
12:16	8.07	7.87	24.10	-	-	
12:17	8.14	7.80	23.93	-	-	
12:18	8.17	7.85	23.70	-	-	
12:19	8.17	7.91	23.54	-	-	
12:20	8.12	7.89	23.59	-	-	
12:21	8.12	7.90	23.72	-	-	
12:22	8.11	7.81	23.82	-	-	
12:23	8.11	7.90	23.83	-	-	
12:24	8.14	7.90	23.61	-	-	
12:25	8.17	7.83	23.87	-	-	
12:26	8.17	7.86	23.81	-	-	
12:27	8.13	7.91	23.79	-	-	
12:28	8.11	7.95	23.90	-	-	
12:29	8.10	7.95	23.92	-	-	
12:30	8.09	7.90	23.91	-	-	
12:31	8.10	7.89	23.90	-	-	
Average	8.12	7.88	23.83	-	-	

Saihaporn.T

(Mr. Saihaporn Thakaew)

Environmental Field Scientist (3)

EMISSION TEST RESULT

		Run #	3
Client	Dow Chemical Thailand Ltd.	Location	TOX1 (ERU Stack)
Date	09 Sep 24	Test Operator	Sathaporn T.
Start Time	12:31	Finish Time	12:52
SO_2 Analyzer Model	-	Serial No.	-
NO_x/O_2 Analyzer Model	TELEDYNE API 200EH	Serial No.	735
CO/CO_2 Analyzer Model	TELEDYNE API 300EM	Serial No.	425

Time (min)	O_2 (%)	CO_2 (%)	NOx (ppm)	SO_2 (ppm)	CO (ppm)	Remark
12:32	8.15	7.83	23.83	-	-	
12:33	8.19	7.85	23.66	-	-	
12:34	8.19	7.80	23.82	-	-	
12:35	8.22	7.82	23.87	-	-	
12:36	8.20	7.79	23.80	-	-	
12:37	8.18	7.85	23.58	-	-	
12:38	8.13	7.85	23.85	-	-	
12:39	8.12	7.82	23.69	-	-	
12:40	8.11	7.82	23.61	-	-	
12:41	8.15	7.88	23.63	-	-	
12:42	8.17	7.87	23.68	-	-	
12:43	8.18	7.85	23.71	-	-	
12:44	8.20	7.88	23.72	-	-	
12:45	8.20	7.80	23.72	-	-	
12:46	8.20	7.80	23.69	-	-	
12:47	8.17	7.87	23.59	-	-	
12:48	8.18	7.88	23.47	-	-	
12:49	8.17	7.83	23.37	-	-	
12:50	8.17	7.87	23.49	-	-	
12:51	8.18	7.82	23.55	-	-	
12:52	8.14	7.82	23.59	-	-	
Average	8.17	7.84	23.63	-	-	

Sathaporn T

(Mr. Sathaporn Thakaew)

Environmental Field Scientist (3)

Lot No 2408830-1

ANALYZER CALIBRATION DATA

Client : Dow Chemical Thailand Ltd. Location : TOX2 (ERU Stack)
Date : 10 Sep 24 Test Operator : Sathaporn T.

O_2 ANALYZER
Model : TELEDYNE API 200EH Serial No. : 735
Span (%) : 25

	Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.01	0.02	0.04
Low-Level Gas	8.19	8.20	8.21	0.04
Span Gas	18.07	18.07	18.10	0.12

NO_x ANALYZER
Model : TELEDYNE API 200EH Serial No. : 735
Span (ppm) : 100

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.01	0.02	0.01
Low-Level Gas	54.98	54.95	54.95	0.00
Span Gas	82.51	82.50	82.48	0.02

Calibrated by

Sathaporn T

(Mr.Sathaporn Thakaew)

Environmental Field Scientist (3)

Lot No 2408830-1

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Client : Dow Chemical Thailand Ltd. Location : TOX2 (ERU Stack)
Date : 10 Sep 24 Test Operator : Sathaporn T.

O_2 ANALYZER
Cylinder Conc. (%) : 18.07 Span (%) : 25

	O_2 Analyzer Calibration Response	Initial Values: System Calibration Response	Initial Values: System Cal Bias (% of Span)	Final Values: System Calibration Response	Final Values: System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.01	0.03	0.08	0.03	0.08	0.00
Upscale Gas	18.07	18.12	0.20	18.12	0.20	0.00

NO_x ANALYZER
Cylinder Conc. (ppm) : 82.51 Span (ppm) : 100

	NO_x Analyzer Calibration Response	Initial Values: System Calibration Response	Initial Values: System Cal Bias (% of Span)	Final Values: System Calibration Response	Final Values: System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.01	0.03	0.02	0.03	0.02	0.00
Upscale Gas	82.50	82.45	0.05	82.45	0.05	0.00

Calibrated by

Sathaporn T

(Mr.Sathaporn Thakaew)

Environmental Field Scientist (3)

EMISSION TEST RESULT

		Run #	1
Client	Dow Chemical Thailand Ltd.	Location	TOX2 (ERU Stack)
Date	10 Sep 24	Test Operator	Sathaporn T.
Start Time	11:50	Finish Time	12:10
SO_2 Analyzer Model	-	Serial No.	-
NO_x/O_2 Analyzer Model	TELEDYNE API 200EH	Serial No.	735
CO/CO_2 Analyzer Model	TELEDYNE API 300EM	Serial No.	425

Time (min)	O_2 (%)	CO_2 (%)	NOx (ppm)	SO_2 (ppm)	CO (ppm)	Remark
11:50	6.65	8.66	26.87	-	-	
11:51	6.63	8.70	26.91	-	-	
11:52	6.60	8.72	27.03	-	-	
11:53	6.58	8.71	27.29	-	-	
11:54	6.59	8.75	27.34	-	-	
11:55	6.58	8.80	27.35	-	-	
11:56	6.60	8.70	27.36	-	-	
11:57	6.64	8.74	27.24	-	-	
11:58	6.64	8.67	27.24	-	-	
11:59	6.63	8.72	27.19	-	-	
12:00	6.61	8.81	27.18	-	-	
12:01	6.62	8.80	27.20	-	-	
12:02	6.58	8.69	27.14	-	-	
12:03	6.69	8.57	26.97	-	-	
12:04	6.71	8.59	26.90	-	-	
12:05	6.70	8.63	26.91	-	-	
12:06	6.67	8.60	26.90	-	-	
12:07	6.69	8.64	26.87	-	-	
12:08	6.70	8.66	26.82	-	-	
12:09	6.69	8.72	26.86	-	-	
12:10	6.70	8.64	26.97	-	-	
Average	6.65	8.70	27.07	-	-	

Sathaporn T

(Mr.Sathaporn Thakaew)

Environmental Field Scientist (3)

EMISSION TEST RESULT

		Run #	2
Client	Dow Chemical Thailand Ltd.	Location	TOX2 (ERU Stack)
Date	10 Sep 24	Test Operator	Sathaporn T.
Start Time	12:11	Finish Time	12:31
SO_2 Analyzer Model	-	Serial No.	-
NO_x/O_2 Analyzer Model	TELEDYNE API 200EH	Serial No.	735
CO/CO_2 Analyzer Model	TELEDYNE API 300EM	Serial No.	425

Time (min)	O_2 (%)	CO_2 (%)	NOx (ppm)	SO_2 (ppm)	CO (ppm)	Remark
12:11	6.67	8.65	26.91	-	-	
12:12	6.69	8.72	26.78	-	-	
12:13	6.68	8.65	26.83	-	-	
12:14	6.67	8.67	26.75	-	-	
12:15	6.64	8.74	26.58	-	-	
12:16	6.57	8.71	26.65	-	-	
12:17	6.63	8.73	26.87	-	-	
12:18	6.64	8.68	26.87	-	-	
12:19	6.64	8.81	26.69	-	-	
12:20	6.63	8.73	26.71	-	-	
12:21	6.65	8.75	26.70	-	-	
12:22	6.67	8.66	26.68	-	-	
12:23	6.66	8.58	26.66	-	-	
12:24	6.67	8.71	26.59	-	-	
12:25	6.66	8.63	26.54	-	-	
12:26	6.63	8.77	26.61	-	-	
12:27	6.64	8.79	26.69	-	-	
12:28	6.63	8.77	26.76	-	-	
12:29	6.63	8.75	26.83	-	-	
12:30	6.63	8.75	26.69	-	-	
12:31	6.63	8.70	26.55	-	-	
Average	6.65	8.71	26.71	-	-	

Sathaporn T

(Mr.Sathaporn Thakaew)

Environmental Field Scientist (3)

EMISSION TEST RESULT

		Run #	3
Client	Dow Chemical Thailand Ltd.	Location	TOX2 (ERU Stack)
Date	10 Sep 24	Test Operator	Sathaporn T.
Start Time	12:32	Finish Time	12:52
SO_2 Analyzer Model	-	Serial No.	-
NO_x/O_2 Analyzer Model	TELEDYNE API 200EH	Serial No.	735
CO/CO_2 Analyzer Model	TELEDYNE API 300EM	Serial No.	425

Time (min)	O_2 (%)	CO_2 (%)	NOx (ppm)	SO_2 (ppm)	CO (ppm)	Remark
12:32	6.63	8.74	26.45	-	-	
12:33	6.60	8.81	26.42	-	-	
12:34	6.61	8.72	26.41	-	-	
12:35	6.66	8.71	26.37	-	-	
12:36	6.66	8.70	26.36	-	-	
12:37	6.64	8.72	26.41	-	-	
12:38	6.62	8.74	26.41	-	-	
12:39	6.58	8.72	26.55	-	-	
12:40	6.54	8.77	26.81	-	-	
12:41	6.54	8.82	27.05	-	-	
12:42	6.55	8.83	27.15	-	-	
12:43	6.54	8.77	27.08	-	-	
12:44	6.56	8.86	26.96	-	-	
12:45	6.52	8.79	26.92	-	-	
12:46	6.51	8.74	26.97	-	-	
12:47	6.51	8.85	27.02	-	-	
12:48	6.49	8.85	27.09	-	-	
12:49	6.49	8.87	27.12	-	-	
12:50	6.48	8.81	27.26	-	-	
12:51	6.48	8.84	27.34	-	-	
12:52	6.48	8.78	27.44	-	-	
Average	6.56	8.77	26.84	-	-	

Sathaporn T

(Mr.Sathaporn Thakaew)

Environmental Field Scientist (3)

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number	E04NI99E15A021C	Reference Number	180-402270199-1
Cylinder Number	CC73069	Cylinder Volume	144.4 CF
Laboratory	124 - Plumsteadville - PA	Cylinder Pressure	2315 PSIG
PGVP Number	A12021	Valve Outlet	660
Gas Code	CO NO NOX SO2 BALN	Certification Date	Feb 22, 2021

Expiration Date: Feb 22, 2029

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	55.00 PPM	54.96 PPM	G1	+/- 1.4% NIST Traceable	02/15/2021, 02/22/2021
CARBON MONOXIDE	55.00 PPM	54.84 PPM	G1	+/- 0.7% NIST Traceable	02/15/2021
NITRIC OXIDE	55.00 PPM	54.60 PPM	G1	+/- 1.1% NIST Traceable	02/15/2021, 02/22/2021
SULFUR DIOXIDE	55.00 PPM	55.55 PPM	G1	+/- 1.0% NIST Traceable	02/15/2021, 02/22/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	[illegible]	[illegible]	[illegible] PPM CARBON MONOXIDE/NITROGEN	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] PPM [illegible]	[illegible]	Feb 20, 2026
NTRM	[illegible]	[illegible]	49.82 PPM NITRIC OXIDE/NITROGEN	[illegible]	Feb 02, 2025
GMIS	[illegible]	[illegible]	[illegible] PPM NITROGEN DIOXIDE/NITROGEN	[illegible]	Aug [illegible], 2021
NTRM	[illegible]	[illegible]	[illegible] PPM SULFUR DIOXIDE/NITROGEN	[illegible]	Jun [illegible], 2022

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 FTIR [illegible] CO	FTIR	Feb 04, 2021
Nicolet iS50 FTIR [illegible] NO	FTIR	Feb [illegible], 2021
Nicolet iS50 FTIR [illegible] NO2	FTIR	Feb [illegible], 2021
Nicolet iS50 FTIR [illegible] SO2	FTIR	Feb [illegible], 2021

Triad Data Available Upon Request

NOTES:
Gross Weight: 26.8 Kg
Net Weight: 4.6 Kg

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
[illegible]
Plumsteadville, PA [illegible]
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer	AIR LIQUIDE (THAILAND) LTD		
Part Number	[illegible]	Reference Number	180-402[illegible]
Cylinder Number	[illegible]	Cylinder Volume	[illegible] CF
Laboratory	124 - Plumsteadville - PA	Cylinder Pressure	2214 PSIG
PGVP Number	A12023	Valve Outlet	590
Gas Code	O2,BALN	Certification Date	Sep 05, 2023

Expiration Date: Sep 05, 2031

[illegible]

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	[illegible] %	[illegible] %	G1	+/- [illegible] NIST Traceable	[illegible]
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	[illegible]	[illegible]	[illegible] % OXYGEN/NITROGEN	[illegible]	Jun [illegible], 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS OXYMAT 6 [illegible] O2	PARAMAGNETIC	Aug [illegible], 2023

Triad Data Available Upon Request

NOTES: Gross Weight: [illegible] Kg
Net Weight: [illegible] Kg

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI92E3HA0000	Reference Number:	180-401948144-1
Cylinder Number:	GN3025066	Cylinder Volume:	248.4 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2214 PSIG
PGVP Number:	A12020	Valve Outlet:	590
Gas Code:	O2,BALN	Certification Date:	Nov 11, 2020

Expiration Date: Nov 11, 2028

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	8.000 %	8.186 %	G1	+/- 0.3% NIST Traceable	11/11/20
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	10010602	1D38055	9.967 % OXYGEN/NITROGEN	+/- 0.3%	Apr 19, 2022

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS OXYMAT 6 - N1-W5-951 - O2	PARAMAGNETIC	Oct 26, 2020

Triad Data Available Upon Request

NOTES:
Gross Weight: 48.1 Kg
Net Weight: 8.2 Kg

Approved for Release

CONSOLE CONTROL UNIT CALIBRATION TEST REPORT

Calibration of Date	10-Jul-24
Next Cal Date	10-Jan-25

Console Control Meter Data

Calibration ID	C-100724 BKK_FS0518
Dry Gas Meter ID	BKK_FS0518
Serial No	1504025
Model No	XC-572V

Barometric Pressure (mmHg)	752.4
Relative Humidity (%)	64.0
Temperature (C°)	29.2

Reference Dry Gas Meter Data

Reference Dry Gas Meter ID	BKK_FS1122
Serial No	A2003240
Correction Factor (Y)	0.9824
Next Calibration Date	7-Nov-24

ΔH (mm H_2O)	Θ Minutes	Reference Dry Gas Meter Calibration Vr (Liters) Final	Initial	Total	Tr (°C)	Console Control, Drygas Meter Vm (Liters) Final	Initial	Total	Ti (°C)	To (°C)	Avg Tm (°C)	Dry Gas Meter Correction Factor (Y)	Orifice Calibration Factor ΔH@
15	12.00	150.00	0.10	149.90	29.0	[illegible]	[illegible]	149.00	29.0	29.0	29.0	0.9909	44.0579
25	9.10	150.00	0.00	150.00	29.0	[illegible]	[illegible]	149.10	30.0	30.0	30.0	0.9965	42.3980
50	6.34	150.00	0.00	150.00	29.0	[illegible]	[illegible]	149.00	30.0	30.0	30.0	0.9974	41.1305
80	5.00	150.00	0.00	150.00	30.0	[illegible]	[illegible]	150.00	31.0	31.0	31.0	0.9740	41.0863
120	4.08	150.00	0.00	150.00	30.0	[illegible]	[illegible]	150.00	31.0	31.0	31.0	0.9742	41.0164
											Avg	0.9854	41.9278

Y Ratio of reading of reference to dry gas meter. Tolerance for individual values ± 0.02 from average

ΔH@ Orifice pressure differential that equates to 21.24 lmin of air @ 25 C and 760 mm of mercury, mmH2O. Tolerance for individual values ± 5.08 from average

Procedure: 40 CFR 60 APP A M5 for SEC 5.3 & 7

Calibrated by: (Mr Sakst Phasanphout) RYG Field Service Scientist (4)

Approved by: (Mr Natthapol Jengwareewong) RYG Field Service Specialist (1)

Stopwatch ID No	RYG_FS0540	Dry Gas Meter No	BKK_FS518
Model	F808	Model	XC 572 V
Serial No	E18061	Serial No	1504075
Calibration Date	4 Jul 24		
Certificate No	E 2407022		

Run No	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff (ms)	Diff (min)
1	5.00.03	5.00	3	0.00005
2	5.00.07	5.00	7	0.00012
3	5.00.07	5.00	7	0.00012
4	5.00.08	5.00	8	0.00013
5	5.00.05	5.00	5	0.00008
6	5.00.06	5.00	6	0.00010
7	5.00.06	5.00	6	0.00010
8	5.00.06	5.00	6	0.00010
9	5.00.07	5.00	7	0.00012
10	5.00.07	5.00	7	0.00012
			Average	0.00010
			SD	0.00002

Calibrate by: Mr Saksit Phasanphout, RYG Field Service Scientist (4)

Approved by: Mr Natthapol Jengwareewong, RYG Field Service Specialist (1)

Next Calibrate: 13 Nov 24

Location	Reference Temperature °C	Digital Temperature °C	Error °C	MPE	Pass / Fail
Stack	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass
	100	100	0	±3	Pass
	150	150	0	±3	Pass
	200	201	1	±3	Pass
	250	251	1	±3	Pass
	300	301	1	±3	Pass
	500	501	1	±3	Pass
Probe	100	100	0	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Oven	100	100	0	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Filter	100	100	0	±3	Pass
	120	121	1	±3	Pass
	140	141	1	±3	Pass
Exit	0	0	0	±3	Pass
	10	9	-1	±3	Pass
	20	19	-1	±3	Pass
Meter	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	51	1	±3	Pass
AUX	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	51	1	±3	Pass

MPE (Maximum permissible error of measurement) ค่าความผิดพลาดสูงสุดของการวัดที่ยอมรับได้

Calibrated by: Mr Saksit Phasanphout, RYG Field Service Scientist (4)

Approved by: Mr Natthapol Jengwareewong, RYG Field Service Specialist (1)

FORM NO. F 06 027 REVISION NO. 2 ISSUE DATE 9 Feb 23

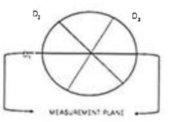
	D_1	D_2	D_3	ΔD	D_{avg}
1	0.318	0.318	0.318	0.000	0.318
2	0.472	0.474	0.475	0.003	0.474
3	0.632	0.635	0.634	0.003	0.634
4	0.792	0.792	0.792	0.000	0.792
5	0.952	0.952	0.952	0.000	0.952
6	1.091	1.110	1.092	0.019	1.098
7	1.256	1.262	1.262	0.006	1.260
8	1.601	1.598	1.600	0.003	1.600

Where

D_1, D_2, D_3 = Three 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} = $(D_1 + D_2 + D_3)/3$



Calibrated by: (Mr Saksit Phasanphout) RYG Field Service Scientist (4)

Approved by: (Mr Natthapol Jengwareewong) RYG Field Service Specialist (1)

Type S Pitot Tube Calibration

Date Calibration	10-Jul-24	**Due Date**	10-Jan-25
Pitot ID	BKK_FS0523	**Inclinometer ID**	BKK_FS1131
Pitot SN	-	**Vernier ID**	RYG_FS0539

Parameter	Value	Allowable Range	Check
α1	-0.2	-10° < α1 < +10°	OK
α2	2.4	-10° < α2 < +10°	OK
β1	-1.2	-5° < β1 < +5°	OK
β2	-1.6	-5° < β2 < +5°	OK
γ	-1.1	-	-
θ	0.2	-	-
Z = A tan γ	-0.018	Z ≤ 0.125"	OK
W = A tan θ	0.003	W ≤ 0.031"	OK
Dt	0.308	0.188" to 0.375"	OK
A/2Dt	1.494	1.05 ≤ PA/Dt ≤ 1.5	OK
A	0.92	2.1Dt ≤ A ≤ 3Dt	OK

Certify that pitot tube/porbe meets or exceeds all specifications, crieria and/or applicable design features and is hereby assigned a pitot tube certification fact of 0.84. See 40 CFR Pt. 60, App. A,EPA Method 2.

Calibrated by: (Mr. Saksit Phasanphout) RYG Field Services Scientist (4)

Approved By: (Mr.Natthapol Jengwareewong) RYG Field Services Specialist (1)

FORM NO. F 06 124 REVISION NO. 0 ISSUE DATE 21/12/23

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel +66 2643 8361-6, e-mail service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

REVIEW BY: Thanida
APPROVED BY: [signature]
NEXT CAL. DATE: 18/02/2025

Model Number:	MSU224S-100-DU	Certificate No.:	24BCI0073
Description:	Analytical Balance	Issued Date:	Friday, February 23, 2024
Serial Number:	0031709552	Reference No.:	229196
ID No.:	RYG_EN0003		
Manufacturer:	Sartorius	Page No.:	1 of 2

Customer Name: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch) 616/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand

Calibrated Place: ALS Laboratory Group (Thailand) Co., Ltd (Balance Room) 616/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand

Calibrated By: Mr Chonchai Inthana

Calibration Date: Thursday, February 22, 2024

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: 23.7 °C ± 5.0 °C

Humidity: 62.0 % RH ± 10.0 % RH

Pressure: ±

Reasons for calibration

☐ New Installation ☐ Service / Repaired ☑ Re-calibration/ Maintenance

Equipment Condition: ☑ Good Operate ☐ Fair

Measurement Method **UKAS Publication Ref :Lab 14**

The measurement uncertainty stated is the expended 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 form 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	TCS	M2308197S	23-Aug-2025
MHB-382SD	Humidity/Barometer/Temp. Lutron MHB-382SD	DKSH	C19031845	23-Aug-2024

This certificate relate and apply this equipment only

This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division Sartorius (Thailand) Co., Ltd

Mr.chonchai Inthana(Technical Manager)

STAMP

SOP FM 33 03 February 2022

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel +66 2643 8361-6 Fax +66 2643-8367, e-mail service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number:	MSU224S-100-DU	Certificate No:	24BCI0073
Description:	Analytical Balance	Issued Date:	Friday, February 23, 2024
Serial Number:	0031709552	Reference No:	229196
ID No.:	RYG_EN0003		
Manufacturer:	Sartorius	Page No.:	2 of 2

Calibration Results : Without Adjustment

Repeatability

The reproducibility is the ability of a weighing instrument to display nearly identical measured values 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 reproducibility quantitatively.

Nominal Value: (Low Load) 20 g, Tolerance 0.0001 g

Nominal Value: (High Load) 200 g, Tolerance 0.0001 g

Low Load	High Load
20.0000	200.0001
20.0000	200.0000
20.0001	200.0001
20.0000	200.0001
20.0000	200.0001
20.0000	200.0001
19.9999	200.0001
20.0000	200.0000
20.0000	200.0002
20.0000	200.0001
Standard Deviation 0.00005	0.00005

Eccentricity (Off-center loading error)

The off-center loading error is yielded by the difference between the readings of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76)

Nominal value: 100 g

Tolerance 0.0004 g

	Difference
1	-
2	0.0000
3	-0.0001
4	0.0000
5	0.0001
6	-

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 (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.0100	0.0100	0.0000	0.00013
0.1	0.1000	0.1000	0.0000	0.00013
0.5	0.5000	0.5000	0.0000	0.00013
1	1.0000	1.0000	0.0000	0.00013
5	5.0000	5.0000	0.0000	0.00013
10	10.0000	10.0000	0.0000	0.00013
20	20.0000	20.0000	0.0000	0.00013
50	50.0000	50.0000	0.0000	0.00024
100	100.0000	99.9999	-0.0001	0.00019
200	200.0000	199.9999	-0.0001	0.00029

End of Report

SOP FM 33 03 February 2022

NAC

TEST REPORT

RYG_EN0038

[illegible]

TEST RESULTS

POINT NO	IDEAL	ACTUAL CH4	ERROR CH4	%ERROR CH4	ACTUAL THC	ERROR THC	%ERROR THC
ZERO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
AVERAGE (%)				0.55			0.93

REVIEW BY: [illegible]
APPROVED BY: [signature]
NEXT CAL. DATE: [illegible]

NAC

CHECK LIST

[illegible]

TEST VALUES

NO	THC Analyzer (APHA-370)	UNIT	BEFORE	AFTER
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Cert. No : ACC24008
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-75
Serial No : 35002716
ID No.: RYG_FS0446

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 ± 2) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 19 JANUARY 2024
Calibration Date : 25 JANUARY 2024
Date of Issue : 29 JANUARY 2024

Calibrated by : Nuhakorn Pisutpaisan

Approved by : (Thanakul Petchum)

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.

Cert. No. : ACC24008
Job No. : VC67AC0058
Pages : 2 of 3

Calibration Procedure : CP-AC 03

Calibration Method :
This equipment was calibrated by follow 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	LL-0010-23	[illegible]
Digital Multimeter	34461A	MY53220104	EEL-BP 30-0266	[illegible]
Digital Multimeter	34461A	MY53220076	EEL-BP 30-0267	[illegible]
Digital Multimeter	34461A	MY60024271	EEL-BP 31-0266	[illegible]
Programmable Attenuator	MAT-1070	62100114	FT-0011-23	[illegible]
Condenser Microphone	4180	2977900	AA-1001-23	[illegible]
Measuring Amplifier	NA-42KAI	34580495	AA-3002-23	14-FEB-24
Audio Analyzer	AVR 3360A	V744B6069	EE-0012-23	10-FEB-24

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).

Cert. No. : ACC24008
Job No. : VC67AC0058
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
94	93.98	-0.02	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Acceptance limit (%)
1000	1000.0	0.0	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Acceptance limit (%)
0.83	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

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP 174-0167

CALIBRATION CERTIFICATE

Submitted by ALS Laboratory Group (Thailand) Co., Ltd.
Address 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Calibrated at Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre, Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :
Description : Sound Level Meter
Manufacturer : Rion
Model : NL-42
Serial No. : 00295517 (ID: RYG_FS0434)
Microphone : Type UC-52 No. 135220
Preamplifier : Type NH-24 No. 87527

Ambient Environment
Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :
1. Band Pass Filter Wavetek 752A S/N [illegible]
2. Condenser Microphone Brüel&Kjær 4180 S/N 2659871
3. Decade Attenuator Ardo AT-205 S/N 00104002
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44024[illegible]
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037
6. Digital Multimeter Fluke 8520A S/N 4385007
7. Pistonphone Rion NC-72 S/N 00024[illegible]
8. Measuring Amplifier Brüel&Kjær 2610 S/N 1527481

Date of Receipt 24 Jan 2024
Date of Calibration 22-29 Feb 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP 174-0167

9. Power Amplifier Brüel&Kjær 2706 S/N 1517659
10. Speaker Tannoy Limited, Great Britain Brand, Patent No. 215500
11. Digital Multimeter Agilent 34401A S/N MY44005560
12. Programmable Attenuator Tamagawa TPA-103A S/N 2212.

Calibration Procedure :
This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-02, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EELL) which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

Date of Calibration 22-29 Feb 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP 174-0167

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB) Before adjust	Measured value (dB) After adjust	Deviation value (dB)	Acceptance limit Class 1 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
113.96	114.3	113.9	-0.1	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The external calibration adjustment was then completed at the display at 113.9 dB.

2. Self-generated noise

2.1 Normal test :

Measured value (dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
19.7	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
A-Weight	14.1	0.10	N/A
C-Weight	19.6	0.10	N/A
Flat	24.8	0.10	N/A

Date of Calibration 22-28 Feb 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP 174-0167

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB) A-weight	C-weight	Flat	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
125	#DIV/0!	#DIV/0!	#DIV/0!	1.5	#DIV/0!	0.6
1 000	#DIV/0!	#DIV/0!	#DIV/0!	1.0	#DIV/0!	0.6
8 000	#DIV/0!	#DIV/0!	#DIV/0!	3.0	#DIV/0!	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB) A-weight	C-weight	Flat	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
63	0.1	-0.1	-0.1	2.0	0.20	0.6
125	0.1	0.0	0.0	1.5	0.20	0.6
250	-0.1	0.0	0.0	1.5	0.20	0.6
500	-0.1	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	0.0	0.0	-0.1	2.0	0.20	0.6
4 000	0.0	0.0	0.0	3.0	0.20	0.6
8 000	0.0	0.0	0.0	5.0	0.20	0.7

Date of Calibration 22-28 Feb 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP 174-0167

5. Long-term stability

Test	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration 22-28 Feb 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP 174-0167

7. Level linearity on the reference level range

Applied value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
137	137.0	0.0	1.1	0.30	0.3
136	136.0	0.0	1.1	0.30	0.3
135	135.0	0.0	1.1	0.30	0.3
133	133.0	0.0	1.1	0.30	0.3
132	132.0	0.0	1.1	0.30	0.3
131	131.0	0.0	1.1	0.30	0.3
130	130.0	0.0	1.1	0.30	0.3
129	129.0	0.0	1.1	0.30	0.3
124	124.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	69.0	0.0	1.1	0.30	0.3
64	63.9	-0.1	1.1	0.30	0.3
59	59.0	0.0	1.1	0.30	0.3

Date of Calibration 22-29 Feb 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No.21-67 0232 — MTC No. EEL. BP. 174/0167

7. Level linearity on the reference level range (cont.)

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
54	53.9	-0.1	1.1	0.30	0.3
49	49.0	0.0	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
39	38.9	-0.1	1.1	0.30	0.3
34	33.9	-0.1	1.1	0.30	0.3
29	29.0	0.0	1.1	0.30	0.3
28	27.9	-0.1	1.1	0.30	0.3
27	26.9	-0.1	1.1	0.30	0.3
26	25.9	-0.1	1.1	0.30	0.3
25	24.9	-0.1	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
30-120	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration 22-26 Jan 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No.21-67 0232 — MTC No. EEL. BP. 174/0167

8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
30-130	25	25.0	0.0	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Tone burst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	126.0	0.0	±1.0	0.20	0.3
	2	106.9	-0.1	+1.0,-2.5	0.20	0.3
	0.25	100.0	0.0	+1.5,-5.0	0.20	0.3
Slow	200	119.5	-0.1	±1.0	0.20	0.3
	2	100.0	0.0	+1.0,-5.0	0.20	0.3

Date of Calibration 22-24 Jan 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No.21-67 0232 — MTC No. EEL. BP. 174/0167

10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.5	0.1	3.0	0.23	0.35
Positive half cycle	124.4	124.1	-0.3	2.0	0.23	0.35
Negative half cycle	124.4	124.1	-0.3	2.0	0.23	0.35

11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle				
135.4	135.4	0.0	1.5	0.35	0.25

12. High level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by (Mr. Tanasit Prasingsri)

Approved by (Mr. [illegible]) Director
Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre
Ref 20112o7012400347004

Date of Calibration 22-24 Jan 2024

Date of Issue 29 Feb 2024

End of Certificate

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY

451-451/15 Srinakharin Rd.,Bangchuenu,Bangplad Bangkok 10700 THAILAND
Tel.0-2435-8500 Fax.0-2435-4679 email:cal-center@sithiporn.com http://www.sithiporn.com

Cert. No. : ACL23320
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00597167 / 179116 / 87525
ID No.: RYG_ES0437

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) %

REVIEW BY / APPROVED BY / NEXT CAL DATE

Received Date : 11 OCTOBER 2023
Calibration Date : 19-20 OCTOBER 2023
Date of Issue : 24 OCTOBER 2023

Calibrated by : Nathakorn Pechpisan

Approved by : (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 ASSOCIATES CO.,LTD CALIBRATION LABORATORY
Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This instrument 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	EE-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EE-0010-23	07-FEB-24
Digital Multimeter	34461A	MY53220104	EEL.BP 30/0266	13-FEB-24
Digital Multimeter	34461A	MY53220076	EEL.BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60034273	EEL.BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1072	62100114	EE-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

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).

SITHIPORN ASSOCIATES CO.,LTD CALIBRATION LABORATORY
Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
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

Note: Pass/Fail evaluation for each parameter will be considered together from the acceptance limit and the Maximum-permitted uncertainty of measurement.

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY
Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

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	17.5
Flat	23.1

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	0.0	0.0	0.0	±1.0
8000	1.3	1.4	1.4	±5.0

SITHIPORN ASSOCIATES CO.,LTD CALIBRATION LABORATORY
Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
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	-0.1	±1.5
250	0.0	0.0	-0.1	±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	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	±0.2
C - weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Leq	94.0	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

SITHIPORN ASSOCIATES CO.,LTD CALIBRATION LABORATORY
Continuation of Calibration Certificate

Cert. No. : ACL23320
Job No. : VC67AC0011
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	63.9	-0.1	±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	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	24.9	-0.1	±1.1

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CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No : ACL23320
Job No. : VC67AC0011
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, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.1	0.1	±3.0
One	136.4	136.1	-0.3	±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	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QF-TS12-06-06-02 Rev. 04

T. [signature]

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CALIBRATION LABORATORY

Continuation of Calibration Certificate

Cert. No : ACL23320
Job No. : VC67AC0011
Pages : 8 of 8

11. Overload indication

Measured value (dB): Positive one-half cycle	Measured value (dB): Negative one-half cycle	Deviated Value (dB)	Acceptance Limits (dB)
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	±0.2

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-TS12-06-06-02 Rev. 04

T. [signature]

TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL BP 173 0167

CALIBRATION CERTIFICATE

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Address : 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre. [illegible] Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280

Instrument Calibrated
Description : Sound Level Meter
Manufacturer : Rion
Model : NL-42
Serial No. : 00296510 (ID: BYG_FS0433)
Microphone : Type UC-52 No. 100412
Preamplifier : Type NH-24 No. 18152

Ambient Environment
Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 3) kPa

Standards used :
1. Band Pass Filter Wavetek 432A S/N 9901[illegible]
2. Condenser Microphone Brüel&Kjær 4180 S/N 2[illegible]871
3. Decade Attenuator Ando AL-205 S/N 00 [illegible]602
4. Function Arbitrary Waveform Generator Agilent 33220A S/N MY44042[illegible]
5. Digital Function Synthesizer NF Electronic Instruments DF-1934 S/N 122037
6. Digital Multimeter Fluke 8520A S/N 49[illegible]007
7. Pistonphone Rion NC-72 S/N 004[illegible]
8. Measuring Amplifier Brüel&Kjær [illegible]

Date of Receipt 24 Jan 2024
Date of Calibration 2[illegible] Feb 2024

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TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL BP 173 0167

9. Power Amplifier Brüel&Kjær 2706 S/N 1517650
10. Speaker Tannoy Limited, Great Britain British Patent No. 215300
11. Digital Multimeter Agilent 34401A S/N MY41005[illegible]
12. Programmable Attenuator Yokogawa TPA-301A S/N 2212

Calibration Procedure

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3: Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EES), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

Date of Calibration 22-29 Feb 2024

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TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL BP 173 0167

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB): Before adjust	Measured value (dB): After adjust	Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
113.99	114.1	113.9	-0.1	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 124.1 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
16.9	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
A-Weight	12.3	0.10	N/A
C-Weight	17.7	0.10	N/A
Flat	23.1	0.10	N/A

Date of Calibration 22-29 Feb 2024

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TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL BP 173 0167

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB): A-weight	C-weight	Flat	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
125	0.0	0.2	0.1	1.5	0.45	0.6
1 000	0.0	0.0	0.0	1.0	0.45	0.6
8 000	-0.3	-0.3	-0.3	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB): A-weight	C-weight	Flat	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
63	-0.1	0.0	0.0	2.0	0.20	0.6
125	-0.1	0.0	0.0	1.5	0.20	0.6
250	0.0	0.0	0.0	1.5	0.20	0.6
500	0.0	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	0.0	0.0	0.0	2.0	0.20	0.6
4 000	0.0	0.0	0.0	3.0	0.20	0.6
8 000	0.0	0.0	0.0	5.0	0.20	0.7

Date of Calibration 22-29 Feb 2024

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TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL BP 173 0167

5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration 22-29 Feb 2024

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TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL BP 173 0167

7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
137	137.1	0.1	1.1	0.30	0.3
136	136.1	0.1	1.1	0.30	0.3
135	135.1	0.1	1.1	0.30	0.3
133	133.1	0.1	1.1	0.30	0.3
132	132.1	0.1	1.1	0.30	0.3
131	131.0	0.0	1.1	0.30	0.3
130	130.0	0.0	1.1	0.30	0.3
129	129.0	0.0	1.1	0.30	0.3
124	124.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.1	0.1	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	69.0	0.0	1.1	0.30	0.3
64	64.0	0.0	1.1	0.30	0.3
59	59.0	0.0	1.1	0.30	0.3

Date of Calibration 22-29 Feb 2024

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TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL BP 173 0167

7. Level linearity on the reference level range (cont.)

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
54	54.0	0.0	1.1	0.30	0.3
49	48.9	-0.1	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
39	38.9	-0.1	1.1	0.30	0.3
34	33.9	-0.1	1.1	0.30	0.3
29	28.8	-0.2	1.1	0.30	0.3
28	27.8	-0.2	1.1	0.30	0.3
27	26.9	-0.1	1.1	0.30	0.3
26	25.9	-0.1	1.1	0.30	0.3
25	24.8	-0.2	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
30-130	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration 22-29 Feb 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP-173-0167

8. Level linearity including the level range control

At reference level at 5 dB greater than the underrange on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
30-130	25	25.0	0.0	1.1	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Fast	200	126.0	0.0	±1.0	0.20	0.3
	2	108.9	-0.1	+1.0; -2.5	0.50	0.3
	0.25	100.0	0.0	+1.5; -5.0	0.20	0.3
Slow	200	119.5	-0.1	±1.0	0.20	0.3
	2	100.0	0.0	+1.0; -5.0	0.20	0.3

Date of Calibration 22-26 Feb. 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP-173-0167

10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.5	0.1	3.0	0.20	0.35
Positive half cycle	124.4	124.1	-0.3	2.0	0.20	0.35
Negative half cycle	124.4	124.1	-0.3	2.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Positive one half cycle	Negative one half cycle				
135.4	135.4	0.0	1.5	0.55	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by (Mr. Pannasit Pansingsri)

Approved by (Mr. [illegible] Khanyai)
Director
Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre
Ref. 2311267012400247001

Date of Calibration 22-26 Feb. 2024

Date of Issue 29 Feb. 2024

End of Certificate

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP-173-0167

CALIBRATION CERTIFICATE

Submitted by ALS Laboratory Group (Thailand) Co., Ltd.

Address 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250

Calibrated at Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre, Soi 3C Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280

Instrument Calibrated :

Description Sound Level Meter

Manufacturer Rion

Model NL-42

Serial No. 00256[illegible] (ID: RYG_ES0431)

Microphone Type UC-52 No. [illegible]6239

Preamplifier Type NH-24 No. 34375

Ambient Environment

Temperature (23 ± 3) °C

Relative Humidity (50 ± 15) %

Ambient Pressure (101.325 ± 5) kPa

Standards used :

1. Band Pass Filter Wavetek 752A S/N 90010494
2. Condenser Microphone Brüel&Kjaer 4180 S/N 2889871
3. Decade Attenuator Ando AL-[illegible] S/N [illegible]
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY440426[illegible]
5. Digital Function Synthesizer NF Electronic Instruments DF-1923A S/N 172037
6. Digital Multimeter Fluke 8520A S/N 4985007
7. Pistonphone Rion NC-72 S/N 00402446
8. Measuring Amplifier Brüel&Kjaer 2636 S/N 1537454

Date of Receipt 26 Jan. 2024

Date of Calibration 22-26 Feb. 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP-173-0167

9. Power Amplifier Brüel&Kjaer 2706 S/N 1517650
10. [illegible] S/N 215[illegible]
11. Digital Multimeter Agilent 3458A S/N MY4100556[illegible]
12. Programmable Attenuator Tamagawa TPA-303A S/N 2212

Calibration Procedure

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3: Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.

Date of Calibration 22-26 Feb. 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP-173-0167

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)		Deviated value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
	Before adjust	After adjust				
113.95	113.3	113.9	-0.1	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 124 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
20.2	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
A-Weight	14.4	0.10	N/A
C-Weight	19.9	0.10	N/A
Flat	25.3	0.10	N/A

Date of Calibration 22-26 Feb. 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP-173-0167

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB) A-weight	C-weight	Flat	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
125	0.1	0.2	0.1	1.5	0.45	0.6
1 000	0.0	0.0	0.0	1.0	0.45	0.6
8 000	1.7	1.7	1.7	5.0	0.55	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB) A-weight	C-weight	Flat	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
63	-0.1	-0.1	-0.1	2.0	0.20	0.6
125	-0.1	0.0	0.0	1.5	0.20	0.6
250	-0.1	0.0	0.0	1.5	0.20	0.6
500	-0.1	0.0	0.0	1.5	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	0.0	-0.1	2.0	0.20	0.6
4 000	-0.1	0.0	0.0	3.0	0.20	0.6
8 000	0.0	0.0	0.0	5.0	0.20	0.7

Date of Calibration 22-26 Feb. 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP-173-0167

5. Long term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.1
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.1	0.1	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration 22-26 Feb. 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP-173-0167

7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
137	137.0	0.0	1.1	0.30	0.3
136	136.0	0.0	1.1	0.30	0.3
135	135.0	0.0	1.1	0.30	0.3
133	133.0	0.0	1.1	0.30	0.3
132	132.0	0.0	1.1	0.30	0.3
131	131.0	0.0	1.1	0.30	0.3
130	130.0	0.0	1.1	0.30	0.3
129	129.0	0.0	1.1	0.30	0.3
124	124.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	69.0	0.0	1.1	0.30	0.3
64	63.9	-0.1	1.1	0.30	0.3
59	59.0	0.0	1.1	0.30	0.3

Date of Calibration 22-26 Feb. 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-BP-173-0167

7. Level linearity on the reference level range (cont.)

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
54	53.9	-0.1	1.1	0.30	0.3
49	49.0	0.0	1.1	0.30	0.3
44	43.9	-0.1	1.1	0.30	0.3
39	39.0	0.0	1.1	0.30	0.3
34	33.9	-0.1	1.1	0.30	0.3
29	28.9	-0.1	1.1	0.30	0.3
28	27.9	-0.1	1.1	0.30	0.3
27	26.9	-0.1	1.1	0.30	0.3
26	25.9	-0.1	1.1	0.30	0.3
25	24.8	-0.2	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
30-130	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration 22-26 Feb. 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL BP 171-0167

8. Level linearity including the level range control

At reference level at 5 dB greater than the underrange on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
30-130	25	25.0	0.0	1.1	0.30	0.3

9. Tone burst response

Time weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Fast	200	126.0	0.0	±1.0	0.20	0.3
	2	105.9	-0.1	+1.0;-2.5	0.20	0.3
	0.25	100.0	0.0	+1.5;-5.0	0.20	0.3
Slow	200	119.5	-0.1	±1.0	0.20	0.3
	2	100.0	0.0	+1.0;-5.0	0.20	0.3

Date of Calibration 22-28 Feb. 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL BP 171-0167

10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.5	0.1	3.0	0.20	0.35
Positive half cycle	124.4	124.1	-0.3	2.0	0.20	0.35
Negative half cycle	124.4	124.1	-0.3	2.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Positive one half cycle	Negative one half cycle				
135.4	135.4	0.0	1.5	0.55	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Begin	129.0	0.0	0.3	0.10	0.1
End	129.0				

Calibrated by (Mr. Pannarat Phanngam)

Approved by (Mr. Prawat Khuyya)

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Ref: 20112670124001470001

Date of Calibration 22-28 Feb. 2024

Date of Issue 29 Feb. 2024

End of Certificate

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0292 MTC No. EEL BP 83/0267

CALIBRATION CERTIFICATE

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

Address: 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok, 10250

Calibrated at: Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre, Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280

Instrument Calibrated

Description: Sound Calibrator

Manufacturer: Rion

Model: NC-74

Serial No.: 34178121 (ID No. [illegible])

Ambient Environment

Temperature: (23 ± 3) °C

Relative Humidity: (50 ± 15) %

Ambient Pressure: (101.325 ± 1.300) kPa

Standards used:
1. Digital Function Synthesizer NF Electronic DF 193A S/N 122037
2. Measuring Amplifier Brüel & Kjær 2636 S/N 1557484
3. Programmable Attenuator Tamagawa TPA-301A S/N OF 2214
4. Digital Multimeter Agilent 34421A S/N MY-[illegible]
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001
6. Audio Analyzer Keithley 2015 P S/N [illegible]
7. Condenser Microphone B&K 4180 S/N 2869671

Calibration Procedure: CP-122-04 based on IEC 60942:2003. The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL) which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual results is attached herewith and the uncertainties quoted refer to the measured values only.

Date of Receipt: [illegible] 2024

Date of Calibration: [illegible] 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0292 MTC No. EEL BP 83/0267

The reported expanded uncertainty is based up on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 94 dB re 20µPa at 1000 Hz

Acoustic Output in dB re 20µPa, Corrected to Reference Conditions (101.325 kPa, 23.0 °C and 50 %RH).

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4160	94.01	0.01	± 0.10	±0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4160	1003.1	3.1	± 1.5	±1.0%

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4160	1.50	± 0.50	±3.0%

Note: 1. No adjustment.
2. The calibrator pressure correction was not included.
3. The microphone volume correction was included at level of 0.16 dB from manual.

Calibrated by (Mr. Weerachai Deechaiyo)

Approved by (Mr. Prawat Khuyya) Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Ref: 20112670219007190001

Date of Calibration: 28 Feb. 2024

Date of Issue: 29 Feb. 2024

End of Certificate 2/2

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

Cert. No.: ACL24012
Pages: 1 of 8

Calibration Certificate

Equipment: SOUND LEVEL METER

Manufacturer: RION

Model: NL-42A / Microphone UC-52 / Preamplifier NH-24

Serial No: 00623390 / 195637 / 26416

ID No: RYG-ES0615

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: (101.2 ± 3) kPa

Relative Humidity: (50.0 ± 20) %

Received Date: 19 DECEMBER 2023

Calibration Date: 05-08 JANUARY 2024

Date of Issue: 09 JANUARY 2024

Calibrated by: Nattakorn Pisutpisan

Approved by: (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 ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

Cert. No.: ACL24012
Job No.: VC67AC0044
Pages: 2 of 8

Calibration Procedure: CP-AC-01

Calibration Method:

This equipment was calibrated by follow 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-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL.BP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL.BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024275	EEL.BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34510495	AA-1002-23	14-FEB-24

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).

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

Cert. No.: ACL24012
Job No.: VC67AC0044
Pages: 3 of 8

Summary of Measurement Result:

Parameter	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

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

Cert. No.: ACL24012
Job No.: VC67AC0044
Pages: 4 of 8

Result of calibration:

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.9)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)
A - weight	12.6
C - weight	19.2
Flat	24.8

3. Acoustical signal tests of frequency weightings

Meter free field anechoic 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	0.3	0.3	0.3	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	1.0	1.1	1.1	±5.0

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Cert. No.: ACL24012
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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	±2.0
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	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	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	± 0.2

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CALIBRATION LABORATORY

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Cert. No. : ACL24012
Job No. : VC67AC0044
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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	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	26.8	-0.2	±1.1
26.0	25.9	-0.1	±1.1
25.0	24.9	-0.1	±1.1

T. Petch

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CALIBRATION LABORATORY

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Cert. No. : ACL24012
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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	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	126.0	126.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
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	±2.0
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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Cert. No. : ACL24012
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11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.7	89.5	-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 -----

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Cert. No. : ACL24013
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No. : 00623391 / 198638 / 26419
ID No. : RYG-F-0516

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 : 19 DECEMBER 2023
Calibration Date : 05-08 JANUARY 2024
Date of Issue : 09 JANUARY 2024

Calibrated by : Nattakorn Puanpanan

Approved by : T. Petch
(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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Cert. No. : ACL24013
Job No. : VC67AC0044
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :
This equipment was calibrated by follow 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.
The test 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-0009-23	07-FEB-24
Waveform Generator	33511B	MY52307742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	ELE-BP 30/0296	13-FEB-24
Digital Multimeter	33461A	MY53220076	ELE-BP 29/0296	13-FEB-24
Digital Multimeter	34461A	MY60024273	ELE-BP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	SA-42KAI	34567495	AA-1002-23	14-FEB-24

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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Cert. No. : ACL24013
Job No. : VC67AC0044
Pages : 3 of 8

Summary of Measurement Result :

Parameter	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	0.5	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	0.5	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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CALIBRATION LABORATORY

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Cert. No. : ACL24013
Job No. : VC67AC0044
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.40)	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	17.6
C - weight	20.3
Flat	21.6

3. Acoustical signal tests of frequency weightings
Mean 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	0.2	0.2	0.2	±1.5
1000	0.0	0.0	0.0	±1.0
8000	1.5	1.6	1.6	±5.0

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Cert. No. : ACL24013
Job No. : VC67AC0044
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	0.0	±2.0
125	0.0	0.0	0.0	±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	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	±0.2
C - weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Leq	94.0	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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Cert. No. : ACL24013
Job No. : VC67AC0044
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	79.0	0.0	±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	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.1	0.1	±1.1
30.0	30.1	0.1	±1.1
29.0	29.1	0.1	±1.1
28.0	28.1	0.1	±1.1
27.0	27.2	0.2	±1.1
26.0	26.2	0.2	±1.1
25.0	25.3	0.3	±1.1

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Cert. No. : ACL24013
Job No. : VC67AC0044
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	5	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, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
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	133.1	0.1	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.3	-0.1	±2.0

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Cert. No. : ACL24013
Job No. : VC67AC0044
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	89.3	0.3	±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 ————

T. Petch.

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SITHIPORN associates ILAC-MRA

Cert. No. : ACL24033
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42A / Microphone UC-52 / Preamplifier NH-24
Serial No.: 00624392 / 154639 / 26420
ID No.: RYG_LS0612

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 ± 2) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 05 JANUARY 2024
Calibration Date : 12-15 JANUARY 2024
Date of Issue : 16 JANUARY 2024

Calibrated by : Nattakorn Prechavut

Approved by : T. Petch.
(Thanakul Petchurat)

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Cert. No. : ACL24033
Job No. : VC67AC0052
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :
This equipment was calibrated by follow 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	EI-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EI-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL.BP 30-0266	13-FEB-24
Digital Multimeter	33461A	MY53220376	EEL.BP 29-0266	15-FEB-24
Digital Multimeter	34461A	MY60026273	EEL.BP 31-0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	LT-0311-23	05-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-1002-23	14-FEB-24

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 realized at :
   3.1 National Institute of Metrology (Thailand).
   3.2 Thailand Institute of Scientific and Technological Research (TISTR).

T. Petch.

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Cert. No. : ACL24033
Job No. : VC67AC0052
Pages : 3 of 8

Summary of Measurement Result :

Parameter	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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CALIBRATION LABORATORY

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Cert. No. : ACL24033
Job No. : VC67AC0052
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.90)	93.9	0.0	±0.3

2. Self-generated noise
2.1 Normal test

Measured Value (dB)
14.8

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	13.8
C - weight	20.6
Flat	26.1

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	0.1	0.1	0.1	± 1.5
1000	0.0	0.0	0.0	± 1.0
8000	1.2	1.3	1.3	±5.0

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Cert. No. : ACL24033
Job No. : VC67AC0052
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	0.1	±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	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.2
C - weight	94.0	94.0	0.0	± 0.2
Flat	94.0	94.0	0.0	± 0.2

5.2 Time weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	± 0.1
Slow	94.0	94.0	0.0	± 0.1
Leq	94.0	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	94.2	94.1	0.1	± 0.3

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Cert. No. : ACL24033
Job No. : VC67AC0052
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	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	27.1	0.1	± 1.1
26.0	26.1	0.1	± 1.1
25.0	25.1	0.1	± 1.1

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Cert. No. : ACL24033
Job No. : VC67AC0052
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	5	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, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
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	±2.0
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	0.3	±2.0

T. Petch.

Cert. No. : ACL24033
Job No. : VC67AC0052
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one half cycle	Negative one half cycle		
89.7	89.7	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

Cert. No. : ACC24054
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No.: 34178123
ID No.: BYG_FS0215

REVIEW BY
APPROVED BY
NEXT CAL DATE

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 : 18 OCTOBER 2024
Calibration Date : 22 OCTOBER 2024
Date of Issue : 24 OCTOBER 2024

Calibrated by : Nathakorn Pisutpaisan

Approved by : (Thanakul Petchurai)

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Cert. No. : ACC24054
Job No. : VC66AC0015
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :
This equipment was calibrated by follow 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-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-IIP 21/0267	13-FEB-25
Digital Multimeter	33461A	MY53220076	EEL-IIP 20/0267	15-FEB-25
Digital Multimeter	33461A	MY60024273	EEL-IIP 22/0267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25
Audio Analyzer	AVR-3360A	V744B6069	EF-0009-24	09-FEB-25

2. The 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)

Cert. No. : ACC24054
Job No. : VC66AC0015
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance limit (dB)
94	94.09	0.09	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Acceptance limit (%)
1000	1001.5	0.1	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Acceptance limit (%)
1.55	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

Cert. No. : ACL24095
Pages : 1 of 9

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-21 Microphone UC-52 / Preamplifier NH-21
Serial No.: 00376364 / 71486 / 23142
ID No.: BYG_FS0012

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 : 19 JANUARY 2024
Calibration Date : 25-26 JANUARY 2024
Date of Issue : 29 JANUARY 2024

Calibrated by : Nathakorn Pisutpaisan

Approved by : (Thanakul Petchurai)

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Cert. No. : ACL24096
Job No. : VC67AC0058
Pages : 2 of 9

Calibration Procedure : CP-AC-02

Calibration Method :
This equipment was calibrated by follow 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-0009-23	07-FEB-24
Waveform Generator	33511B	MY52302742	EF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220104	EEL-IIP 30/0266	13-FEB-24
Digital Multimeter	33461A	MY53220076	EEL-IIP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL-IIP 31/0266	14-FEB-24
Programmable Attenuator	MAT-1070	62100114	EF-0011-23	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	15-FEB-24
Measuring Amplifier	NA-42KAI	34560495	AA-3002-23	14-FEB-24

2. The 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)

Cert. No. : ACL24096
Job No. : VC67AC0058
Pages : 3 of 9

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.1	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. Toneburst 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

Cert. No. : ACL24096
Job No. : VC67AC0058
Pages : 4 of 9

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.98)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
26.2

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)
A - weight	22.9
C - weight	24.2
Flat	27.6

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	0.2	0.3	0.3	± 1.5
1000	0.1	0.1	0.1	± 1.0
8000	0.5	0.6	0.6	±5.0

Cert. No. : ACL24096
Job No. : VC67AC0058
Pages : 5 of 9

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	0.0	0.0	±2.0
125	0.0	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	0.1	0.1	0.0	±2.0
4000	0.1	0.1	0.0	±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	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	±0.2
C - weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Leq	94.0	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	±0.2

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Job No. : VC67AC0058
Pages : 6 of 9

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
135.0	135.0	0.0	±1.1
134.0	134.0	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

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Cert. No. : ACL24096
Job No. : VC67AC0058
Pages : 7 of 9

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1
120	94.0	94.0	0.0	±1.1
110	94.0	94.0	0.0	±1.1
100	94.0	94.0	0.0	±1.1
90	94.0	94.0	0.0	±1.1

Level linearity on each level range

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	41.6	41.9	0.3	±1.1
120	32.0	31.9	-0.1	±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	96.0	95.9	-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

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Cert. No. : ACL24096
Job No. : VC67AC0058
Pages : 8 of 9

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±3.0
One	133.4	132.8	-0.6	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±2.0
Positive half cycle	132.4	132.1	-0.3	±2.0
Negative half cycle	132.4	132.1	-0.3	±2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.3	89.3	0.0	±1.5

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Cert. No. : ACL24096
Job No. : VC67AC0058
Pages : 9 of 9

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

T. Petch.

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Cert. No : ACL24074
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier 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,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND

Location : -
Ambient Temperature : (23.0 ± 5) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 11 JANUARY 2024
Calibration Date : 22-24 JANUARY 2024
Date of Issue : 24 JANUARY 2024

Calibrated by : Nathakorn Paanprinan

Approved by : T. Petch.
(Thanakul Petchurai)

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Cert. No. : ACL24074
Job No. : VC67AC0054
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :
This equipment was calibrated by follow 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	17-0006-23	07-FEB-24
Waveform Generator	33511B	MY52307742	LF-0010-23	07-FEB-24
Digital Multimeter	33461A	MY53220101	EEL.BP 30/0266	13-FEB-24
Digital Multimeter	34461A	MY53220076	EEL.BP 29/0266	13-FEB-24
Digital Multimeter	34461A	MY60024273	EEL.BP 31/0266	14-FEB-24
Programmable Attenuator	MAT 1070	62100114	17-0011-21	08-FEB-24
Condenser Microphone	4180	2977900	AA-1001-23	14-FEB-24
Measuring Amplifier	NA-42KA1	34566495	AA-1002-23	14-FEB-24

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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Cert. No. : ACL24074
Job No. : VC67AC0054
Pages : 3 of 8

Summary of Measurement Result :

Parameter	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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Cert. No. : ACL24074
Job No. : VC67AC0054
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.88)	93.9	0.0	±0.3

2. Self-generated noise
2.1 Normal test

Measured Value (dB)
17.0

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	17.0
Flat	22.7

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	0.4	0.4	0.4	±1.5
1000	0.0	0.0	0.0	±1.0
8000	-1.4	-1.4	-1.3	±5.0

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Cert. No. : ACL24074
Job No. : VC67AC0054
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	-0.1	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	0.1	0.0	±3.0
8000	0.1	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz
5.1 Frequency weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	±0.2
C - weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Leq	94.0	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	±0.1

T. Petch.

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	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

T. Retch.

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	128.1	0.1	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lcpeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±3.0
One	136.4	135.7	-0.7	±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	±2.0
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

T. Retch.

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

T. Retch.

TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No.

CALIBRATION CERTIFICATE

Submitted by ALS Laboratory Group (Thailand) Co., Ltd.

Address 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng [illegible], Khet Suan Luang, Bangkok 102[illegible]

Calibrated at Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre, Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280

Instrument Calibrated

Description	Sound Level Meter
Manufacturer	Rion
Model	NL-42
Serial No.	00900073 (ID.RYG [illegible])
Microphone	UC-52 No.188466
Preamplifier	NH-21 No.[illegible]735

Ambient Environment

Temperature	: (23 ± 3) °C
Relative Humidity	: (50 ± 15) %
Ambient Pressure	: (101.325 ± 1.5) kPa

Standards used :

1. Band Pass Filter Wavetek 752A S/N 93015494
2. Condenser Microphone Brüel&Kjaer 4180 S/N [illegible]871
3. Decade Attenuator Aeroflex AL-205 S/N [illegible]
4. Function Arbitrary Waveform Generator Agilent 33220A S/N MY44042688
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037
6. Digital Multimeter Fluke 8520A S/N 4985027
7. Pistonphone Rion NC-72 S/N 00402446
8. Measuring Amplifier Brüel&Kjaer 2636 S/N 1537484

Date of Receipt 24 Jan 2024

Date of Calibration 22 Feb 2024 - 1 Mar 2024

TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No.

9. Power Amplifier Brüel&Kjaer 2706 S/N 517650
10. Speaker Tannoy Limited Great Britain British Patent No. 215300
11. Digital Multimeter Agilent 3440A S/N MY44005560
12. Programmable Attenuator Tamagawa TPA-103A S/N 2212

Calibration Procedure :

This instrument was calibrated by using calibration procedures in CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3: Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

This instrument has been calibrated against standards maintained at the Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading as attached herewith are the uncertainty values quoted refer to the measured values only.

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95 %.

Date of Calibration 22 Feb 2024 - 1 Mar 2024

TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No.

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB) Before adjust	Measured value (dB) After adjust	Deviation value (dB)	Acceptance limit Class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
113.6	114.1	113.9	0.0	1.0	0.30	N/A

Note: The external calibration adjustment was firstly performed. The internal calibration adjustment was then completed at the display of 124.6 dB.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
17.8	0.10	N/A

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
A-Weight	12.6	0.10	N/A
C-Weight	15.5	0.10	N/A
Flat	24.2	0.10	N/A

Date of Calibration 22 Feb 2024 - 1 Mar 2024

TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No.

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB) A-weight	C-weight	Flat	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
125	0.1	0.2	0.2	1.5	0.45	0.6
1 000	-0.1	-0.1	-0.1	1.0	0.45	0.6
8 000	-0.7	-0.7	-0.7	5.0	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB) A-weight	C-weight	Flat	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
63	-0.1	0.0	0.0	2.0	0.20	0.6
125	-0.1	0.0	0.0	1.5	0.20	0.6
250	-0.1	0.0	0.0	1.4	0.20	0.6
500	0.0	0.0	0.1	1.4	0.20	0.6
1 000	0.0	0.0	0.0	1.0	0.20	0.6
2 000	-0.1	0.0	0.0	2.0	0.20	0.6
4 000	-0.1	0.0	0.0	3.0	0.20	0.6
8 000	0.0	0.0	0.0	5.0	0.20	0.7

Date of Calibration 22 Feb 2024 - 1 Mar 2024

TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No.

5. Long-term stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Begin	94.0	0.0	0.3	0.10	0.2
End	94.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
A-weight	94.0	0.0	0.2	0.20	0.2
C-weight	94.0	0.0	0.2	0.20	0.2
Flat	94.0	0.0	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Fast	94.0	0.0	0.1	0.20	0.2
Slow	94.0	0.0	0.1	0.20	0.2
Leq	94.0	0.0	0.1	0.20	0.2

Date of Calibration 22 Feb 2024 - 1 Mar 2024

TISTR

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0232

MTC No.

7. Level linearity on the reference level range

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
136	136.0	0.0	1.1	0.30	0.3
135	135.0	0.0	1.1	0.30	0.3
134	134.0	0.0	1.1	0.30	0.3
133	133.0	0.0	1.1	0.30	0.3
132	132.0	0.0	1.1	0.30	0.3
131	131.0	0.0	1.1	0.30	0.3
130	130.0	0.0	1.1	0.30	0.3
129	129.0	0.0	1.1	0.30	0.3
124	124.0	0.0	1.1	0.30	0.3
119	119.0	0.0	1.1	0.30	0.3
114	114.0	0.0	1.1	0.30	0.3
109	109.0	0.0	1.1	0.30	0.3
104	104.0	0.0	1.1	0.30	0.3
99	99.0	0.0	1.1	0.30	0.3
94	94.0	0.0	1.1	0.30	0.3
89	89.0	0.0	1.1	0.30	0.3
84	84.0	0.0	1.1	0.30	0.3
79	79.0	0.0	1.1	0.30	0.3
74	74.0	0.0	1.1	0.30	0.3
69	[illegible]	0.1	1.1	0.30	0.3

Date of Calibration 22 Feb 2024 - 1 Mar 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 2[illegible]-67-0232 MTC No. EEL-DP-1765167

7. Level linearity on the reference level range (cont.)

Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
64	63.9	-0.1	1.1	0.30	0.3
59	58.9	-0.1	1.1	0.30	0.3
54	53.9	-0.1	1.1	0.30	0.3
49	49.0	0.0	1.1	0.30	0.3
44	44.0	0.0	1.1	0.30	0.3
39	38.9	-0.1	1.1	0.30	0.3
34	33.9	-0.1	1.1	0.30	0.3
29	28.9	-0.1	1.1	0.30	0.3
28	27.9	-0.1	1.1	0.30	0.3
27	26.9	-0.1	1.1	0.30	0.3
26	25.9	-0.1	1.1	0.30	0.3
25	24.9	-0.1	1.1	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
30-130	94.0	94.0	0.0	1.1	0.30	0.3

Date of Calibration 23 Feb 2024 - 1 Mar 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-DP-1765167

8. Level linearity including the level range control

At reference level at 5 dB greater than the under range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
30-130	35.0	35.0	0.0	1.1	0.30	0.3

9. Tone burst response

Time weighting	Toneburst duration Td (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Fast	200	126.0	0.0	±1.0	0.20	0.3
	2	109.0	0.0	+1.0; -2.5	0.20	0.3
	0.25	99.9	0.1	+1.5; -5.0	0.20	0.3
Slow	200	119.6	0.0	±1.0	0.20	0.3
	2	100.0	0.0	+1.0; -5.0	0.20	0.3
SEL	200	120.0	0.0	±1.0	0.20	0.3
	2	100.0	0.0	+1.0; -2.5	0.20	0.3
	0.25	99.9	0.1	+1.5; -5.0	0.20	0.3

Date of Calibration 23 Feb 2024 - 1 Mar 2024

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67-0232 MTC No. EEL-DP-1765167

10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Complete cycle	125.4	125.3	-0.1	3.0	0.20	0.35
Positive half cycle	124.4	124.1	-0.3	2.0	0.20	0.35
Negative half cycle	124.4	124.1	-0.3	2.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Positive one half cycle	Negative one half cycle				
135.5	135.5	0.0	1.5	0.20	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 2 (±dB)	Uncertainty (±dB)	Maximum permitted uncertainty of measurement (±dB)
Begin	129.3	0.0	0.3	0.10	0.1
End	129.3				

Calibrated by : (Mr. Tawsut [illegible])

Approved by : (Mr. Prasert Klaiya) Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Center

Date of Calibration : 23 Feb 2024 - 1 Mar 2024

Date of Issue : 1 Mar 2024

Ref : [illegible]

End of Certificate

JNAC
JIRANATEE ASSOCIATES CO., LTD.

Accredited calibration laboratory ISO/IEC 17025:2017
NSC – TISI – TIS 17025 CALIBRATION 0367

Temperature measurement laboratory
Calibration service department

CERTIFICATE OF CALIBRATION

Certificate No. CDT-012-67 Page 1 of 2 Pages

MEASUREMENT ITEM	Heat Stress Monitor
MANUFACTURER	Delta OHM
MODEL/TYPE	HD32.2
SERIAL NUMBER	[illegible]
ID NUMBER	KYS_[illegible]
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	05 Jan 2024
MEASUREMENT DATE	08 Jan 2024
ISSUE DATE	09 Jan 2024

ENVIRONMENTAL CONDITIONS
Ambient conditions in the laboratory are as follows:
Temperature 23.0 ± 3.0 °C
Relative humidity 55.0 ± 15.0 %RH

NOTED: The certificate is valid only to the item calibrated on date and place of calibration.

TABULATION OF RESULTS:
The table on next page give the measured values

Calibration procedure: The temperature correction was done by in-house calibration method as WI-[illegible] according to comparison method with standard digital temperature indicator and standard temperature probe. [illegible]

Traceability: The measurement results are traceable to the International System of Units (SI) through National Institute of Metrology Thailand (NIMT) [illegible]

Reference Used During Calibration: 1. Standard Temperature Probe [illegible] 2. Digital Temperature Indicator [illegible]

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%. [illegible]

Calibrated by: [illegible]

Approved signatory: Mr. [illegible] Calibration Department Manager

THIS CERTIFICATE MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

JNAC
JIRANATEE ASSOCIATES CO., LTD.

Continuation of Certificate of Calibration Number CDT-012-67 Page 2 of 2 Pages

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: 17015113
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.059	20.0	-0.1	0.099
60	25.050	24.9	-0.1	[illegible]
60	30.044	29.9	-0.1	[illegible]
60	35.037	34.9	-0.1	[illegible]
60	40.034	39.9	-0.1	[illegible]

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15024482
Dimension: Diameter 3.3 mm. Length 105 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.059	20.1	0.0	0.099
110	25.050	25.1	0.0	0.099
110	30.044	30.1	0.1	[illegible]
110	35.037	35.1	0.1	[illegible]
110	40.034	40.1	0.1	[illegible]

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15013222
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.059	20.1	0.0	0.095
75	25.050	24.9	-0.2	0.095
75	30.044	29.8	-0.2	[illegible]
75	35.038	34.7	-0.3	[illegible]
75	40.034	39.6	-0.4	[illegible]

UUC*: Unit Under Calibration

Remark: The reported uncertainty of measurement is 0.16, based on standard uncertainty multiplied by a coverage factor k=2.1 providing a level of confidence of approximately 95%.

End of Certificate of Calibration

JNAC
JIRANATEE ASSOCIATES CO., LTD.

Accredited calibration laboratory ISO/IEC 17025:2017
NSC – TISI – TIS 17025 CALIBRATION 0367

Temperature measurement laboratory
Calibration service department

CERTIFICATE OF CALIBRATION

Certificate No. CDT-020-67 Page 1 of 2 Pages

MEASUREMENT ITEM	Heat Stress Monitor
MANUFACTURER	Delta OHM
MODEL/TYPE	HD32.2
SERIAL NUMBER	19013113
ID NUMBER	KYS_[illegible]
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	11 Jan 2024
MEASUREMENT DATE	15 Jan 2024
ISSUE DATE	17 Jan 2024

ENVIRONMENTAL CONDITIONS
Ambient conditions in the laboratory are as follows:
Temperature 23.0 ± 3.0 °C
Relative humidity 55.0 ± 15.0 %RH

NOTED: The certificate is valid only to the item calibrated on date and place of calibration.

TABULATION OF RESULTS:
The table on next page give the measured values

Calibration procedure: [illegible]

Traceability: [illegible]

Reference Used During Calibration: [illegible]

Uncertainty of Measurement: [illegible]

Calibrated by: [illegible]

Approved signatory: Mr. [illegible] Calibration Department Manager

THIS CERTIFICATE MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

JNAC
JIRANATEE ASSOCIATES CO., LTD.

Continuation of Certificate of Calibration Number CDT-020-67 Page 2 of 2 Pages

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: 18021467
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
90	20.039	20.1	0.1	[illegible]
90	25.051	25.1	0.0	[illegible]
90	[illegible]	[illegible]	[illegible]	[illegible]
90	35.036	35.1	[illegible]	[illegible]
90	40.030	[illegible]	[illegible]	[illegible]

Table 2: This equipment was connected with Globe thermometer probe Model: TP3275.2 S/N: 18020497
Dimension: Diameter 3.3 mm. Length 105 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.039	20.1	0.1	[illegible]
110	25.051	[illegible]	0.0	[illegible]
110	30.045	[illegible]	0.1	[illegible]
110	35.036	35.1	[illegible]	[illegible]
110	40.030	40.1	0.1	[illegible]

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 18021270
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.039	[illegible]	[illegible]	[illegible]
75	25.051	25.1	0.0	[illegible]
75	30.045	30.1	0.1	[illegible]
75	35.036	35.0	0.0	[illegible]
75	40.030	39.9	-0.1	[illegible]

UUC*: Unit Under Calibration

End of Certificate of Calibration

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
[illegible]

Certificate of Calibration

Certificate No. 23[illegible]524 Page 1 of 2

Equipment	pH Meter
Manufacturer	Mettler Toledo
Model	[illegible]
Serial No.	B[illegible]
ID No.	RYC_ENC[illegible]
Condition As-Received	Used item
Received Date	08 December 2023
Calibration Date	11 December 2023
Reference	[illegible]
Ambient Temperature	[illegible] °C
Relative Humidity	[illegible] %

This certificate may not be reproduced other than in full except with the prior written approval of the Head of Corporate Services & Equipment Calibration and Testing Services.

Submitted by: A. [illegible] Laboratory Group (Thailand) Co., Ltd. Rayong Branch [illegible] Rayong 21150 Thailand

Procedure used: Calibrations were conducted using calibration procedure No. [illegible] according to EURAMET cg-15

Condition of the result of calibration
1. Reference standard instruments

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multi-Product Calibrator	5080A	24[illegible]	[illegible]	29 Apr 2024

2. [illegible]
3. [illegible]
4. This Certification is traceable to the International System of Units (SI) through National Institute of Metrology Thailand (NIMT)

Calibrated by: [illegible]
Issue Date: 11 December 2023

Approved Signatory: [ ] [illegible] [✓] [illegible] [ ] [illegible]

N 0331156

Cert. No. [illegible]
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 (± µV)
-200.0000	-199.9	0.1	69
-150.0000	-150.0	0.0	65
-100.0000	-100.0	0.0	63
-50.0000	-50.0	0.0	61
0.0000	0.0	0.0	58
50.0000	50.0	0.0	61
100.0000	100.0	0.0	63
150.0000	150.0	0.0	65
200.0000	199.9	-0.1	68

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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N 1193422

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

Cert.No.: 23CH1574
Page: 1 of 3

Certificate of Calibration

Equipment :	pH Meter
Manufacturer	Mettler Toledo
Model :	SevenExcellence
Serial No. :	B634201445
ID No. :	RYG_EN0152
Condition As Received :	Used Item
Received Date :	05 December 2023
Calibration Date :	15 December 2023
Reference :	2312-0151DSC-3
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch 616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng Rayong 21140 Thailand
Ambient Temperature :	(25 ± 2.5) °C
Relative Humidity :	(50 ± 15) %
Calibration Procedure :	In house method - CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM) - CP-CH2 by comparison with standard thermometer
Calibrated by :	Warakorn Lempagtrakul
Approved by :	Approved Signatory

( ) Saithip Meangma
( ) Warakorn Lempagtrakul
(✓) Pondon Papan

Issue Date : 19 December 2023

The Uncertainties are for a confidence probability of approximately 95%

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Cert.No.: 23CH1574
Page: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	I30RC118	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	4462054	110RC044	23IN08	26 July 2024

This certification is traceable to the International System of Unit maintained through - Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials This measurement results are traceable to SI through CPA chem Ltd. ANSI ASQ National Accreditation Board, Accredited No. AR 1535

Buffer Solution	Manufacturer	Lot No.	Exp date
pH 4.008	CPA chem	913598	14 July 2025
pH 6.986	CPA chem	931959	01 Oct 2024
pH 9.947	CPA chem	949106	02 Nov 2024

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	Coverage factor
	pH	mV	mV	pH	(±mV)	k
pH Meter S/N: B634201445	4.000	177.48	177.3	4.000	0.058	2.00
	7.000	0.00	-0.1	7.000	0.058	2.00
	10.000	-177.48	-177.5	10.000	0.056	2.00

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Cert.No.: 23CH1574
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 (±)	Coverage factor k
pH Electrode S/N: 3225368	4.008	4.013	164.1	0.0045	2.00
	6.986	6.938	0.7	0.0084	2.00
	9.937	10.002	-164.7	0.0066	2.11

Function : Temperature Measurement
(*) Without adjustment
This equipment was connected with Temperature Probe
- Model: InLab®Expert Pro-ISM
- Serial No: 3225368
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 (±°C)	Coverage factor k
25.0	25.003	24.3	-0.703	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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a 1193851

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES
5743 PATTANAKARN ROAD SOI 18 SUANLUANG, SUANLUANG BANGKOK 10250

Cert.No.: 23TW168
Page: 1 of 2

Certificate of Testing

Equipment :	DO Meter
Manufacturer	YSI
Model :	5000-115V
Serial No. :	15E102790
ID No. :	RYG_EN0032
Received Date :	21 July 2023
Test Date :	24 July 2023
Reference :	2307-0713DSC-1
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 ± 5) °C Humidity (50 ± 20) %
Test Procedure :	In - house method : CP-CH9 by Comparison Technique with Azide Modification Method
Tested by :	Walalak Sittiwan
Approved by :	Approved Signatory

REVIEWED BY / APPROVED BY / NEXT CAL DATE

( ) Malee Bulkruea
(✓) Saithip Meangma
( ) Warakorn Lempagtrakul

Issue Date : 26 July 2023

A 0320211

Cert.No.: 23TW168
Page: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments
This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Centre, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1) Burette	-	I30BU10	23GG1172	22 Mar 2025
2) Balance	1128143784	14CRC004	22MM50	20 Sep 2023

2. Standard Material :-

Material	Manufacturer	Lot No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No. : 15E100484

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.18	8.17	0.0055

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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a 1172155

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

Cert. No.: 23LM125
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 616/10 Moo 5 T. Maenam Khu, A. Pluakdaeng, Rayong 21140 Thailand
Location :	TPA On Site Calibration Laboratory
Received Order :	25 July 2023
Calibrated Date :	27 July 2023
Ambient Temperature :	(25 ± 10) °C
Relative Humidity :	(50 ± 30) %
AC Line Voltage :	(220 ± 22) V
Calibrated by :	Preecha Hlaho
Approved by :	Approved Signatory

( ) Pornthippa Tameyakul
( ) Malee Bulkruea
(✓) Suwit Impai

Issue Date : 31 July 2023

The Uncertainties are for a confidence probability of approximately 95%

A 0053616

Equipment :	DO Meter with Sensor
Condition As Received :	Used Item
Reference :	2307-0713DSC-2

Cert. No : 23LM125
Page : 2 of 2

Procedure Used :-
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	Serial No.	Cert. No.	Traceable	Due Date
1) Digital Thermometer	2163080	22I1235	TPA	21 Oct 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.
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment
Function : Temperature measurement
This instrument was connected with temperature sensor S/N : 1228475307

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (±°C)	Coverage Factor k
20.00	100	20.011	19.91	-0.101	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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a 1158515

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

Cert. No.: 23TM962
Page: 1 of 3

Certificate of Calibration

Equipment :	Low Temp. Incubator
Manufacturer :	Memmert
Model :	IPP750
Serial No :	V518.0064
ID No :	RYG_EN0154
Submitted by :	ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch) 616/10 Moo 5 T. Maenam Khu, A. Pluakdaeng, Rayong 21140 Thailand
Location :	BOD Room
Received Order :	29 May 2023
Calibration Date :	29 May 2023
Ambient Temperature :	(25 ± 10) °C
Relative Humidity :	(50 ± 30) %
Calibrated by :	Man Pattanapongpaiboon
Approved by :	Approved Signatory

REVIEWED BY / APPROVED BY / NEXT CAL DATE

( ) Pornthippa Tameyakul
( ) Malee Bulkruea
(✓) Suwit Impai

Issue Date : 7 June 2023

The Uncertainties are for a confidence probability of approximately 95%

A 0054567

Equipment :	Low Temp. Incubator
Condition As-Received :	Used Item
Reference :	2305-0898OC-2

Cert. No.: 23TM962
Page: 2 of 3

Procedure Used :-
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

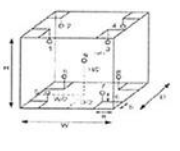
Condition of this result of calibration
1. Reference standard instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34972A	MY57013711	22LM50	02 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 :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Environment during calibration	Beginning	Finished
Temp. (°C)	23	22
Rel. Humid. (%)	54	50
AC Supply (Volt)	223	222



Position :	Ref. Std ID No. :
1	16-18RTD-01
2	16-18RTD-02
3	16-18RTD-03
4	16-18RTD-04
5	16-18RTD-05
6	16-18RTD-10
7	16-18RTD-07
8	22-18RTD-08
9 (ref)	16-18RTD-09

Probe Installation Details
a = 10 cm
b = 10 cm
c = 10 cm

Dimension of Chamber
D = 0.60 m
W = 1.0 m
H = 1.2 m
Capacity = 0.75 m³

a 1165130

Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2305-0696OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No : 23TM062
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.0	20.0	0.019	0.72	1.0	2

Calibration Point (°C)	Measured Temperature (°C) Position 1	2	3	4	5	6	7	8	9 (ref.)	Uncertainty (± °C)
20.0	18.547	19.180	19.487	19.529	19.428	20.139	20.112	20.406	20.116	0.30

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 1165129

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL 0-2717-3000-29 FAX 0-2719-9484

ilac-MRA

Certificate of Calibration

Cert. No : 24TM1663
Page : 1 of 3

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
616/10 Moo 5, T.Maenam Khu,
A.Pluakdaeng,
Rayong 21140, Thailand
Location : BOD Room

REVIEW BY ThanitaK.
APPROVED BY
NEXT CAL DATE 01/05/26

Received Order : 01 November 2024
Calibration Date : 01 November 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Krisda Malee
Approved by : Kunchit
Approved Signatory
( ) Ponpan Paipim
( ) Suwit Impai
(✓) Kunchit Prompat

Issue Date : 07 November 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3 Equipment Calibration and Testing Services.

Equipment : Low Temp. Incubator
Condition As Received : Used Item
Reference : 2411-0002OC-1

Cert. No : 24TM1663
Page : 2 of 3

Procedure Used :-
Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

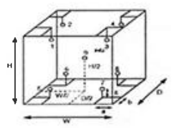
Condition of this result of calibration
1. Reference standard Instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY44073381	24LMT3	TPA	18 May 2025

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.
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Environment during calibration	Beginning	Finished
Temp. (°C)	24	25
REL.Humid. (%)	55	53
AC Supply (Volt)	220	221



Position :	Ref. Std. ID No :
1	1RTD-2/1
2	1RTD-2/2
3	22-01RTD-03
4	1RTD-2/4
5	1RTD-2/5
6	1RTD-2/6
7	23-01RTD-07
8	1RTD-2/8
9 (ref.)	23-01RTD-09

Probe Installation Details :
a = 10 cm
b = 10 cm
c = 10 cm

Dimension of Chamber :
D = 0.60 m
W = 1.0 m
H = 1.2 m
Capacity = 0.72 m³

Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2411-0002OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No : 24TM1663
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.0	20.0	0.026	0.26	0.53	2

Calibration Point (°C)	Measured Temperature (°C) Position 1	2	3	4	5	6	7	8	9 (ref.)	Uncertainty (± °C)
20.0	20.071	19.915	20.273	20.179	19.977	19.782	20.056	20.026	20.033	0.30

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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

ilac-MRA

Cert No : 23CG3704
Page : 1 of 2

Certificate of Calibration

Equipment : Burette
Capacity : 50 mL
Serial No. : -
ID No. : RYG_EN0216
Manufacturer : Witeg
Made in : Germany
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Rayong Branch
616/10 Moo 5, T.Maenam Khu,
A.Pluakdaeng, Rayong 21140 Thailand

REVIEW BY N.Boonyat
APPROVED BY
NEXT CAL DATE 25/09/24

Ambient Temperature : (20 ± 2.5) °C
Relative Humidity : (50 ± 10) %
Barometric Pressure : 756 mmHg
Calibration Procedure : ASTM E 542 - 01
Calibrated by : Srisuda Khamtha
Approved by :
Approved Signatory
( ) Ponpan Paipim
(✓) Srisuda Khamtha
( ) Saingeunkam Wongsa

Issue Date : 26 September 2023

The Uncertainties are for a confidence probability of approximately 95%

A 0056881

Equipment : Burette
Received Date : 19 September 2023
Condition As-Received : Used Item
Calibration Date : 25 September 2023
Reference : 2309-0636DSC-3

Cert No. : 23CG3704
Page : 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	MS204TS	C226356493	140RC010	TH2000-C12	METTLER	29 Sep 2023
2) Thermo-Hygrograph	THDX-CE	00016540	140EC001	23H1275	TPA	09 June 2024
3) Thermometer	-	1594592	140EC010	23I159	TPA	10 Feb 2024

This certification is traceable to SI Unit.
2. The certificate is valid only to the item calibrated on date and place of calibration.
3. True value is converted to true volume at the standard temperature of 20 °C

Calibration result :

Nominal capacity (mL)	Reading (mL)	Uncertainty (± mL)	k Factor
10	10.0224	0.0080	2.00
20	20.0064	0.0085	2.00
30	29.9931	0.0088	2.00
40	39.9910	0.0094	2.00
50	49.9806	0.010	2.00

Remark mL = cm³

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 1162477

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL 0-2717-3000-29 FAX 0-2719-9484

ilac-MRA

Certificate of Calibration

Cert.No : 24CG3711
Page : 1 of 2

Equipment : Burette
Capacity : 50 mL
Serial No. : -
ID. No. : RYG_EN0216
Manufacturer : Witeg
Made In : Germany
Submitted by : ALS Laboratory Group (Thailand) Co. Ltd
Rayong Branch
616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng
Rayong 21140, Thailand

REVIEW BY ThanitaK.
APPROVED BY
NEXT CAL DATE 24/09/25

Ambient Temperature : (20 ± 2.5) °C
Relative Humidity : (50 ± 10) %
Barometric Pressure : 756 mmHg
Calibration Procedure : ASTM E 542 - 01
Calibrated by : Saingeunkam Wongsa
Approved by :
Approved Signatory
(✓) Srisuda Khamtha
( ) Ponpan Paipim
( ) Unnopphol Harachai

Issue Date : 24 September 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3 Equipment Calibration and Testing Services.

Equipment : Burette
Received Date : 19 September 2024
Condition As-Received : Used Item
Calibration Date : 24 September 2024
Reference : 2409-0756DSC-3

Cert.No : 24CG3711
Page : 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	XP205	B134206712	140RC007	24MM316	TPA	15 July 2025
2) Data Logger	HL-20D	20683159	140EC012	23H2174	TPA	10 Oct 2024
3) Thermometer	-	1594592	140EC010	24I175	TPA	20 Feb 2025

This certification is traceable to SI Unit.
2. The certificate is valid only to the item calibrated on date and place of calibration.
3. True value is converted to true volume at the standard temperature of 20 °C

Calibration result :

Nominal capacity (mL)	Reading (mL)	Uncertainty (± mL)	k Factor
10	10.0259	0.0082	2.00
20	20.0214	0.0085	2.00
30	30.0006	0.0089	2.00
40	40.0003	0.0094	2.00
50	49.9968	0.011	2.00

Remark mL = cm³

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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DKSH

ilac-MRA

Certificate of Calibration

Equipment: SPECTROPHOTOMETER
Model: DR6000
Serial No. (or ID): 1627845 (RYG_EN0037)
Manufacturer: HACH
Condition: In Condition

Certificate No.: C06230441
Issued Date: 19 September 2023
Job No.: WO-00005362
Page: 1 of 3

Customer: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
616/10 Moo 5 T.Maenam Khu,
A Pluakdaeng, Rayong 21140, Thailand

Environment Condition: Temperature 23.9 °C ± 0.2 °C
Humidity 65.3 %RH ± 1.4 %RH

REVIEW BY N.Boonyat
APPROVED BY
NEXT CAL DATE 18/9/25

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch) (Wet Chemistry)
616/10 Moo 5 T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand

Calibration By: Mr.Nattapat Rungruang
Calibration Date: 18 September 2023
The Method used: In house method, CAL-WI-24, base on ASTM E 275-08 and ASTM E 387-04
Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Starna Scientific Limited.
The standard for Wavelength Certificate No. 111583 and 111584
The standard for Photometric Certificate No. 9114984 and 111588
The standard for Stray light Certificate No. 111586 and 111585
The standard for Spectral resolution Certificate No. 111587

(Mr. Nattapat Rungruang)
Person in charge

(Mr. Nonun Srihawan)
Authorized signatory

Delivering Growth in Asia and Beyond

CAL-FM-C06-15, 12 Sep 2022

DKSH

Certificate No.: C00230441 Page 2 of 3

Calibration Results:

Without Adjustment

Wavelength Accuracy (nm). The spectral bandwidth of Std at 2 nm and UUC at 2 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.61	418.3	0.31	0.13
536.88	536.6	0.06	0.13
637.98	638.3	-0.32	0.13
748.46	748.7	-0.22	0.13
807.03	807.4	-0.37	0.13

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.2930	0.289	0.0040	0.0045
	0.5168	0.519	-0.0022	0.0045
	1.0258	1.028	0.0006	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.2867	0.283	0.0037	0.0045
	0.5073	0.509	-0.0017	0.0045
	1.0083	1.007	0.0013	0.0045
455 nm	0.0000	0.000	0.0000	0.0045
	0.2516	0.250	0.0016	0.0045
	0.4595	0.482	-0.0225	0.0045
	0.9334	0.935	0.0004	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.2461	0.245	0.0011	0.0046
	0.4652	0.466	-0.0008	0.0045
	0.9468	0.948	0.0006	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.2594	0.259	0.0004	0.0045
	0.5040	0.505	-0.0010	0.0045
	1.0032	1.002	0.0012	0.0045
635 nm	0.0000	0.000	0.0002	0.0045
	0.2579	0.257	0.0008	0.0045
	0.4971	0.497	0.0001	0.0045
	0.9720	0.971	0.0010	0.0045

Delivering Growth – in Asia and Beyond

CAL-FM-C06-10 12 Sep 2022

DKSH

Certificate No.: C00230441 Page 3 of 3

Calibration Results:

Without Adjustment

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0060
	0.7355	0.737	-0.0015	0.0060
257 nm	0.0000	0.000	0.0000	0.0060
	0.8574	0.857	0.0004	0.0060
313 nm	0.0000	0.000	0.0000	0.0060
	0.2864	0.290	-0.0036	0.0060
360 nm	0.0000	0.000	0.0000	0.0060
	0.6374	0.637	0.0004	0.0060

Stray light *

Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)
260.82 +/- 0.11 nm	260.8	1.3	1.888
391.44 +/- 0.11 nm	391.4	1.3	1.886

Spectral Resolution *

Nominal Concentration 0.02 % w/v	Peak	Trough	Ratio	SBW
Standard Wavelength (nm)	268.86	266.69	1.38	2.00
UUC: Wavelength (nm)	268.2	266.1		
Std Absorbance (A)	0.4566	0.2783		
Absorbance (A)	0.413	0.300		

* Calibration Marked * Not TISI Accredited * in this Certificate have been included for completeness.

The End of Certificate

Delivering Growth – in Asia and Beyond

CAL-FM-C06-10 12 Sep 2022

DKSH

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: WO-00005382

ชนิดเครื่องมือ: SPECTROPHOTOMETER รุ่น: DR6000 หมายเลขเครื่อง: 1627845

ตรวจสอบ (รับ) 18 Sep 2023 ปกติ	ไม่ปกติ	รายการตรวจเช็ค	ตรวจสอบ (ส่ง) 18 Sep 2023 ปกติ	ไม่ปกติ	หมายเหตุ
		General			
☑	☐	1. ความสมบูรณ์ของเครื่อง	☑	☐	
☑	☐	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	☑	☐	
☑	☐	3. สวิทซ์ปิด – เปิด เครื่อง (On-Off Switch)	☑	☐	
☑	☐	4. ปุ่มกด (Keypad)	☑	☐	
☑	☐	5. หน้าจอ (Display, Screen Contrast)	☑	☐	
		Spectrophotometer			
☐	☐	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	☐	☐	
☐	☐	7. ตัวควบคุมเลือกความยาวคลื่น (Wavelength Control)	☐	☐	
☑	☐	8. ความยาวคลื่น (Wavelength Check)	☑	☐	*
☑	☐	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	☑	☐	9.2 Hours
☑	☐	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	☑	☐	741.5 Hours
☑	☐	11. ช่องใส่หลายตัวอย่าง (Carousel Module)	☑	☐	
		pH Meter and Conductivity Meter			
☐	☐	12. อิเล็กโทรด (Electrode and Connection Cable)	☐	☐	
☐	☐	13. ระดับสารละลายใน Electrode (Level KCl)	☐	☐	
☐	☐	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	☐	☐	
☐	☐	15. ขาจับอิเล็กโทรด (Stand)	☐	☐	
		Turbidimeter			
☐	☐	16. ค่าความขุ่นต่ำสุด (No Sample)	☐	☐	
☐	☐	17. ระดับการส่องสว่างของแสง (>= 2.5 ไม่เกิน 3.0)	☐	☐	
		Automatic titrator			
☐	☐	18. สภาพ Piston Burettes	☐	☐	
☐	☐	19. Function Rinsing and Dosing	☐	☐	
☐	☐	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	☐	☐	

เพิ่มเติม/ข้อแนะนำ: *656.1nm=656.1nm

*486.0nm=485.5nm

Mr. Nattapal Rungruang

Service Engineer

Delivering Growth – in Asia and Beyond

CAL-FM-R31-03 20 Jul 2022

Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310

Tel +66 2643 8361-6, e-mail: service.thailand@sartorius.com

SARTORIUS

NAC-TIS-TIS 17025 CALIBRATION 0424

Certificate of Calibration

REVIEW BY Tharitak. APPROVED BY [signature] NEXT CAL DATE 22/02/2025

Model Number:	MSE224S-100-DU	Certificate No.:	24BC10059
Description:	Analytical Balance	Issued Date:	Friday, February 23, 2024
Serial Number:	0026207038	Reference No.:	228196
ID No.:	RYG_EN0002		
Manufacturer:	Sartorius	Page No.:	1 of 2

Customer Name: ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch) 616/10 Moo 5 T.Maenam Khu, A.Pluak Daeng, Rayong 21140, Thailand

Calibrated Place: ALS Laboratory Group (Thailand) Co., Ltd (Balance Room) 616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, Rayong 21140, Thailand

Calibrated By: Mr.Chonchai Inthana

Calibration Date: Thursday, February 22, 2024

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: 24.2 °C ± 5.0 °C

Humidity: 57.0 % RH ± 10.0 % RH

Pressure: - ± -

Reasons for calibration

☐ New Installation ☐ Service / Repaired ☑ Re-calibration/ Maintenance

Equipment Condition: ☑ Good Operate ☐ Fair

Measurement Method UKAS Publication Ref :Lab 14

The measurement uncertainty stated is the expended 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 Metrologica Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-622-00	Sartorius weight set 1mg - 5000g E2 YCS011-622-00	TCS	M23081975	23-Aug-2025
MHB-382SD	Humidity/Barometer/Temp. Lutron MHB-382SD	DKSH	C19231845	23-Aug-2024

This certificate relate and apply this equipment only

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Mr.chonchai Inthana(Technical Manager)

STAMP

SOP FM 33 03 February 2022

Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310

Tel +66 2643 8361-6 Fax +66 2643-8367, e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number:	MSE224S-100-DU	Certificate No:	24BC10059
Description:	Analytical Balance	Issued Date:	Friday, February 23, 2024
Serial Number:	0026207038	Reference No:	228196
ID No:	RYG_EN0002		
Manufacturer:	Sartorius	Page No:	2 of 2

Calibration Results : Without Adjustment

Repeatability

The reproducibility is the ability of a weighing instrument to display nearly identical readouts 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 reproducibility quantitatively.

Nominal Value (Low Load) 20 g, Tolerance 0.0001 g

Nominal Value: (High Load) 200 g, Tolerance 0.0001 g

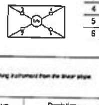
Low Load	High Load
20.0000	199.9999
20.0000	200.0000
20.0001	200.0000
20.0000	199.9999
20.0001	200.0000
19.9999	200.0000
20.0000	200.0000
20.0000	199.9999
19.9999	200.0001
19.9999	200.0000
Standard Deviation 0.00007	0.00006

Eccentricity (Off-center loading error)

The off-center loading error is indicated by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76)

Nominal value: 100 g

Tolerance 0.0004 g



	Difference
1	-
2	-0.0001
3	-0.0001
4	0.0000
5	-0.0001
6	-

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 (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.0100	0.0100	0.0000	0.00018
0.05	0.0500	0.0500	0.0000	0.00018
0.1	0.1000	0.1000	0.0000	0.00018
0.5	0.5000	0.5000	0.0000	0.00018
1	1.0000	1.0000	0.0000	0.00018
5	5.0000	5.0000	0.0000	0.00018
10	10.0000	10.0000	0.0000	0.00018
20	20.0000	20.0000	0.0000	0.00024
50	50.0000	49.9999	-0.0001	0.00019
100	100.0000	100.0000	0.0000	0.00023
200	200.0000	199.9999	-0.0001	0.00032

End of Report

SOP FM 33 03 February 2022

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

TEL.0-2717-3000-29 FAX.0-2719-9484

ilac-MRA

Certificate of Calibration

Cert. No.: 24TM632

Page: 1 of 3

REVIEW BY Tharitak. APPROVED BY [signature] NEXT CAL DATE 21/09/25

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:	21 March 2024
Calibration Date:	21 March 2024
Ambient Temperature:	(26 ± 10) °C
Relative Humidity:	(50 ± 30) %
Calibrated by:	Man Pattanapongpaiboon

Approved by: [signature] Approved Signatory

( ) Pornthippa Tameyakul

( ) Unnopphol Harachai

(✓) Suwit Imjai

Issue Date: 22 March 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

Equipment:	Hot Air Oven
Condition As Received:	Used Item
Reference:	2403-0563OC-1

Cert. No.: 24TM632

Page: 2 of 3

Procedure Used :-

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	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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.

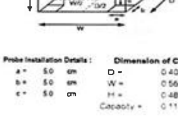
Remark : TPA Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration	Beginning	Finished
Temp. (°C)	27	27
REL.Humid. (%)	57	59
AC Supply (Volt)	222	224



Position :	Ref. Std. ID No.: @ Calibration Point (180) °C	(104) °C
1	18-18TC-01	18-18RTD-01
2	18-18TC-02	18-18RTD-02
3	18-18TC-03	18-18RTD-03
4	18-18TC-04	18-18RTD-04
5	18-18TC-05	18-18RTD-05
6	18-18TC-06	23-18RTD-06
7	18-18TC-07	18-18RTD-07
8	18-18TC-08	22-18RTD-08
9 (ref.)	18-18TC-09	18-18RTD-09

Probe Installation Details :

a = 5.0 cm

b = 5.0 cm

c = 5.0 cm

Dimension of Chamber :

D = 0.40 m

W = 0.56 m

H = 0.48 m

Capacity = 0.11 m³

Equipment:	Hot Air Oven
Condition As Received:	Used Item
Reference:	2403-0563OC-1
Result of Calibration :-	(*) Without Adjustment
Function of UUC* :	Temperature Source
Fresh air setting :	Close

Cert. No.: 24TM632

Page: 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
104.0	104.0	104.0	0.051	0.59	0.62	2
180.0	180.0	180.0	0.15	1.3	1.7	2

Calibration Point (°C)	Measured Temperature (°C) Position 1	2	3	4	5	6	7	8	9 (ref.)	Uncertainty (±°C)
104.0	103.921	103.716	103.757	103.759	103.950	103.817	104.213	103.672	103.673	0.42
180.0	179.614	179.270	179.145	179.599	180.001	180.423	180.293	180.629	179.429	1.1

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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES

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TEL.0 2717-3000 29 FAX.0 2719-9484

ilac-MRA

Certificate of Calibration

Cert. No.: 24TM634

Page: 1 of 3

REVIEW BY Tharitak. APPROVED BY [signature] NEXT CAL DATE 21/03/25

Equipment:	Hot Air Oven
Manufacturer:	Memmert
Model:	UF 110
Serial No:	B423.0653
ID No:	RYG_EN0213
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:	21 March 2024
Calibration Date:	21 - 22 March 2024
Ambient Temperature:	(26 ± 10) °C
Relative Humidity:	(50 ± 30) %
Calibrated by:	Man Pattanapongpaiboon

Approved by: [signature] Approved Signatory

( ) Pornthippa Tameyakul

( ) Unnopphol Harachai

(✓) Suwit Imjai

Issue Date: 23 March 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

Equipment : Hot Air Oven — Cert. No : 24TM634
Condition As Received : Used Item — Page : 2 of 3
Reference : 2403-0563OC-3

Procedure Used :-

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:-

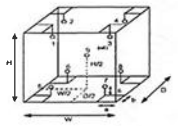
Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Environment during calibration	Beginning	Finished
Temp. (°C)	27	27
REL.Humid. (%)	59	59
AC Supply (Volt)	224	223



Position :	Ref. Std. ID No.: @ Calibration Point (180) °C	(104) °C
1	18-18TC-01	18-18RTD-01
2	18-18TC-02	18-18RTD-02
3	18-18TC-03	18-18RTD-03
4	18-18TC-04	18-18RTD-04
5	18-18TC-05	18-18RTD-05
6	18-18TC-06	23-18RTD-06
7	18-18TC-07	18-18RTD-07
8	18-18TC-08	22-18RTD-08
9 (ref.)	18-18TC-09	18-18RTD-09

Probe Installation Details : a = 5.0 cm; b = 5.0 cm; c = 5.0 cm

Dimension of Chamber : D = 0.40 m; W = 0.56 m; H = 0.48 m; Capacity = 0.11 m³

Equipment : Hot Air Oven — Cert. No.: 24TM634
Condition As Received : Used Item — Page : 3 of 3
Reference : 2403-0563OC-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
104.0	104.0	104.0	0.065	0.52	0.90	2
180.0	180.0	180.0	0.20	1.2	2.0	2

Calibration Point (°C)	Measured Temperature (°C) Position 1	2	3	4	5	6	7	8	9 (ref.)	Uncertainty (± °C)
104.0	104.169	103.506	103.898	103.712	103.772	103.730	104.289	103.805	103.798	0.42
180.0	180.701	179.239	179.935	179.969	180.127	180.138	180.895	179.313	180.211	1.1

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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
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TEL 0-2717-3000-29 FAX 0-2719-9484

Certificate of Calibration

Cert. No.: 24TM635
Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNB22
Serial No. : L513.0648
ID No. : RYG_EN0061

REVIEW BY Thanitak.
APPROVED BY [signature]
NEXT CAL DATE 21/09/25

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 : 21 March 2024
Calibration Date : 21 March 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Man Pattanapongpaiboon
Approved by : [signature] Approved Signatory
( ) Pornthippa Tameyakul
( ) Unnopphol Harachai
(✓) Suwit Impai

Issue Date : 23 March 2024

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Water Bath — Cert. No.: 24TM635
Condition As-Received : Used Item — Page : 2 of 3
Reference : 2403-0563OC-4

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 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:-

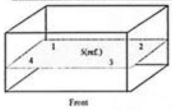
Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Heat transfer medium used : Water

	Environmental (°C)	(%R.H.)	AC Voltage Supply (Volt)
Beginning of Calibration	25	55	222
Finished of Calibration	25	57	223



Position :	Ref. Std. ID No.:
1	4803068-001
2	4803068-002
3	4803068-003
4	4803068-004
5(ref.)	4803068-005

Equipment : Water Bath — Cert. No.: 24TM635
Condition As-Received : Used Item — Page : 3 of 3
Reference : 2403-0563OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C) Position 1	2	3	4	5 (ref.)	Uncertainty (± °C)
85.0	85.0	85.0	84.428	84.424	84.489	84.507	84.477	0.18

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor k
85.0	0.19	0.11	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 %.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL 0-2717-3000-29 FAX 0-2719-9484

Certificate of Calibration

Cert.No.: 24CH160
Page : 1 of 3

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : Seven2Go
Serial No. : B627713284
ID No. : RYG_FS0381
Condition As-Received: Used Item
Received Date : 01 February 2024
Calibration Date : 02 February 2024
Reference : 2402-0019DSC-1

REVIEW BY P.tthayo T
APPROVED BY [signature]
NEXT CAL DATE 02/02/25

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch 616/10 Moo 5, T.Maenam Khu, A.Pluakdaeng, Rayong 21140, Thailand

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with standard voltage and direct measurement with certified reference material (CRM)
- CP-CH6 by comparison with themperature standard

Calibrated by : Watalak Sirithean
Approved by : [signature] Approved Signatory
(✓) Sathip Meangmai
( ) Warakorn Lamgogtrakul
( ) Pornpan Paipim

Issue Date : 5 February 2024

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

Cert.No : 24CH160
Page : 2 of 3

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	4982054	110RC044	23IKI8	26 July 2024

This certification is traceable to the International System of Unit maintained through:-
- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	940102	27 Nov 2025
pH 6.986	CPA chem	940104	02 Nov 2024
pH 9.997	CPA chem	940106	02 Nov 2024

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 pH	Standard Voltage Input mV	Actual Reading mV	Actual Reading pH	Uncertainty of Measurement (±mV)	Coverage factor k
pH Meter	4.00	177.48	178	4.00	0.58	2.00
S/N. B627713284	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.46	-178	10.00	0.58	2.00

Cert.No.: 24CH160
Page : 3 of 3

Calibration Results
Function : pH Measurement
Performing three buffers standard curve by using buffer nominal pH (4.01,7.00,10.01)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor k
pH Electrode	4.008	4.01	169	0.0071	2.00
S/N : 2337383	6.986	6.99	-6	0.0093	2.00
	9.997	10.00	-180	0.0090	2.00

Function : Temperature Measurement
(*) Without adjustment
This equipment was connected with Temperature Probe;
- Model : InLabExpert GO-ISM
- Serial No. : 2337383
Dimension of probe
- Length : 120 mm.
- Diameter : 12 mm.
- Immersion Depth : 110 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.000	25.1	0.100	0.13	2.00
30.0	29.999	30.1	0.101	0.13	2.00
40.0	40.001	40.1	0.099	0.13	2.00

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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BKK_EN0041

Agilent CrossLab Compliance Services

Certificate of System Qualification

GC-OQ • GCMS OQ

System ID: GM 6
Overall Qualification Status: Pass

REVIEWED BY [signature]
APPROVED BY [signature]
NEXT CAL DATE [illegible]

Overall CDS Logon Verification GC Test Status
Pass

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status
Pass

Setpoint Status: Pass

Overall Inlet Pressure Accuracy Test Status
Pass

Headspace Leak

Name: 7697A with Tray
Sampler 1
Setpoint Status: Pass

Overall Headspace Leak Test Status
Pass

Headspace Heated Zones Temperature Accuracy

Name: 7697A with Tray
Sampler 1
Setpoint Status: Pass
Zone: Transferline
Temperature:
Setpoint 115.0 °C
Actual 116.6
Accuracy: 0.5 °C
Agilent Recommended: >= -1.8 % setpoint (-2.1 °C)
<= 5.2 % setpoint (6.0 °C)

Setpoint Status: Pass
Zone: Sample Loop
Temperature:
Setpoint 110.0 °C
Actual 110.4
Accuracy: 0.4 °C
Agilent Recommended >= -4.0
<= 4.0

Setpoint Status: Pass
Zone: Oven
Temperature:
Setpoint 100.0 °C
Actual 100.6
Accuracy: 0.6 °C
Agilent Recommended: >= -4.0
<= 4.0

Overall Headspace Heated Zones Temperature Accuracy Test
Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass
Zone: Oven
Setpoint/Actual
Temperature: 230.0 231.1 °C
Accuracy: 1.1 °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: 100.0 100.2 °C
Accuracy: 0.2 °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: 100.0 100.1687 °C
Stability: 0.1 °C
Agilent Recommended: <= 0.5

Overall GC Oven Temperature Stability Test Status
Pass

Log Amp

Tested Combination 1 Front SSL / External SQ
Name 5975C inert XL with TAD
Setpoint Status: Pass

Overall Log Amp Test Status
Pass

RFPA

Tested Combination 1 Front SSL / External SQ
Name 5975C inert XL with TAD
Setpoint Status: Pass
Amu: 1050 n/a Drift After Five Minutes: RFPA Voltage:
22 mV 942 mV
Agilent Recommended: >= -100 and <= 100 <= 1900

Overall RFPA Test Status
Pass

Tune EI

Tested Combination 1 Front SSL / External SQ
Name 5975C inert XL with TAD
Setpoint Status: Pass
Filament 1

Setpoint Status: Pass
Filament 2

Overall Tune EI Test Status
Pass

Scouting Run

Tested Combination 1 Front SSL / External SQ
Headspace
Name 7697A with Tray
Source: EI - Inert

Setpoint Status: Completed
Injection Volume on Column: 1000 uL

Overall Scouting Run Status
Completed

Injection Precision

Tested Combination 1 Front SSL / External SQ
Name 7697A with Tray
Source: EI - Inert

Setpoint Status: Pass
Injection Volume on Column: 1000 uL
Area RSD: 1.27 % Retention Time RSD: 0.00 %
Agilent Recommended: <= 8.00 <= 1.00

Overall Injection Precision Test Status
Pass

Mass Ratio Precision

Tested Combination 1 Front SSL / External SQ
Headspace
Name: 7697A with Tray
Source: EI - Inert
Setpoint Status: Pass
Injection Volume on Column: 1000 uL

Area Mass 1 Abundance% Mass Ratio
RSD: 1.27 % 0.3% %
Agilent Recommended <= 5.00 <= 5.00
Pass Pass

Overall Mass Ratio Precision Test Status
Pass

Injection Carry Over

Tested Combination 1 Front SSL / External SQ
Name 7697A with Tray
Source: EI - Inert
Setpoint Status: Pass
Injection Volume on Column: 1000 uL
Area Carry Over: 0.00 %
Agilent Recommended: <= 1.00

Overall Injection Carry Over Test Status
Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

System ID	GM-6
Manufacturer	Agilent Technologies
Name	7890
Flow Data Input	Manual Data
Temperature Data Input	Manual Data or Other Data Logging

Tested Combination 1

Injection Technique	Headspace
Inlet	Front
Detector	External
LTM Included?	No

Sampler 1

Manufacturer	Agilent Technologies
Type	Headspace
Name	7697A with Tray
Model Number	G4557A
Serial Number	CN13023009
Firmware Revision	A.01.05.1
Sampling System	Loop fill
Location	Front
Injection Volume (uL)	1000
Headspace to GC Connection	EPC Headspace

Mainframe 1

Manufacturer	Agilent Technologies
Name	7890
Model Number	G3440A
Serial Number	CN12511186
Firmware Revision	A.01.14
Oven Type	Standard

Inlet 1

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	5975C inert XL with TAD
Model Number	G3172A
Serial Number	US13023A3D
Firmware Revision	5.52.09
High Vacuum System	Turbo Pump
Scouting Run Standard	MRP Std

MS EI Source 1

Manufacturer	Agilent Technologies
Source Type	EI - Inert
Number of filaments	2

Electronic Signature

Purpose

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Details

Full Name of Signer:	Sulufi Name
Logged On User Name:	sulufi.name@agilent.com
Signature Creation Date:	June 28, 2023
Reason for Signature:	Executed protocol and published the original version of document

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User Name: [illegible]
Hostname: [illegible]
System Id: GM-6
Print Date: June 26, 2023 [illegible] PM

[illegible]_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 9:12:[illegible] AM	Audit	Account Created	Session	None
June 26, 2023 9:12:05 AM	Start	Configuration	Session	None
June 26, 2023 9:12:05 AM	Audit	Preferences	Licensing	[illegible]
June 26, 2023 9:18:34 AM	Audit	[illegible]	Session	EOP details for primary technique (GC) - File path [illegible]; EOP File Name [illegible]; EOP Name [illegible]; EOP details for hyphenated technique (GCMS) - File path [illegible]; EOP File Name [illegible]; EOP Name [illegible]
June 26, 2023 9:38:13 AM	End	Configuration	Session	None
June 26, 2023 9:38:21 AM	Start	Qualification	Session	OQ
June 26, 2023 9:38:21 AM	Start	Execution	CDS Logon Verification - GC - 7890 - Qualitative test	None
June 26, 2023 9:41:[illegible] AM	End	Execution	CDS Logon Verification - GC - 7890 - Qualitative test	Run Count : 1
June 26, 2023 9:41:[illegible] AM	Start	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	None

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User Name: [illegible]
Hostname: [illegible]
System Id: GM-6
Print Date: June 26, 2023 5:00:37 PM

[illegible]_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 9:43:21 AM	End	Execution	System Inspection and Basic Safety and Operation - 7890 - Qualitative Test - No setpoints associated	Run Count : 1
June 26, 2023 9:47:34 AM	Start	Execution	Inlet Pressure Accuracy - Front EPC - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	None
June 26, 2023 9:53:27 AM	End	Execution	Inlet Pressure Accuracy - Front EPC - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi	Run Count : 1
June 26, 2023 9:53:37 AM	Start	Execution	Headspace Leak - 7697A with Tray (Sampler 1) - Qualitative Test - No setpoints associated	None
June 26, 2023 10:18:48 AM	End	Execution	Headspace Leak - 7697A with Tray (Sampler 1) - Qualitative Test - No setpoints associated	Run Count : 1
June 26, 2023 10:18:52 AM	Start	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1) - Zone : Transferline - S: 115.0°C - L: >= -1.8% setpoint and <= 1.8% setpoint	None
June 26, 2023 10:20:42 AM	Audit	Data	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1) - Zone : Transferline - S: 115.0°C - L: >= -1.8% setpoint and <= 1.8% setpoint	Manual Data Entry
June 26, 2023 10:20:44 AM	End	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1) - Zone : Transferline - S: 115.0°C - L: >= -1.8% setpoint and <= 1.8% setpoint	Run Count : 1

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User Name: [illegible]
Hostname: [illegible]
System Id: GM-6
Print Date: June 26, 2023 5:00:37 PM

[illegible]_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 10:20:48 AM	Start	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1) - Zone : Sample Loop - S: 110.0°C - L: >= -4.0°C and <= 4.0°C	None
June 26, 2023 10:25:37 AM	Audit	Data	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1) - Zone : Sample Loop - S: 110.0°C - L: >= -4.0°C and <= 4.0°C	Manual Data Entry
June 26, 2023 10:25:38 AM	End	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1) - Zone : Sample Loop - S: 110.0°C - L: >= -4.0°C and <= 4.0°C	Run Count : 1
June 26, 2023 10:25:41 AM	Start	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1) - Zone : Oven - S: 100.0°C - L: >= -4.0°C and <= 4.0°C	None
June 26, 2023 10:32:33 AM	Audit	Data	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1) - Zone : Oven - S: 100.0°C - L: >= -4.0°C and <= 4.0°C	Manual Data Entry
June 26, 2023 10:32:35 AM	End	Execution	Headspace Heated Zones Temperature Accuracy - 7697A with Tray (Sampler 1) - Zone : Oven - S: 100.0°C - L: >= -4.0°C and <= 4.0°C	Run Count : 1
June 26, 2023 10:32:38 AM	Start	Execution	GC Oven Temperature Accuracy - 7890 - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K	None

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User Name: [illegible]
Hostname: [illegible]
System Id: GM-6
Print Date: June 26, 2023 5:00:37 PM

[illegible]_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 10:37:21 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
June 26, 2023 10:37:27 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
June 26, 2023 10:37:29 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 26, 2023 10:42:29 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 26, 2023 10:42:31 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 26, 2023 10:42:37 AM	Start	Execution	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
June 26, 2023 10:44:38 AM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert Part of GCMS System Preparation	None
June 26, 2023 10:50:53 AM	Start	Execution	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	None
June 26, 2023 11:18:38 AM	Audit	Data	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Manual Data Entry

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User Name: [illegible]
Hostname: [illegible]
System Id: GM-6
Print Date: June 26, 2023 5:00:37 PM

[illegible]_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 11:18:42 AM	End	Execution	GC Oven Temperature Stability - 7890 - Temperature : Oven - S: 100.0°C - L: <= 0.5°C	Run Count : 1
June 26, 2023 11:18:43 AM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert Part of GCMS System Preparation	None
June 26, 2023 11:21:31 AM	Start	Execution	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	None
June 26, 2023 11:25:11 AM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert Part of GCMS System Preparation	None
June 26, 2023 12:33:12 PM	Start	Execution	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert - L (RSD) <= 5.00%	None
June 26, 2023 12:34:09 PM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert Part of GCMS System Preparation	None
June 26, 2023 12:34:30 PM	Start	Execution	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	None
June 26, 2023 12:50:07 PM	Start	Execution	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert - L (RSD) <= 5.00%	None

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User Name: [illegible]
Hostname: [illegible]
System Id: GM-6
Print Date: June 26, 2023 5:00:37 PM

[illegible]_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 12:58:18 PM	Start	Execution	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	None
June 26, 2023 1:08:19 PM	Start	Execution	Log Amp - 5975C Inert XL with TAD SQ - Source: EI - Inert	None
June 26, 2023 1:17:31 PM	End	Execution	Log Amp - 5975C Inert XL with TAD SQ - Source: EI - Inert	Run Count : 1
June 26, 2023 1:17:38 PM	Start	Execution	RFPA - 5975C Inert XL with TAD SQ - Source: EI - Inert	None
June 26, 2023 1:36:48 PM	End	Execution	RFPA - 5975C Inert XL with TAD SQ - Source: EI - Inert	Run Count : 1
June 26, 2023 1:38:53 PM	Start	Execution	Tune ID - 5975C Inert XL with TAD SQ - Source - EI - Inert Filament 1 (Qualitative - No setpoints associated)	None
June 26, 2023 1:42:01 PM	End	Execution	Tune ID - 5975C Inert XL with TAD SQ - Source - EI - Inert Filament 1 (Qualitative - No setpoints associated)	Run Count : 1
June 26, 2023 1:42:04 PM	Start	Execution	Tune ID - 5975C Inert XL with TAD SQ - Source - EI - Inert Filament 2 (Qualitative - No setpoints associated)	None
June 26, 2023 1:46:45 PM	End	Execution	Tune ID - 5975C Inert XL with TAD SQ - Source - EI - Inert Filament 2 (Qualitative - No setpoints associated)	Run Count : 1
June 26, 2023 1:46:47 PM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert Part of GCMS System Preparation	None

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User Name: [illegible]
Hostname: [illegible]
System Id: GM-6
Print Date: June 26, 2023 5:00:37 PM

[illegible]_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 2:01:24 PM	Start	Execution	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	None
June 26, 2023 4:20:32 PM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert Part of GCMS System Preparation	None
June 26, 2023 4:32:03 PM	Start	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert Part of GCMS System Preparation	None
June 26, 2023 4:33:04 PM	Audit	Data	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert Part of GCMS System Preparation	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:35:02 PM	End	Execution	Scouting Run - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert Part of GCMS System Preparation	Run Count : 1
June 26, 2023 4:35:05 PM	Start	Execution	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	None
June 26, 2023 4:36:32 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS

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User Name: [illegible]
Hostname: [illegible]
System Id: GM-6
Print Date: June 26, 2023 5:00:37 PM

[illegible]_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 4:36:33 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:36:33 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:36:33 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:36:33 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:36:33 PM	Audit	Data	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:36:[illegible] PM	End	Execution	Injection Precision - 7697A with Tray Headspace, Front SSL, SQ - Source - EI - Inert L (Area) <= 5.00% - L (Ret. Time) <= 1.00%	Run Count : 1
June 26, 2023 4:36:[illegible] PM	Start	Execution	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert - L (RSD) <= 5.00%	None

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User Name: [illegible]
Hostname: [illegible]
System Id: GM-6
Print Date: June 26, 2023 5:00:37 PM

[illegible]_ALS_OQ_GM6 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 26, 2023 4:36:30 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert - L (RSD) <= 5.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:36:31 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert - L (RSD) <= 5.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:36:31 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert - L (RSD) <= 5.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:36:31 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert - L (RSD) <= 5.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:36:33 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert - L (RSD) <= 5.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:36:33 PM	Audit	Data	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert - L (RSD) <= 5.00%	Data files Path : D:\OQ\2023\[illegible].D\DATA.MS
June 26, 2023 4:37:28 PM	End	Execution	Mass Ratio Precision - 7697A with Tray Headspace, Front SSL, SQ - Source: EI - Inert - L (RSD) <= 5.00%	Run Count : 1
June 26, 2023 4:37:32 PM	Start	Execution	Injection Carry Over - 7697A with Tray Headspace, Front SSL, SQ - Headspace Sampler - EI - Inert - L: <= 1.00%	None

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User Name: [illegible]
Hostname: [illegible]

System Id: GM-5
Print Date: June 29, 2023 5:00:37 PM

[illegible]_ALS_OQ_[illegible] Transaction log :

Time	Transaction State	Activity Performed	Type of Execution	Optional Information
June 26, 2023 4:37:53 PM	Audit	Data	Injection Carry Over - FBITA with Tray Headspace, Front [illegible], SQ - Headspace Sample - EI - Inert - L<= 1.00%	Data Box Path : D:\[illegible]\DATA\[illegible]
June 26, 2023 4:37:53 PM	Audit	Data	Injection Carry Over - FBITA with Tray Headspace, Front [illegible], SQ - Headspace Sample - EI - Inert - L<= 1.00%	Data Box Path : D:\[illegible]\DATA\[illegible]
June 26, 2023 4:38:01 PM	End	Execution	Injection Carry Over - FBITA with Tray Headspace, Front [illegible], SQ - Headspace Sample - EI - Inert - L<= 1.00%	Run Count : 1
June 28, 2023 4:38:58 PM	End	Qualification	Session	OQ
June 28, 2023 4:38:58 PM	Start	Reporting	Session	None
June 28, 2023 4:58:20 PM	Audit	Reporting	Session	Report Generated : Certificate

Date: June 29, 2023 5:00:36 PM
System ID: GM-5

BKK_EL0026

Agilent Technologies

[illegible]

SERVICE REPORT

Customer Contact
[illegible]
Tax ID: [illegible]

Invoice To
[illegible]

Customer Purchase Order Number: [illegible]
Customer Number: [illegible]
Service Request:
Service Request Date:
Service Order: [illegible]
Service Confirmation: [illegible]

REVIEW BY [signature]
APPROVED BY [signature]
NEXT CAL. DATE [illegible]

Delivery Site
[illegible]

Location
Room
Bldg
Lab
Dept

Direct Inquiries to:
Contact Name: [illegible]
Contact Email: [illegible]
Contact Telephone: [illegible]
Contact Fax: [illegible]

[illegible]

Service Confirmation Number: 6905338201
Service Confirmation Date: 12.12.2023

Service Instrument:

Model Number	Model Description	Serial Number	System Handle	Parent Asset
SYS-IM-7700-E	ICPMS 7700 System Enhanced		ICP MS 7700 (HPLC)	
G1316A	1260 Thermostatted Column Compartment	DEACN12300	ICP MS 7700 (HPLC)	SYS-IM-7700-E
G1329B	1260 Standard Autosampler	DEAAC11098	ICP MS 7700 (HPLC)	SYS-IM-7700-E
G1311B	1260 Quaternary Pump	DEAB704380	ICP MS 7700 (HPLC)	SYS-IM-7700-E
G3281A	Agilent 7700x ICP-MS	JP12091612	ICP MS 7700 (HPLC)	SYS-IM-7700-E

Service Items:

Item	Service/Part #	Description	Qty	Entitlement	Service Start	Service End
1600	EQO	Enterprise Operational Qualification	1.00	Agreement Entitlement - 100 % covered	12.12.2023	12.12.2023
1613	5185-5850	ICP-MS Checkout Solutions	1.00	Agreement Entitlement - 100 % covered		

Additional Information:

Service Confirmation Number: 6905338201
Service Confirmation Date: 12.12.2023

Service Information:

Problem Description: WU OQ-IM/HPLC-7700-5001143093		
Service Provided: Perform OQ Hardware control test CSD logon, Autosample, IDIS, Auto tune, EG and Stability. After done the instrument BKK_EL0026 calibrated pass all		
Service Overview Code: Reason Code: Scheduled Service; Diagnosis Code: Scheduled Service; Resolution Code: Scheduled Service		
Reported Hours: 6.0	**Travel Hours:** 1.0	
Customer Field Service Representative Name: Pardeep Konsachale	**Customer Field Service Representative Signature:** [signature]	**Date:** 12 Dec 2023
Customer Name: Supalwan Mak	**Customer Signature:** [signature]	**Date:** 12 Dec 2023
Additional Comments:		

Metrological Center
SCI ECO Services Company Limited
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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. T231676 — 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	: 13 September 2023
Calibrated By	: Sanee Musikawan (Site Calibration Manager)
Approved By	: [signature] / Sujjar Saknakred (Site Calibration Manager)
Date of Issue	: 26 SEP 2023

REVIEW BY [signature]
APPROVED BY [signature]
NEXT CAL. DATE [illegible]

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.

Metrological Center
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Certificate No. T231676 — Page 2 of 6

Calibration Report

Equipment : HEATING BLOCK
Date of Calibration : 22 September 2023
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 20 standard thermocouples type T into its chamber, the other one standard thermocouples type T use to [illegible] temperature measurement. The calibration was done in according to WI-T20.
   All data shown 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	TN21-TN30	T230014	17 January 2024
TC	TYPE T	TN31-TN40	T230014	17 January 2024
DATA LOGGER	34970A	T151	T230014	17 January 2024

3. This certificate is traceable to National Institute of Metrology (Thailand) through Metrological Center [illegible]
4. Condition of calibration item : good
   Equipment Description :
   Time Constant 2 Hour 20 Minute At 95 °C
   Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
   ☐ Close
   ☒ Not Available
5. Adjustment
   ( ) without adjustment (X) after adjustment

Approved By [signature]

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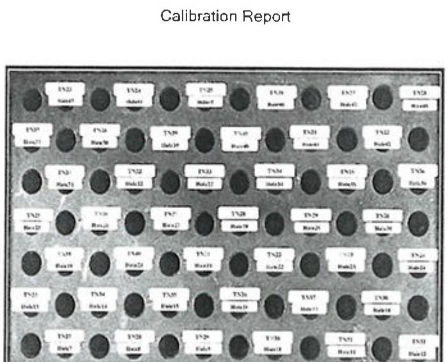
Telephone +66 2 586 5792-4 Fax +66 2 586 5109
Website www.scieco.co.th E-Mail calibrate@scg.co.th

Certificate No. T231676 — Page 3 of 6

Calibration Report



FRONT CONTROL

Approved By [signature]

Metrological Center
SCI ECO Services Company Limited
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Certificate No. T231676 — Page 4 of 6

Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6		TN21	TN22	TN23	TN24	TN25	TN26
CAL POINT 95	Max	[illegible]	[illegible]	[illegible]	95.41	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	94.52	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	94.26	[illegible]
R2 Hole7-Hole12		TN27	TN28	TN29	TN30	TN31	TN32
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	95.15	95.19	[illegible]	[illegible]	[illegible]	[illegible]
R3 Hole13-Hole18		TN33	TN34	TN35	TN36	TN37	TN38
	Max	[illegible]	95.53	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	95.32	[illegible]	95.02	[illegible]	[illegible]
R4 Hole19-Hole24		TN39	TN40	TN21	TN22	TN23	TN24
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R5 Hole25-Hole30		TN25	TN26	TN27	TN28	TN29	TN30
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R6 Hole31-Hole36		TN31	TN32	TN33	TN34	TN35	TN36
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R7 Hole37-Hole42		TN37	TN38	TN39	TN40	TN21	TN22
	Max	[illegible]	94.44	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	94.24	[illegible]	[illegible]	[illegible]	[illegible]
R8 Hole43-Hole48		TN23	TN24	TN25	TN26	TN27	TN28
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Approved By [signature]

Metrological Center
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Certificate No. T231676 — Page 5 of 6

Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6		TN21	TN22	TN23	TN24	TN25	TN26
CAL POINT [illegible]	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R2 Hole7-Hole12		TN27	TN28	TN29	TN30	TN31	TN32
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R3 Hole13-Hole18		TN33	TN34	TN35	TN36	TN37	TN38
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R4 Hole19-Hole24		TN39	TN40	TN21	TN22	TN23	TN24
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R5 Hole25-Hole30		TN25	TN26	TN27	TN28	TN29	TN30
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R6 Hole31-Hole36		TN31	TN32	TN33	TN34	TN35	TN36
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R7 Hole37-Hole42		TN37	TN38	TN39	TN40	TN21	TN22
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
R8 Hole43-Hole48		TN23	TN24	TN25	TN26	TN27	TN28
	Max	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Min	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Average	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Approved By [signature]

Metrological Center

SCI ECO Services Company Limited

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Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

Website : www.sciecs.co.th E-Mail : calibrate@scg.co.th

Certificate No. T231676 Page 6 of 6

Calibration Report

Measurement Results:

HEATING BLOCK			Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (±°C)	Uncertainty (±°C)
	Min , Max	Average		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* The uncertainty include "calibration"

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, provides a level of confidence of approximately 95 %

Approved By:

FM-L15 [illegible]

Metrology

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110, Thailand

Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100

Bangkok Tel : +668 9205 6851 , +669 8247 2360

Website : www.sciecs.co.th E-Mail : calibrate@scg.com

NSC-TISI-TIS 17025 CALIBRATION 0244

Certificate No. T232160 Page 1 of 4

Certificate of Calibration

Equipment	:	Chamber (Cooling 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., Khweng Phatthanakan, Khet Suan Luang, Bangkok 10250
Customer Location	:	Laboratory
Date of Receipt	:	29 November 2023
Calibrated By	:	Atiphong Rongrat (Technician)
Approved By	:	/ Boonchai Suriyswong (Site Calibration Manager)
Date of Issue	:	09 JAN 2024

REVIEW BY
APPROVED BY
NEXT CAL. DATE 01/01/25

The uncertainties are for a confidence probability of approximately 95%.

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FM-L14 [illegible]

Metrology

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110, Thailand.

NSC-TISI-TIS 17025 CALIBRATION 0244

Certificate No. T232160 Page 2 of 4

Calibration Report

Equipment	:	Chamber (Cooling Room)
Date of Calibration	:	6 December 2023
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	TN164-TN170	T230773	10 April 2024
TC	TYPE T	TN171-TN160	T230773	10 April 2024
DATA LOGGER	34970A	T149	T230773	10 April 2024

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 30 Minute At 3 °C
   Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
   ☐ Close
   ☒ Not Available
5. Adjustment :
   (X) without adjustment ( ) after adjustment

Approved By:

FM-L15 [illegible]

Metrology

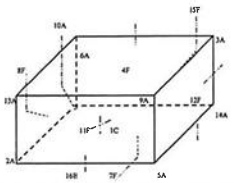
SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110, Thailand

NSC-TISI-TIS 17025 CALIBRATION 0244

Certificate No. T232160 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:

FM-L15 [illegible]

Metrology

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110, Thailand.

NSC-TISI-TIS 17025 CALIBRATION 0244

Certificate No. T232160 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	TN171	TN172
3.0	2.83	3.34	2.95	3.46	3.45	3.76	3.25	3.46	3.39	3.50	3.38	3.42
	TN173	TN174	TN175	TN176								
	3.23	3.29	3.15	3.43								

Chamber (Cooling Room)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min , Max	Average					
3.0	2.8 , 4.1	3.5	3.36	1.10	2.00	1.90	2.09

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 [illegible]

BKK_EL0128

Scientist Instrument

REVIEW BY
APPROVED BY
NEXT CAL. DATE

Performance Verification Certificate

for Mercury Analyzer

PRODUCT ID	*Quicktrace M-8000 , Teledyne Leeman Labs*
Equipment ID	BKK_EL0128 Mercury Analyzer S/N: US22133002 BKK_EL0129 Autosampler S/N: 052222A560
Customer Name	ALS Laboratory Group (Thailand) Co.,Ltd.
Address	104 Soi Pattana 40, Pattana Rd. Suan Luang, Suan Luang Bangkok 10250 Thailand

Date of Qualified December 6, 2023
Next Due date December 6, 2024

This certifies for products which was performed in acceptable criteria specifications

Autosampler & Sample Introduction	PASSED
Analyzer	PASSED
Gas Liquid Separator & Dryer	PASSED
CVAFS Detector	PASSED
Electronics/Mechanical	PASSED
Data station/PC	PASSED
Analytical test	PASSED

Provided by
Scientist Instrument Co.,Ltd.
123 Soi Hachin 44, Charoen Nakorn
Khlong Ilang Tien, Bangkok
Bangkok 10600 Thailand

Certified by
Thunraphol Sakduyos
Service Engineer

BKK_EL0128

Scientist Instrument

REVIEW BY
APPROVED BY
NEXT CAL. DATE

Performance Verification Certificate

for Mercury Analyzer

PRODUCT ID	*Quicktrace M-8000 , Teledyne Leeman Labs*
Equipment ID	BKK_EL0128 Mercury Analyzer S/N: US22133002 BKK_EL0129 Autosampler S/N: 052222A560
Customer Name	ALS Laboratory Group (Thailand) Co.,Ltd.
Address	104 Soi Pattana 40, Pattana Rd. Suan Luang, Suan Luang Bangkok 10250 Thailand

Date of Qualified December 6, 2024
Next Due date December 6, 2025

This certifies for products which was performed in acceptable criteria specifications

Autosampler & Sample Introduction	PASSED
Analyzer	PASSED
Gas Liquid Separator & Dryer	PASSED
CVAFS Detector	PASSED
Electronics/Mechanical	PASSED
Data station/PC	PASSED
Analytical test	PASSED

Provided by
Scientist Instrument Co.,Ltd.
123 Soi Hachin 44, Charoen Nakorn
Khlong Ilang Tien, Bangkok
Bangkok 10600 Thailand

Certified by
Thunraphol Sakduyos
Service Engineer

BKK_EL0167

Agilent CrossLab

Agilent CrossLab Start Up Services

Agilent 5100 5110 ICP-OES
Preventive Maintenance

REVIEW BY
APPROVED BY
NEXT CAL. DATE

[redacted]

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Agilent CrossLab

Introduction

Customer Information

Agilent

CrossLab

Important Customer Web Links

- To access **Agilent University**, visit https://www.agilent.com/crosslab/university to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit https://www.agilent.com/en/support/... The following information topics are available:
  - Sample Prep and Containment
  - Chemical Standards
  - Analysis
  - Service and Support
  - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find helpful documents and videos relevant to Agilent technologies. Visit https://community.agilent.com/welcome
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at https://www.youtube.com/user/agilent
- **Need to place a service call?** Available Service Options | Agilent

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Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check **"Service not applicable"** check boxes to indicate any tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system, across the order of the tasks listed.
- Complete the **Service Review** section together with the customer.
- Complete the fields for page numbers at the foot of each selected page.
- Fill relevant page numbers for selected pages and complete the total number of pages for the Service Completion section.
- **Ask the customer to sign the Service Verification section including the customer's and your signature.**

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Instrument Maintenance

System Information

☑ Check the box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	G8010A / MY[illegible]
Instrument System Site and Location	[illegible]

	List System Component Product Numbers	List the Serial Numbers of each Component
1	G8010A	MY[illegible]
2	[illegible]	[illegible]
3	[illegible]	[illegible]
4		
5		
6		
7		
8		
9		

ICP-OES Configuration Table	Circle the type or write in the type if other
Nebulizer Type	SeaSpray / Concentric / Conikal / Other
Spray Chamber	Cyclonic Single Pass / Cyclonic Double Pass / Other
Torch	Radial / Dual View / Other
Torch Type	One Piece / Semi-Demountable / Fully Demountable / Other
Injector Diameter	[illegible] / Other
Injector Material	Quartz / Ceramic / Other

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Preparation

☐ Discuss any specific issues with the customer before starting
☑ Review the instrument logbook for recorded problems and comments
☑ Save instrument control settings before starting the procedure
☑ Perform a general inspection of the system for cleanliness
☐ Check for proper installation of parts, assemblies, versions etc.
☑ Check system for required installation of components and implementation of Service Notes
☐ Check for required firmware/software updates and verify with customers if they want to have them installed
☑ For the application systems, if standard sample introduction system was not installed, ask the customer to install it
☑ Ask the customer to remove any samples from the ICP-OES sample introduction area, auto sampler or around the ICP-OES

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Preventive Maintenance Procedures

Record Pre-PM Instrument performance

☑ Run Instrument Performance test
☑ Record results in Instrument Performance Test Results Table – Pre-PM

Clean and inspect ICP-OES 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 action is required
☑ Record the instrument operating conditions in the ICP-OES Status Results Table
☑ Replace the polyethersulfur purge filter
☑ Remove the radial pre-optics window
☑ Replace the axial pre-optics window for SVDV and VDV instruments
☑ Check exhaust flow for the correct position of exhaust at the exhaust duct to ensure they meet minimum requirements
☑ Replace air inlet dust filter
☑ Replace high capacity air inlet dust filter element if installed
☑ Remove and clean instrument water inlet filter

Agilent Water Recirculator

☐ **Service not applicable**
☑ Drain cooling fluid and remove any particles from the chiller reservoir
☑ Remove, clean and reinstall water inlet metal mesh filter if present
☑ Refill with Agilent Cool Clear cooling fluid
☑ Clean the cooling system Air filter and the condenser

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SPS 3 Auto Sampler

☑ **Service not applicable**
☐ Power cycle the autosampler and verify successful initialization
☐ Inspect X and Z axis belts for wear. Replace as necessary
☐ Clean X and Z axis guide 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 accurately centered in the vial

SPS 4 Auto sampler

☐ **Service not applicable**
☑ Clean the spill tray, rack stations, and frames with a damp cloth and diluted mild detergent
☑ Clean the autosampler arm and [illegible]
☑ Check the X-axis and Z-axis drive belts for cracks, stretched, 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 wires 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
☑ Test using customer's tray and move the sample probe to the sample vial, wash and rinse port and ensure that the probe is centered in the vial. If not use calibration wizard and calibrate the position

AVS 4, 6, 7 Advanced Valve System

☑ **Service not applicable**
☐ Replace valve rotor 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

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ICP-OES adjustment

☑ Check position of Zn peak, adjust if required
☑ Check Argon Ratio. Adjust to specified value if required
☑ Perform Detector Calibration
☑ Perform Instrument Calibration

Record Post-PM instrument performance

☑ Run Instrument Performance Test
☐ 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

- ☑ Subsystem Communication Test
- ☑ Air Flow
- ☑ Water Flow
- ☑ Gas Flows
- ☑ RF Generator
- ☑ Camera Test
- ☑ [illegible] Test
- ☑ Nebulizer Test

☑ Record the results in the Instrument Test Results Table

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Restore Instrument

☑ For HF applications, ask the customer to reinstall their sample introduction system
☑ Leave system in an idle state upon completion
☑ Guidance: If the PM service is performed prior to qualification services, then use the qualification procedure as a guide for initial instrument setup and checkout

Service Review

☑ Attach available results printouts of tests to this documentation
☑ Record the Preventive Maintenance in the instrument's records
☑ Record the PM event in the Smart Alerts logbook, if applicable
☑ Update the instrument maintenance counters as appropriate
☑ Affix the PM sticker to the system or instrument logbook based on the customer's request
☑ Complete the Service Engineer comments section if there are additional comments
☑ Review this service and its required and test results outcome with the customer
☑ If the instrument firmware was updated, record the details of the change in the Service Engineer's comments box. Systems in a compliant environment may need additional [illegible]
☑ **Complete the Signature Page with both Service Engineer and Customer signatures**

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Test Results

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*
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

* Axial results not applicable for G8016A, 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	[illegible]
Water Flow	Pass
Gas Flows	[illegible]
RF Generator	Pass
Camera Test	Pass
[illegible] Test	Pass
Nebulizer Test	Pass

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ICP-OES Status Results Table

Measurement	Standby Mode		Plasma On	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	No measurement		[illegible]	[illegible]
[illegible]	No measurement		[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	No measurement		[illegible]	[illegible]
[illegible]	No measurement		[illegible]	[illegible]
[illegible]	No measurement		[illegible]	[illegible]
[illegible]	No measurement		[illegible]	[illegible]
[illegible]	No measurement		[illegible]	[illegible]
[illegible]	No measurement		[illegible]	[illegible]

** If option installed

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

Consumed Parts Reference
(Purchased by customer, not included as part of PM)

☑ Section Not Applicable

Part Description	Part Number	Product or Model# where used	Quantity consumed

Signature Page

Service Engineer Comments (optional)

[illegible]

Service Verification

[illegible]

ภาคผนวก จ

สำเนาหนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

ที่ อก ๐๓๑๐(๑)/ ๑๖๑๖๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๐ พฤศจิกายน ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๔ สิงหาคม ๒๕๖๖

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ แผ่น
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ ๑๘๑ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล หรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรม ภายใน ๑๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายศิระ จันทร์เจิด)
นักวิทยาศาสตร์เชี่ยวชาญ รักษาราชการแทน
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิจิการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

Green Industry "อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"

สิ่งที่ส่งมาด้วย ๑

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ว-๒๐๔
ที่ อก ๐๓๑๐(๑)/ ๑๖๑๖๘ ลงวันที่ ๒๐ พฤศจิกายน ๒๕๖๖

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย

๑) นางสาวยุพาพร จันทร์เปล่ง	ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๑
๒) นางสาวชัชนัย โกมารกุล ณ นคร	ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๒
๓) นายศรายุทธ จิตรานนท์	ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๓
๔) นางสาวกนกกร เอนา	ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๔
๕) นายสุชิยา สอนแก้ว	ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๕
๖) นายวิชาญ ชุณหวัต	ทะเบียนเลขที่ ว-๒๐๔-ค-๐๐๐๖

สิ่งที่ส่งมาด้วย ๒

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ว-๒๐๔
ที่ อก ๐๓๑๐(๑)/ ๑๖๑๖๘ ลงวันที่ ๒๐ พฤศจิกายน ๒๕๖๖

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๘๑ ราย

๑) นายการุญ์ณพิต กิตติคุณาณิชย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๑
๒) นายภัทรพล ลว่างใจธรรม์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๒
๓) นายนราริป เหือกขัยคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๓
๔) นายศิริโชค พงษ์ประสม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๔
๕) นายณัฐวุฒิ ตั้วงแพง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๕
๖) นางสาวจินดา โชจุลธรรม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๖
๗) นางสาวสาวิตรี น้อยเจ้ยม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๗
๘) นางสาวขณัฐกาญจน์ อิ่มชม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๘
๙) นางสาวนรินทร์ สายเส็ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๙
๑๐) นางสาวบันทวดี สมบูรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๐
๑๑) นางสาวศรัณยา เฉลิมอำรงค์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๑
๑๒) นางสาวธัญญธร มงคลจิรวุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๒
๑๓) นางสาวศิริลักษณ์ บุนนาค	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๓
๑๔) นายนพพงศ์ จันทรุพันธุ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๔
๑๕) นายนรเศรษฐ์ โกมาลย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๕
๑๖) นายธันวา จริยา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๖
๑๗) นางสาวเกศรินทร์ แก้วมัน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๗
๑๘) นางสาวสุวิมล ชัยเรืองวุฒิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๘
๑๙) นางสาวสุขาดา ธรรมถาวร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๑๙
๒๐) นางสาวเปมิกา ชัยเดชธนกุล	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๐
๒๑) นางสาวศศิธร หมูลวังดี	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๑
๒๒) นางสาวเสาวลักษณ์ ภู่นภาอำพร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๒
๒๓) นายอภิสิทธิ์ สิงหา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๓
๒๔) นายศักดิ์สิทธิ์ ไพศาลพิสุทธิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๔
๒๕) ว่าที่ร้อยตรีหญิง พรรณิภา ชำเจวิญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๕
๒๖) นางจิลดา คำภูแก้ว	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๖
๒๗) นางสาวธรวรรณ รักยง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๗
๒๘) นางสาวนพรัตน์ แย้มกราณต์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๘
๒๙) นายจุลเดช วารินทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๒๙
๓๐) นางสาวดายุรัตน์ ร้องคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๐
๓๑) นายพรมมี ศรีปัตเนตร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๑
๓๒) นายอุทิศ อุ่นสิม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๒
๓๓) ว่าที่ร้อยตรี เฉลิมเกียรติ อมรศรีเสริม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๓
๓๔) นางสาววรียา สร้างนา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๔
๓๕) นายอนุพงศ์ รัตนศรีประเสริฐ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๕

๓๖) นางสาวจุฑารัตน์...

๓๖) นางสาวจุฑารัตน์ โอนสันเทียะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๖
๓๗) นางสาวจารุวรรณ พิมพ์อภิกฤติยา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๗
๓๘) นางสาวปรางค์ทิพย์ กิจไพศาลศักดิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๘
๓๙) นางสาวเดือนใจ ทางกลาง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๓๙
๔๐) นางสาวจิราพร ศิริเวช	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๐
๔๑) นายวรากร ผูกรักษ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๑
๔๒) นายทนง วิริยะสหกิจ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๒
๔๓) นายณิต เจนจบ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๓
๔๔) นายคณิศร ชำเพชร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๔
๔๕) นายภูวิช พรหมสะอาด	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๕
๔๖) นายธนเดช โภคาพิพัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๖
๔๗) นายชวฤทธิ์ วงษ์จันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๗
๔๘) นายอาทิตย์ ศรีเสน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๘
๔๙) นายเจษฎินทร์ คงศักดิไทย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๔๙
๕๐) นายจรัส บุญยิ่ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๐
๕๑) นายธนาณัติ เอนก	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๑
๕๒) นายอภิรัฒน์ ทุมหนู	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๒
๕๓) นางสาวสุภาขวัญ มาก	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๓
๕๔) นางสาวทัตพร ชวาลสมบูรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๔
๕๕) นางสาวธิติมา บุญเพ็ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๕
๕๖) นางสาวภานุมาศ นามวัฒน์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๖
๕๗) นางสาวอุไรรัตน์ ทึงสร้างแป้น	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๗
๕๘) นายธีรวัฒน์ ปางสุข	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๘
๕๙) นายอิทธิพล ยะโส	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๕๙
๖๐) นายประพจน์ วรรณชูชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๐
๖๑) นายชยธร พวงทิพย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๑
๖๒) นางสาวกนกวรรณ จันทบาล	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๒
๖๓) นายสิทธิโชค ธงเงิน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๓
๖๔) นางศิลาวรรณ ใจบุญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๔
๖๕) นางสาวพรรณธิดา พุ่มคง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๕
๖๖) นายนวภัทร ศรีวิริยะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๖
๖๗) นายสุวิชา ทองอ่อน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๗
๖๘) นายวิญญู บุญตะนัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๘
๖๙) นายสมบูรณ์ บุตรจันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๙
๗๐) นายวิรัตน์ ไชยนะรา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๐
๗๑) นายนฤเบศน์ เพ็มพูน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๑
๗๒) นายจิรณัฐ ขาวละออ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๒
๗๓) นายอัสรี นามบุรี	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๓
๗๔) นายอัศวเรศ จ่อสาว	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๔

๗๕) นายประเสริฐ...

๗๕) นายประเสริฐ สุระขันธ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๕
๗๖) นายนุกูล จันทร์เนียม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๖
๗๗) นายพีรพงษ์ ทองคูณปรีดา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๗
๗๘) นายณฤพล ทองนุช	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๘
๗๙) นายอนุวัฒน์ ม่วงแพร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๙
๘๐) นายเจตศราวุฒิ ปัตตะมะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๘๐
๘๑) นายกฤษณะ สายวรรณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๘๑
๘๒) นายพิชัย บุญยงค์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๘๒
๘๓) นายภานุพงศ์ โฆมวงศ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๘๓
๘๔) นายสามารถ คุ้มปลี	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๘๔
๘๕) นายสัญชัย โกศรีนาม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๘๕
๘๖) นายณัฐวุฒิ ศรีประเสริฐ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๘๖
๘๗) นายขวัลชัย บาคพนม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๘๗
๘๘) นายพงศธร ชัยทิพย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๘๘
๘๙) นายสิทธิโชค หาสีตา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๘๙
๙๐) นายธนากร อินสุดา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๙๐
๙๑) นางสาววรณิชชา ชาติวันชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๙๑
๙๒) นางสาวพิมพ์ตะวัน มินากูล	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๙๒
๙๓) นางสาวเพชรัตน์ สิงห์สมบุญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๙๓
๙๔) นางสาวชญานิน พรหมจันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๙๔
๙๕) นายกีรติ หวีราช	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๙๕
๙๖) นายจักริน หมั่นวิชา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๙๖
๙๗) นายอัดรชัย สุขเปีย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๙๗
๙๘) นายณรนนท์ ตีะทองคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๙๘
๙๙) นายดุลยพล สนนอก	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๙๙
๑๐๐) นายทักษ์ดนัย อุบลศรี	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๐
๑๐๑) นายธนศวร นามะกุณณา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๑
๑๐๒) นายธิติพงศ์ บัวแดง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๒
๑๐๓) นายนนทชัย อุปถัมภ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๓
๑๐๔) นายนัฐพล คุณสุทธิ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๔
๑๐๕) นายนันทวัฒน์ สาริน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๕
๑๐๖) นายปิยะนัฐ พลมะศรี	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๖
๑๐๗) นายพงศ์สิริ โสมเขียว	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๗
๑๐๘) นายพีรพัฒน์ กำคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๘
๑๐๙) นายภาณุพงศ์ มานิตย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๙
๑๑๐) นายมงคล ผลาทิพย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๑๐
๑๑๑) นายสิรินนท์ ทองอั่น	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๑๑
๑๑๒) นายอเนชา ทันสมัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๑๒
๑๑๓) นายอดิศักดิ์ ผมไผ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๑๓

๑๑๔) นายอนันตชัย...

๑๑๔) นายอนันตชัย วีสม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๑๔
๑๑๕) นายวรุฐ ดีนัก	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๑๕
๑๑๖) นายแสงตะวัน นะตะสัต	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๑๖
๑๑๗) นายยุทธพงศ์ รัตนะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๑๗
๑๑๘) นายชยัณวุฒิ ไชยอะนิจ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๑๘
๑๑๙) นายวิศรุต ศรีธรรมมา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๑๙
๑๒๐) นายนนทกร เผือกฝอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๒๐
๑๒๑) นายกำชัย สุทธะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๒๑
๑๒๒) นางสาวณัฐกรณ์ บุญตะนัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๒๒
๑๒๓) นางสาวพัชรินทร์ แสนสร้อย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๒๓
๑๒๔) นายไพรวัลย์ เปรี่ยมพิมาย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๒๔
๑๒๕) นางสาวศุภมาศ ทองมาก	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๒๕
๑๒๖) นางสาวลลิตา จิตรสว่าง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๒๖
๑๒๗) นางสาวขไมพร เลิกภู่เขียว	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๒๗
๑๒๘) นางสาวกฤติมาพร คำมีแก่น	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๒๘
๑๒๙) นางสาวสกุลรัตน์ ภาคภูมิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๒๙
๑๓๐) นางสาวไพรินทร์ ศรีรูปี	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๐
๑๓๑) นางสาวทิพเนตร ผุยปัญญา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๑
๑๓๒) นางสาวสาธิตา ปานทอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๒
๑๓๓) นางสาวอริสา ทองนวล	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๓
๑๓๔) นางสาวอรยา ค้าคล่อง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๔
๑๓๕) นางสาวชุดาภรณ์ สุนทรสนาน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๕
๑๓๖) นางสาวอัญชลี คำจันทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๖
๑๓๗) นายบุญฤทธิ์ เอี่ยมเทศ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๗
๑๓๘) นางสาวศุภรดา บั้นมยุรา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๘
๑๓๙) นางสาวพาฤดี คุณนาบ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๙
๑๔๐) นางสาวจิราเจต ฟองตา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๔๐
๑๔๑) นางสาวอารยา มีชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๔๑
๑๔๒) นางสาววิษชุตา นาคผจญ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๔๒
๑๔๓) นางสาวบันทิยา จันทะลุน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๔๓
๑๔๔) นายกิตติพงศ์ แซ่ลี้	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๔๔
๑๔๕) นายอนุวัติ ภูถวิล	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๔๕
๑๔๖) นายธีรพล แสงทอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๔๖
๑๔๗) นายศักดิ์พิพัฒน์ บุญมั่น	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๔๗
๑๔๘) นายชูติวัลค์ เอมอุไร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๔๘
๑๔๙) นายชัยณรงค์ ศรีบุรินทร์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๔๙
๑๕๐) นางสาวอัจฉราวรรณ สวนสนอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๐
๑๕๑) นางสาวณัฐฐาพร สิงหา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๑
๑๕๒) นายภีมเรศ แหยมโต	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๒

๑๕๓) นางสาวอุบล...

๑๕๓) นางสาวอุบล เศิกศิริ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๓
๑๕๔) นางสาวมโนรัตน์ ทองบุตร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๔
๑๕๕) นายภาคภูมิ แทนไทย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๕
๑๕๖) นางสาวสุภาณัฐ เมล์พ่วง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๖
๑๕๗) นางสาวพรทิวา สาตวชนม์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๗
๑๕๘) นายเอกวิทย์ วันทะนา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๘
๑๕๙) นายไตรมณฑล ทิพย์วรรณ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๙
๑๖๐) นายจิรเมธ ประเสริฐสิริพงศ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๐
๑๖๑) นายจิรายุส เกษมสุข	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๑
๑๖๒) นายจีรศักดิ์ ศรีวิชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๒
๑๖๓) นายณัฐกฤษณ์ สะพานแก้ว	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๓
๑๖๔) นายบูรณศักดิ์ ปะทิ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๔
๑๖๕) นายปัณณวิชญ์ เสมอทรัพย์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๕
๑๖๖) นายพิษณุพงษ์ ไชยา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๖
๑๖๗) นายภัทรพงษ์ มณฑาทอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๗
๑๖๘) นายสันต์ ตรีนกุล	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๘
๑๖๙) นายภาณุเดช เพชรอุด	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๙
๑๗๐) นายอนุกูล วิละแสง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๐
๑๗๑) นายภัทรพงษ์ มีสุข	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๑
๑๗๒) นางสาวมุชรวี ลีละหีป	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๒
๑๗๓) นางสาวสุภาวดี โกศรีนาม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๓
๑๗๔) นางสาวอรณิช เทียนดำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๔
๑๗๕) นางสาวพรเพ็ญ ชอบสอน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๕
๑๗๖) นางสาววันวิสา ขอนหิกุล	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๖
๑๗๗) นางสาวอรวรรณ เถาร์ทอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๗
๑๗๘) นางสาวอัยย์ลิณ เมอร์วิณณ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๘
๑๗๙) นางสาวรวิสรา คุ่ยครอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๙
๑๘๐) นายวุฒิกร ศิริวรรณ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๐
๑๘๑) นางสาวจารุวรรณ กระจ่างพันธุ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๑

สิ่งที่ส่งมาด้วย ๓

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ว-๒๐๔
ที่ อก ๐๓๑๐(๑)/ ๑๖๑๖๘ ลงวันที่ ๒๐ พฤศจิกายน ๒๕๖๖

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๗๕ รายการ

น้ำเสีย จำนวน 60 รายการ

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/ Mass Spectrometric 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/ Mass Spectrometric Method[4]
8	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
9	δ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
10	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric 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/ Mass Spectrometric Method[4]
17	Chromium	1) Digestion, Inductively Coupled Plasma Method[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[4]
18	Color	ADMI Weighted-Ordinate Spectrophotometric Method[4]

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/ Mass Spectrometric Method[4]
22	4,4´-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
23	2,4´-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
24	4,4´-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
25	2,4´-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
26	4,4´-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
33	Formaldehyde	Distillation, Colorimetric Method[D]
34	Free Chlorine	1) DPD Ferrous Titrimetric Method[4] 2) DPD Colorimetric Method[4]
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
36	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
37	Hexavalent Chromium	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...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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/ Mass Spectrometric Method[4]
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 Phosphorous	Digestion, Colorimetric Method[4]
57	Total Suspended Solids	Dried from 103-105 °C[4]
58	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
59	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation[4]
60	Zinc	1) Digestion, Inductively Coupled Plasma Method[4] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[4]

น้ำใต้ดิน...

น้ำใต้ดิน 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]
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]

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]
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation[4]
35	Chromium (VI)	Colorimetric Method[4]

36 Chrysene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method[4]
37	Cyanide	Distillation, Colorimetric Method[4]
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric 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]
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...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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]
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...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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) Digestion, Cold Vapor Atomic Absorption Spectrometric Method[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[4]
84	Methanol	Purge and Trap, 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-Methylnapthalene	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...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
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]
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, Chloroform Extraction Method[4] 2) Distillation, Direct Photometric Method[4] 3) 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_8)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[14,25]

110 TPH ($C_{>8}$-C_{16})...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
110	TPH ($C_{>8}$-C_{16})	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[9,22]
111	TPH ($C_{>16}$-C_{35})	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method[9,22]
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	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]

อากาศเสีย...

อากาศเสีย (ปล่องระบาย) จำนวน 28 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
2	Arsenic	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
3	Beryllium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
4	Cadmium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
5	Carbon Monoxide	1) Instrumental Analyzer Method[5] 2) Sampling Bag Non-Dispersive Infrared Method[5]
6	Chlorine	1) Absorption Sampling, Ion Chromatographic Method[5] 2) Isokinetic Sampling, Ion Chromatographic Method [5]
7	Chromium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
8	Cobalt	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
9	Copper	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
10	Cresol	Adsorption Sampling, Gas Chromatographic Method[5]
11	Dioxins	isokinetic Sampling[5]
12	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method[5] 2) Isokinetic Sampling, Ion Chromatographic Method[5]
13	Hydrogen Fluoride	1) Absorption Sampling, Ion Chromatographic Method[5] 2) Isokinetic Sampling, Ion Chromatographic Method[5]
14	Hydrogen Sulfide	Absorption Sampling, Iodometric Method[5]

15 Lead...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Lead	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
16	Manganese	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
17	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[5] 2) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method[5]
18	Nickel	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
19	Opacity	Ringelmann's Method[2]
20	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method[5] 2) Absorption Sampling, Alkaline Permanganate/ Colorimetric Method[5] 3) Instrumental Analyzer Method[5]
21	Selenium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
22	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method[5] 2) Instrumental Analyzer Method[5]
23	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method[5]
24	Tellurium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
25	Tin	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
26	Total Suspended Particulate	1) Isokinetic Sampling, Gravimetric Method[5] 2) Paired Train, Isokinetic Sampling, Gravimetric Method[5]

27 Vanadium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Vanadium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[5] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[5]
28	Xylene	Adsorption Sampling, Gas Chromatographic Method[5]

สิ่งปฏิกูลหรือวัสดุที่ใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]

5 Beryllium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method[1,6,16,19] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method[1,6,17,19] 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method[7,8,16,19] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method[7,8, 17,19]

10 Chromium (VI)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method[1,5,19] 2) Alkaline Digestion, Colorimetric Method[8,19]
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26]

2) Soxhlet...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
		2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
17	Dieldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]

22 Mercury...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[1,6,20] 2) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method[1,6,30] 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[20] 4) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method[30] 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method[21]
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic / Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic /Mass Spectrometric Method[11,26]
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic / Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic /Mass Spectrometric Method[11,26]
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
27	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic Method[11,26]

- 2-Chlorobiphenyl...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
	- 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',5,5',6-Nonachlorobiphenyl	
28	Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
29	pH	Electrometric Method[23,26]
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]

31 Silver...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method[1,9,26] 2) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 3) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
35	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method[1,6,16] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method[1,6,17] 3) Digestion, Inductively Coupled Plasma Method[7,16] 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]

ดิน...

<u>ดิน จำนวน 125 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
2	Acetone	1)Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25] 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method[13]
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
4	Anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
5	Antimony	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
8	Barium	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
9	Benz(a)anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]

11 Benzo(b)fluoranthene

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Benzo(b)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
12	Benzo(k)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
13	Benzoic acid	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
14	Benzo(a)pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
15	Benzo(g,h,i)perylene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
17	Bis(2-chloroethyl)ether	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
18	Bis(2-ethylhexyl)phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
21	Butanol	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method[13,25]
22	Butyl Benzyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]

23 Cadmium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
24	Carbazole	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
28	p-Chloroaniline	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
32	2-Chlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
33	Chromium	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method[7,8,16,19] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method[7,8,17,19]
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method[8,19]

36 Chrysene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
36	Chrysene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
37	Cyanide	Extraction, Distillation, Colorimetric Method[27,28,29]
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
39	DDD	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
40	DDE	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
41	DDT	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
42	Dibenz(a,h)anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
43	Di-n-Butyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
47	3,3-Dichlorobenzidine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]

49 1,2-Dichloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
53	2,4-Dichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
58	Diethyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
59	2,4-Dimethylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
60	2,4-Dinitrophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
61	2,4-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
62	2,6-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]

63 Di-n-Octyl Phthalate...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
63	Di-n-Octyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
67	Fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
68	Fluorene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
70	Heptachlor epoxide	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
73	n-Hexane	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25] 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method[15]

73 n-Hexane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
74	α-HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
75	β-HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
76	γ-HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
77	Hexachlorocyclopentadiene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
78	Hexachloroethane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
79	Indeno(1,2,3-cd)pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
80	Isophorone	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
81	Lead	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
82	Manganese	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[20] 2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry[21] 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method[50]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25] 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method[13,25]
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
88	2-methylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
89	2-Methylnaphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
91	Naphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
92	Nickel	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
93	Nitrobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
94	N-Nitrosodiphenylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
95	N-Nitrosodi-n-propylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - 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',3,4,5,5'-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',5,5',6-Nonachlorobiphenyl	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
97	Pentachlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
98	Phenanthrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
99	Phenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
100	Pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
101	Selenium	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
102	Silver	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
108	TPH (C_5–C_8)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
109	TPH ($C_{>8}$– C_{16})	1) Automate Extraction, Gas Chromatographic Method[11,22] 2) Solvent Extraction, Gas Chromatographic Method[12,22] 3) Ultrasonic Extraction, Gas Chromatographic Method[22,31]
110	TPH ($C_{>16}$ – C_{35})	1) Automate Extraction, Gas Chromatographic Method[11,22] 2) Solvent Extraction, Gas Chromatographic Method[12,22] 3) Ultrasonic Extraction, Gas Chromatographic Method[22,31]
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
115	2,4,5-Trichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
116	2,4,6-Trichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[10,26] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method[11,26]
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
121	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
122	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
123	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[15,25]
125	Zinc	1) Digestion, Inductively Coupled Plasma Method[7,16] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method[7,17]

<u>เอกสารอ้างอิง</u>

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ที่ อก ๐๓๑๐(๑)/ ๔๑๒๑

กรมโรงงานอุตสาหกรรม
ถนนพระราม ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๕ เมษายน ๒๕๖๗

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอเอลเอล แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขนิดสารละลายมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๔ มีนาคม ๒๕๖๗

ตามคำขอที่อ้างถึง บริษัท เอเอลเอล แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓ ราย

๑) นางสาวพรรณวิลา พุ่มคง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๕
๒) นายกำชัย สุพรอะ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๗
๓) นางสาวคุภรดา ปั้นมยุร	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๗๘

๒. ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๑๒ ราย

๑) นางสาวฐานิตา แสนเจียว	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๒
๒) นางสาวณัฐภัสสร สายคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๓
๓) นางสาวณัฐนันท์ กันทะวงศ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๔
๔) นายอำนาจ วงษาคม	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๕
๕) นายกฤษณพล ปัญญาวะศ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๖
๖) นายณรากร หรรษา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๗
๗) นายวัชรินทร์ ผองสามสาน	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๘
๘) นายณัฐพงศ์ โสภา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๙
๙) นายศักรินทร์ ปานเพ็ง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๙๐
๑๐) นายณัฐพล ชุ่มจิบ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๙๑
๑๑) นายธนา สุพาพันธุ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๙๒
๑๒) นายธราธร แก้วพะนัษา	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๙๓

อนึ่ง หนังสือฉบับนี้

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ในวันที่ ๒ กันยายน ๒๕๖๙

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพรยศ กลั่นกรอง)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ sarabar@diw.mail.go.th

"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"

ที่ อก ๐๓๑๐(๑)/ ๑๒๓๖๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๘ ธันวาคม ๒๕๖๗

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒ ธันวาคม ๒๕๖๗

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๘ ราย ได้แก่

๑) นายประพจน์ วรรณชูชัย	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๖๐
๒) นายจิรณัฐ ชาวละออ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๗๒
๓) นายพีรพัฒน์ กำคำ	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๐๘
๔) นางสาวอรยา คำคล่อง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๓๔
๕) นายกัตติพงศ์ แซ่ลี้	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๕๔
๖) นายจิรเมธ ประเสริฐสิริพงศ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๐
๗) นายภัทรพงษ์ มณฑาทอง	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๖๗
๘) นางสาวจาฤวรรณ กระจ่างพันธุ์	ทะเบียนเลขที่ ว-๒๐๔-จ-๐๑๘๑

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรทัศน์ อิศรางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ sarabar@diw.mail.go.th

"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"

ที่ อก ๐๓๑๐/ ๗๙๓๘

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐๘ สิงหาคม ๒๕๖๗

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๗ พฤษภาคม ๒๕๖๗

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด จำนวน ๑ แฟ้ม

ตามคำขอที่อ้างถึง บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว ๓๒๓ สถานที่ตั้งเลขที่ ๖๑๒/๑๐ หมู่ที่ ๕ ตำบลมาบข่า อำเภอปลวกแดง จังหวัดระยอง ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกชน

๑) นายเดช ช้างชน	ทะเบียนเลขที่ ว-๓๒๓-ค-๐๐๐๑
๒) นางวิลาสินีย์ บริรักษ์	ทะเบียนเลขที่ ว-๓๒๓-ค-๐๐๐๒
๓) นายสุพจน์ สลามเวีย	ทะเบียนเลขที่ ว-๓๒๓-ค-๐๐๐๓

ข. เจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

๑) นายณัฐพงษ์ เพ็งชาวนา	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๑
๒) นางสาวกัลยพรรณ์ รักดี	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๒
๓) นางสาวจุฑารัตน์ สีทองหลาง	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๓
๔) นางสาวจิตรภา ประเทืองสุข	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๔
๕) นายสรรเสริญ คุ้มบกสุข	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๕
๖) นายณัฐวุฒิ สถมพรเราม	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๖
๗) นายรัตกร สังขสา	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๗
๘) นายพิทักษ์ศญ์ สุวรรณรัตน์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๘
๙) นายสิทธิพันธ์ เสนาจิต	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๐๙
๑๐) นายอนุวรรณ์ เดมา	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๐
๑๑) นายสุรวิทย์ นราพงษ์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๑
๑๒) นายณัฐพล เรียงสมัครร์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๑
๑๓) นายชานนท์ บุญชิน	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๔
๑๔) นายณัฐกานต์ วงศ์ธินหรังหมู่	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๕
๑๕) นายอานนท์ ไพรีพระทอง	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๖

๑๖) นายณัฐพล...

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๑๖) นายณัฐพล ถ้ำกลาง	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๗
๑๗) นายศุภณัฐ พิสัยพันธ์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๘
๑๘) นายวสันต์ คินันติ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๑๙
๑๙) นายวรัญญู ฉิมพาลี	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๐
๒๐) นายศุภณัฐ สกุลกิตติมศักดิ์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๑
๒๑) นายเอกชัย ถันทอง	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๒
๒๒) นายพงษ์เทพ สิทธิเลาะ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๓
๒๓) นายพินกร กุมภาษี	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๔
๒๔) นางสาวนันทิยา เบญจชันธ์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๕
๒๕) นายสิทธิชัย ยันพิมาย	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๖
๒๖) นางสาวปภาณิน หลอดทอง	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๗
๒๗) นางสาวพจนา สีดา	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๘
๒๘) นางสาวธนิดา กุลศิริวงศ์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๒๙
๒๙) นายพิทยา ทองแดง	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๐
๓๐) นางสาวชลธิชา สุบงกช	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๑
๓๑) ว่าที่ร้อยตรี รณชัย ม่วงมา	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๒
๓๒) นายวราวุฒิ พับพา	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๓
๓๓) นายศักดิ์นรินทร์ จรัสกาย	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๔
๓๔) นายสุรศักดิ์ สาชิน	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๕
๓๕) นายสถาพร ถาแก้ว	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๖
๓๖) นายสุทธิ์ดำรง โชคปิติพันธ์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๗
๓๗) นายวัลลภ หันไชยเนาว์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๘
๓๘) นางสาววนาลี เหรียญตระกูล	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๓๙
๓๙) นายธนะสิทธิ์ วงศ์ษาไชย	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๐
๔๐) นายชัยบุสรณ์ เลิศนันทกุลชัย	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๑
๔๑) นายสัจจา เพ็ชรแสวง	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๒
๔๒) นายกัณฑภณ มณีสัมพันธ์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๓
๔๓) นายธารินทร์ อ๊อกจินดา	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๔
๔๔) นายศุภชัย วงศ์สุริย์ฉาย	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๕
๔๕) นายไสว ต้นไพรี	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๖
๔๖) นางสาวกิตติยา สัญญาอริยาภรณ์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๗
๔๖) นางสาวอิศราวัตน์ ศิริมังคะโร	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๘
๔๗) นายพิพัฒน์ นิภัทร์เตรษฐ์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๔๙
๔๘) นายศิริวิทย์ เรืองสม	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๐
๔๙) นายปาราเมศ สัตยาคุณ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๑
๕๐) นายณุนาท ธรรมสะโร	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๒
๕๑) นางสาวศุภรัตน์ โสจันทร์	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๓

๕๒) นายพชรกร...

๕๒) นายพรชัย เจิ่งเจริญ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๔
๕๓) นายพิชาภร เฮี้ยะกุล	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๕
๕๔) นายอนุรักษ์ ทองขจรศักดา	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๖
๕๕) นายอภิชาติ วิลาศ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๗
๕๖) นายชวัลระวี ศรีรักษา	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๘
๕๗) นายประสานมิตร เรือนเพชร	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๕๙
๕๙) นายภานุวัฒน์ วังงะ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๖๐
๖๐) นายสันติ ชัยชนะ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๖๑
๖๑) นายทินกร กุลชาติ	ทะเบียนเลขที่ ว-๓๒๓-จ-๐๐๖๒

ค. ขอบข่ายชนิดสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒๘ มิถุนายน ๒๕๗๑ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๖๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพรชัย กลับกรอง)
ผู้อำนวยการศูนย์วิจัยและเฝ้าระวังมลพิษ
สำนักจัดการมลพิษอุตสาหกรรม

ศูนย์วิจัยและเฝ้าระวังมลพิษโรงงานภาคตะวันออก
โทร. ๐ ๓๘๑๑ ๖๐๕๙ ต่อ ๕๐๐๑-๑๒
ไปรษณีย์อิเล็กทรอนิกส์ eiwq@diw.mail.go.th

Green Industry "อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"

เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ว-๓๒๓
ที่ อก ๐๓๒๐/ ๗ ๙๓ ๘ ลงวันที่ ๐๘ สิงหาคม ๒๕๖๗

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๒๔ รายการ

น้ำเสีย จำนวน 14 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	ADMI Weighted-Ordinate Spectrophotometric Method[2]
4	Cyanide	Distillation, Colorimetric Method[2]
5	Formaldehyde	Distillation, Colorimetric Method[1]
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	Field Method[2]
12	Total Dissolved Solids	Dried at 180 °C [2]
13	Total Kjeldahl Nitrogen	Semi Macro Kjeldahl Method[2]
14	Total Suspended Solids	Dried at 103-105 °C[2]

น้ำใต้ดิน จำนวน 3 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Cyanide	Distillation, Colorimetric Method[2]
2	pH	Electrometric Method[2]
3	Phenols	Distillation, Direct Photometric Method[2]

อากาศเสีย...

อากาศเสีย (ปล่องระบาย) จำนวน 7 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Carbon Monoxide	1) Sampling Bag, Non-Dispersive Infrared Method[5] 2) Instrumental Analyzer Method[9]
2	Hydrogen Sulfide	Absorption Sampling, Iodometric Method[5]
3	Opacity	Ringelmann's Method[3,4]
4	Oxide of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method[8] 2) Instrumental Analyzer Method[10]
5	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Acid Method[5] 2) Instrumental Analyzer Method[11]
6	Sulfuric Acid	Isokinetic Sampling, Barium – Titrimetric Method[6]
7	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method[7]

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ที่ อก ๐๓๒๐/ ๑๐๐๙๙

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐๔ ตุลาคม ๒๕๖๗

เรื่อง แก้ไขรายชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง หนังสือ บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขที่ Env 2024/005 ลงวันที่ ๓๐ สิงหาคม ๒๕๖๗

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๓๒๓ สถานที่ตั้งเลขที่ ๖๑๖/๑๐ หมู่ที่ ๕ ตำบลแม่น้ำคู้ อำเภอปลวกแดง จังหวัดระยอง ขอแก้ไขชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน เนื่องจากมีความคลาดเคลื่อน ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรม ได้รับทราบและดำเนินการแก้ไขรายชื่อเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน จำนวน ๕ ราย ตามที่แจ้งเรียบร้อยแล้ว เป็นดังนี้

ลำดับที่ ๒๗ นางพจนา ลีดา
ลำดับที่ ๒๘ นางสาวธนิดา กุลสุริวงศ์
ลำดับที่ ๓๐ นางชลธิชา สุขงกช
ลำดับที่ ๓๖ นายสุทธิ์ดำรงค์ โชคปิตินันท์
ลำดับที่ ๔๒ นายกันตภณ มณีสัมพันธ์

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพรชัย กลั่นกรอง)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

ศูนย์วิจัยและเตือนภัยมลพิษโรงงานภาคตะวันออก
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