

ภาคผนวก ง

ใบรับรองผลการตรวจวิเคราะห์
ระหว่างเดือนมกราคม-มิถุนายน พ.ศ. 2566

ภาคผนวก ง-1

คุณภาพอากาศในบรรยากาศ



Analysis / Test Report



Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2326791
Date Received : Mar 21, 2023
Date Reported : Mar 29, 2023
Report Number: 2588742-1

Page 1 of 1

Sample Description Air Quality
Location พื้นที่โรงไฟฟ้า (GPS 47P 0669792, 1559128)
Date Analysis Commenced Mar 22, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic bag, one quartz filter paper (8x10 inch) placed in plastic bag

Sample Number	Sampled Date	Total Suspended Particulate (mg/m3)	Particulate Matter (PM-10) (mg/m3)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
2326791-1	Mar 10 - Mar 11, 2023	0.132	0.069	760	32
2326791-2	Mar 11 - Mar 12, 2023	0.117	0.056	760	32
2326791-3	Mar 12 - Mar 13, 2023	0.109	0.057	760	32
2326791-4	Mar 13 - Mar 14, 2023	0.139	0.063	760	32
2326791-5	Mar 14 - Mar 15, 2023	0.156	0.075	760	32
2326791-6	Mar 15 - Mar 16, 2023	0.102	0.053	760	32
2326791-7	Mar 16 - Mar 17, 2023	0.089	0.045	760	32
Guideline		0.33	0.12	-	-

Reference Method

Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B
Particulate Matter (PM-10) : US EPA 40 CFR Part 50 Appendix J

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

Remark :

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

Approved by

Orawan R.

Orawan Rakyong
Scientist (3)

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Analysis / Test Report



Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2326791
Date Received : Mar 21, 2023
Date Reported : Mar 29, 2023
Report Number: 260835171

Page 1 of 1

Sample Description Air Quality
Location โรงพยานาส่งเสริมสุขภาพตำบลเชียงรากน้อย GPS 4(P 06(0(91, 1560(56)
Date Analysis Commenced Mar 22, 2023
Condition of Sample Drawn into one glass filter paper (8x10 inch) placed in plastic - ag, one quartz filter paper (8x10 inch) placed in plastic - ag

Sample Number	Sampled Date	Total Suspended Particulate (mg/m3)	Particulate Matter (PM10) (mg/m3)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
2326(9178	Mar 10 - Mar 11, 2023	0.1(4	0.05(	(60	32
2326(9179	Mar 11 - Mar 12, 2023	0.113	0.036	(60	32
2326(91710	Mar 12 - Mar 13, 2023	0.145	0.049	(60	32
2326(91711	Mar 13 - Mar 14, 2023	0.186	0.05(	(60	32
2326(91712	Mar 14 - Mar 15, 2023	0.21(	0.066	(60	32
2326(91713	Mar 15 - Mar 16, 2023	0.128	0.040	(60	32
2326(91714	Mar 16 - Mar 17, 2023	0.134	0.021	(60	32
Guideline		0.33	0.12	7	7

Reference Method

Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B
Particulate Matter (PM10) : US EPA 40 CFR Part 50 Appendix J

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

Remark :

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

Approved by

Orawan R.

Orawan Rakyong
Scientist (3)

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Analysis / Test Report



Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2326791
Date Received : Mar 21, 2023
Date Reported : Mar 29, 2023
Report Num-er: 260835371

Page 1 of 1

Sample Description Air buality
Location โรงเรียนคลองบ้านพร้าว GPS 4(P 0669(58, 155(619)
Date Analysis Commenced Mar 22, 2023
Condition of Sample Drawn into one glass filter paper (Øx10 inch) placed in plastic - ag, one quartz filter paper (Øx10 inch) placed in plastic - ag

Sample Num-er	Sampled Date	Total Suspended Particulate (µg/m3)	Particulate Matter (PM10) (µg/m3)	Barometric Pressure (mm Hg)	Atmospheric Temperature (°C)
2326(91715	Mar 10 7 Mar 11, 2023	0.1(4	0.061	(60	32
2326(91716	Mar 11 7 Mar 12, 2023	0.109	0.040	(60	32
2326(9171(	Mar 12 7 Mar 13, 2023	0.112	0.060	(60	32
2326(91718	Mar 13 7 Mar 14, 2023	0.1(1	0.05(	(60	32
2326(91719	Mar 14 7 Mar 15, 2023	0.16(	0.064	(60	32
2326(91720	Mar 15 7 Mar 16, 2023	0.125	0.034	(60	32
2326(91721	Mar 16 7 Mar 1(, 2023	0.114	0.040	(60	32
Guideline		0.33	0.12	7	7

Reference Method

Total Suspended Particulate : US EPA 40 CFR Part 50 Appendix B
Particulate Matter (PM10) : US EPA 40 CFR Part 50 Appendix J

Guideline : Notification of the National Environmental Board. No.24, 2004 B.E.254() dated Septem-er 22, 2004

Sampled By : Teeravut Sukdee

Remark :

7 The la-oratory has -een accepted as an accredited la-oratory complying with the ISO/IEC 1(025.

Approved by

Orawan R.
Orawan Rakyong
Scientist (3)

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326786

Date Received : Mar 21, 2023

Date Reported : Mar 27, 2023

Report Number: 2588696-1

Page 1 of 1

Sample Description Air Quality
Location พื้นที่โรงไฟฟ้า (GPS 47P 0669792, 1559128)
Parameter Nitrogen dioxide (ppm)
Measurement Date Mar 10, 2023 - Mar 17, 2023
Measurement by Teeravut Sukdee

Time	2326786-1 Mar 10, 2023	2326786-2 Mar 11, 2023	2326786-3 Mar 12, 2023	2326786-4 Mar 13, 2023	2326786-5 Mar 14, 2023	2326786-6 Mar 15, 2023	2326786-7 Mar 16, 2023
10:00 AM - 11:00 AM	0.009	0.013	0.009	0.012	0.014	0.024	0.014
11:00 AM - 12:00 PM	0.014	0.012	0.008	0.007	0.009	0.019	0.015
12:00 PM - 01:00 PM	0.018	0.012	0.009	0.006	0.009	0.017	0.014
01:00 PM - 02:00 PM	0.019	0.012	0.008	0.006	0.009	0.015	0.015
02:00 PM - 03:00 PM	0.021	0.012	0.009	0.008	0.009	0.014	0.015
03:00 PM - 04:00 PM	0.021	0.012	0.008	0.009	0.009	0.018	0.016
04:00 PM - 05:00 PM	0.022	0.014	0.009	0.010	0.009	0.019	0.016
05:00 PM - 06:00 PM	0.025	0.016	0.013	0.012	0.010	0.021	0.017
06:00 PM - 07:00 PM	0.028	0.016	0.015	0.016	0.022	0.032	0.020
07:00 PM - 08:00 PM	0.029	0.014	0.016	0.019	0.023	0.026	0.019
08:00 PM - 09:00 PM	0.023	0.012	0.015	0.019	0.024	0.022	0.016
09:00 PM - 10:00 PM	0.024	0.014	0.015	0.020	0.029	0.020	0.017
10:00 PM - 11:00 PM	0.020	0.013	0.014	0.020	0.029	0.021	0.015
11:00 PM - 12:00 AM	0.016	0.010	0.014	0.018	0.026	0.018	0.015
12:00 AM - 01:00 AM	0.014	0.008	0.007	0.020	0.023	0.014	0.011
01:00 AM - 02:00 AM	0.011	0.008	0.007	0.018	0.022	0.012	0.009
02:00 AM - 03:00 AM	0.013	0.006	0.008	0.015	0.022	0.009	0.008
03:00 AM - 04:00 AM	0.009	0.012	0.008	0.013	0.020	0.010	0.008
04:00 AM - 05:00 AM	0.009	0.008	0.007	0.013	0.020	0.009	0.008
05:00 AM - 06:00 AM	0.009	0.007	0.008	0.014	0.019	0.010	0.010
06:00 AM - 07:00 AM	0.008	0.010	0.010	0.014	0.022	0.011	0.009
07:00 AM - 08:00 AM	0.010	0.008	0.010	0.018	0.022	0.012	0.009
08:00 AM - 09:00 AM	0.010	0.010	0.010	0.018	0.028	0.011	0.010
09:00 AM - 10:00 AM	0.011	0.010	0.014	0.017	0.027	0.011	0.013
Average	0.016	0.011	0.011	0.014	0.019	0.016	0.013
1hr - Maximum	0.029	0.016	0.016	0.020	0.029	0.032	0.020
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

Saranya C.
Saranya Chalermthamrong
Scientist (4)

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2326786
Date Received : Mar 21, 2023
Date Reported : Mar 27, 2023
Report Number: 2605850-1

Page 1 of 1

Sample Description	Air Quality						
Location	โรงเรียนคลองบ้านพร้าว (GPS 47P 0669758, 1557619)						
Parameter	Nitrogen dioxide (ppm)						
Measurement Date	Mar 10, 2023 - Mar 17, 2023						
Measurement by	Teeravut Sukdee						
Time	2326786-15 Mar 10, 2023	2326786-16 Mar 11, 2023	2326786-17 Mar 12, 2023	2326786-18 Mar 13, 2023	2326786-19 Mar 14, 2023	2326786-20 Mar 15, 2023	2326786-21 Mar 16, 2023
11:00 AM - 12:00 PM	0.005	0.013	0.008	0.005	0.006	0.014	0.015
12:00 PM - 01:00 PM	0.004	0.013	0.008	0.005	0.005	0.008	0.003
01:00 PM - 02:00 PM	0.006	0.014	0.006	0.007	0.004	0.009	0.007
02:00 PM - 03:00 PM	0.010	0.013	0.006	0.010	0.006	0.020	0.026
03:00 PM - 04:00 PM	0.024	0.015	0.006	0.031	0.010	0.030	0.032
04:00 PM - 05:00 PM	0.021	0.020	0.012	0.017	0.005	0.022	0.030
05:00 PM - 06:00 PM	0.029	0.025	0.022	0.015	0.006	0.027	0.029
06:00 PM - 07:00 PM	0.040	0.025	0.025	0.023	0.032	0.036	0.026
07:00 PM - 08:00 PM	0.045	0.019	0.025	0.025	0.028	0.040	0.023
08:00 PM - 09:00 PM	0.035	0.023	0.019	0.027	0.034	0.033	0.020
09:00 PM - 10:00 PM	0.040	0.020	0.025	0.036	0.044	0.033	0.010
10:00 PM - 11:00 PM	0.034	0.013	0.023	0.038	0.043	0.031	0.009
11:00 PM - 12:00 AM	0.022	0.013	0.014	0.032	0.036	0.023	0.007
12:00 AM - 01:00 AM	0.017	0.009	0.006	0.029	0.030	0.012	0.007
01:00 AM - 02:00 AM	0.015	0.009	0.009	0.030	0.024	0.010	0.013
02:00 AM - 03:00 AM	0.020	0.008	0.010	0.021	0.031	0.006	0.019
03:00 AM - 04:00 AM	0.014	0.008	0.012	0.021	0.026	0.007	0.019
04:00 AM - 05:00 AM	0.010	0.007	0.011	0.022	0.026	0.012	0.018
05:00 AM - 06:00 AM	0.013	0.007	0.019	0.018	0.025	0.016	0.018
06:00 AM - 07:00 AM	0.015	0.025	0.014	0.025	0.024	0.019	0.020
07:00 AM - 08:00 AM	0.022	0.020	0.017	0.023	0.022	0.020	0.016
08:00 AM - 09:00 AM	0.019	0.017	0.018	0.021	0.022	0.017	0.016
09:00 AM - 10:00 AM	0.017	0.013	0.021	0.016	0.022	0.015	0.016
10:00 AM - 11:00 AM	0.020	0.008	0.012	0.010	0.020	0.017	0.015
Average	0.021	0.015	0.014	0.021	0.022	0.020	0.017
1hr - Maximum	0.045	0.025	0.025	0.038	0.044	0.040	0.032
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170

Standard : Notification of the National Environment Board No. 33, 2009 (B.E. 2552).
Reference Method : US EPAMethod Part 50 App. F (Chemiluminescence)

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Approved by

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Saranya Chalermthamrong
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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2326786
Date Received : Mar 21, 2023
Date Reported : Mar 27, 2023
Report Number: 2605851-1

Page 1 of 1

Sample Description	Air Quality						
Location	โรงพยาบาลส่งเสริมสุขภาพตำบลเชิงรakov (GPS 47P 0670791, 1560756)						
Parameter	Nitrogen dioxide (ppm)						
Measurement Date	Mar 10, 2023 - Mar 17, 2023						
Measurement by	Teeravut Sukdee						
Time	2326786-8 Mar 10, 2023	2326786-9 Mar 11, 2023	2326786-10 Mar 12, 2023	2326786-11 Mar 13, 2023	2326786-12 Mar 14, 2023	2326786-13 Mar 15, 2023	2326786-14 Mar 16, 2023
12:00 PM - 01:00 PM	0.017	0.024	0.020	0.017	0.027	0.019	0.024
01:00 PM - 02:00 PM	0.015	0.020	0.016	0.016	0.025	0.018	0.026
02:00 PM - 03:00 PM	0.015	0.019	0.018	0.017	0.029	0.014	0.016
03:00 PM - 04:00 PM	0.015	0.018	0.017	0.018	0.020	0.014	0.012
04:00 PM - 05:00 PM	0.016	0.022	0.014	0.017	0.018	0.022	0.011
05:00 PM - 06:00 PM	0.013	0.015	0.010	0.020	0.021	0.018	0.011
06:00 PM - 07:00 PM	0.013	0.015	0.011	0.035	0.022	0.015	0.014
07:00 PM - 08:00 PM	0.026	0.019	0.015	0.034	0.026	0.020	0.015
08:00 PM - 09:00 PM	0.035	0.015	0.017	0.039	0.029	0.022	0.018
09:00 PM - 10:00 PM	0.026	0.012	0.017	0.040	0.028	0.018	0.017
10:00 PM - 11:00 PM	0.030	0.014	0.018	0.039	0.035	0.020	0.017
11:00 PM - 12:00 AM	0.027	0.012	0.017	0.034	0.034	0.024	0.014
12:00 AM - 01:00 AM	0.018	0.012	0.017	0.031	0.038	0.018	0.015
01:00 AM - 02:00 AM	0.014	0.012	0.010	0.032	0.030	0.022	0.015
02:00 AM - 03:00 AM	0.012	0.011	0.007	0.027	0.027	0.015	0.012
03:00 AM - 04:00 AM	0.015	0.010	0.010	0.018	0.026	0.014	0.009
04:00 AM - 05:00 AM	0.014	0.011	0.010	0.018	0.027	0.011	0.011
05:00 AM - 06:00 AM	0.013	0.011	0.012	0.018	0.025	0.016	0.016
06:00 AM - 07:00 AM	0.015	0.016	0.014	0.021	0.030	0.018	0.018
07:00 AM - 08:00 AM	0.019	0.013	0.016	0.026	0.028	0.023	0.020
08:00 AM - 09:00 AM	0.021	0.017	0.020	0.033	0.030	0.023	0.021
09:00 AM - 10:00 AM	0.017	0.018	0.024	0.035	0.044	0.023	0.021
10:00 AM - 11:00 AM	0.020	0.019	0.026	0.029	0.032	0.022	0.021
11:00 AM - 12:00 PM	0.020	0.018	0.023	0.022	0.027	0.024	0.020
Average	0.019	0.016	0.016	0.026	0.028	0.019	0.016
1hr - Maximum	0.035	0.024	0.026	0.040	0.044	0.024	0.026
Standard 1hr - Average	0.170	0.170	0.170	0.170	0.170	0.170	0.170

Standard : Notification of the National Environment Board No. 33, 2009 (B.E. 2552).
Reference Method : US EPAMethod Part 50 App. F (Chemiluminescence)

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Saranya Chalermthamrong
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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID : 2326797

Date Received : Mar 21, 2023

Date Reported : Mar 29, 2023

Report Number : 2588759-1

Page 1 of 2

Sample Number : 2326797-1 to 7
Parameter : Wind Speed / Wind Direction
Location : พื้นที่โรงไฟฟ้า (GPS 47P 0669792, 1559128)
Sampling Date : Mar 10 - Mar 17, 2023
Sampling by : Teeravut Sukdee

Time	Mar 10 - Mar 11, 2023			Mar 11 - Mar 12, 2023			Mar 12 - Mar 13, 2023			Mar 13 - Mar 14, 2023			Mar 14 - Mar 15, 2023			Mar 15 - Mar 16, 2023			Mar 16 - Mar 17, 2023		
	WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)	
10:00 AM - 11:00 AM	1.3	94.0	E	3.1	100.0	E	0.8	109.0	ESE	2.3	59.0	ENE	2.0	101.0	E	1.3	137.0	SE	1.5	262.0	W
11:00 AM - 12:00 PM	2.1	43.0	NE	1.7	238.0	WSW	2.5	125.0	SE	1.9	83.0	E	2.2	359.0	N	0.7	277.0	W	1.3	120.0	ESE
12:00 PM - 01:00 PM	0.6	117.0	ESE	1.2	96.0	E	0.8	0.0	N	2.6	61.0	ENE	3.4	55.0	NE	1.2	28.0	NNE	2.4	282.0	WNW
01:00 PM - 02:00 PM	1.7	257.0	WSW	2.7	255.0	WSW	1.5	247.0	WSW	1.7	36.0	NE	0.8	0.0	N	1.2	196.0	SSW	1.4	257.0	WSW
02:00 PM - 03:00 PM	1.3	241.0	WSW	0.6	310.0	NW	1.0	255.0	WSW	1.2	346.0	NNW	2.5	60.0	ENE	2.0	243.0	WSW	3.1	232.0	SW
03:00 PM - 04:00 PM	1.6	259.0	W	1.9	238.0	WSW	0.6	226.0	SW	1.3	15.0	NNE	1.4	27.0	NNE	4.5	234.0	SW	2.0	268.0	W
04:00 PM - 05:00 PM	1.9	293.0	WNW	3.1	260.0	W	2.3	253.0	WSW	1.4	23.0	NNE	1.4	119.0	ESE	4.0	248.0	WSW	2.5	252.0	WSW
05:00 PM - 06:00 PM	0.5	352.0	N	2.2	252.0	WSW	2.9	251.0	WSW	1.1	29.0	NNE	2.3	276.0	W	3.8	259.0	W	2.1	238.0	WSW
06:00 PM - 07:00 PM	1.2	274.0	W	2.1	269.0	W	1.8	240.0	WSW	1.6	21.0	NNE	1.0	251.0	WSW	2.9	255.0	WSW	2.2	235.0	SW
07:00 PM - 08:00 PM	1.3	262.0	W	1.5	239.0	WSW	1.6	324.0	NW	1.8	39.0	NE	0.0	-	-	1.4	254.0	WSW	3.2	225.0	SW
08:00 PM - 09:00 PM	1.0	258.0	WSW	1.0	226.0	SW	1.4	261.0	W	1.3	359.0	N	0.8	353.0	N	1.9	241.0	WSW	1.5	248.0	WSW
09:00 PM - 10:00 PM	1.8	242.0	WSW	0.9	195.0	SSW	1.9	264.0	W	0.6	0.0	N	0.5	313.0	NW	2.5	260.0	W	2.4	238.0	WSW
10:00 PM - 11:00 PM	3.0	257.0	WSW	1.1	359.0	N	1.1	147.0	SSE	0.5	30.0	NNE	1.5	248.0	WSW	1.7	286.0	WNW	0.9	186.0	S
11:00 PM - 12:00 AM	0.8	262.0	W	0.8	151.0	SSE	1.4	179.0	S	1.9	358.0	N	0.7	275.0	W	0.2	-	-	0.6	267.0	W
12:00 AM - 01:00 AM	0.9	190.0	S	0.9	94.0	E	1.3	74.0	ENE	0.7	354.0	N	1.2	114.0	ESE	0.6	358.0	N	0.1	-	-
01:00 AM - 02:00 AM	0.8	238.0	WSW	0.1	-	-	0.1	-	-	0.4	315.0	NW	0.9	274.0	W	1.6	73.0	ENE	0.6	145.0	SE
02:00 AM - 03:00 AM	0.8	63.0	ENE	0.6	150.0	SSE	1.0	299.0	WNW	0.9	341.0	NNW	1.4	287.0	WNW	0.5	113.0	ESE	0.4	317.0	NW
03:00 AM - 04:00 AM	0.6	34.0	NE	0.8	17.0	NNE	0.4	330.0	NNW	0.1	-	-	0.5	316.0	NW	1.4	114.0	ESE	1.4	115.0	ESE
04:00 AM - 05:00 AM	0.5	93.0	E	1.7	129.0	SE	0.0	-	-	1.1	359.0	N	1.0	338.0	NNW	1.7	118.0	ESE	1.6	122.0	ESE
05:00 AM - 06:00 AM	0.0	-	-	0.0	-	-	0.5	127.0	SE	0.6	40.0	NE	0.0	-	-	1.3	82.0	E	1.6	103.0	ESE
06:00 AM - 07:00 AM	1.4	112.0	ESE	0.2	-	-	0.5	48.0	NE	2.1	33.0	NNE	0.7	62.0	ENE	1.4	99.0	E	1.8	55.0	NE
07:00 AM - 08:00 AM	1.3	93.0	E	1.1	75.0	ENE	0.7	25.0	NNE	1.3	0.0	N	1.4	108.0	ESE	1.7	57.0	ENE	1.5	87.0	E
08:00 AM - 09:00 AM	1.1	70.0	ENE	0.4	260.0	W	0.3	261.0	W	2.0	68.0	ENE	1.1	330.0	NNW	1.6	63.0	ENE	1.4	254.0	WSW
09:00 AM - 10:00 AM	2.2	116.0	FSF	1.0	0.0	N	3.4	117.0	FSF	2.0	90.0	E	1.8	120.0	FSF	1.8	278.0	W	1.0	259.0	W

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Approved by

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



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

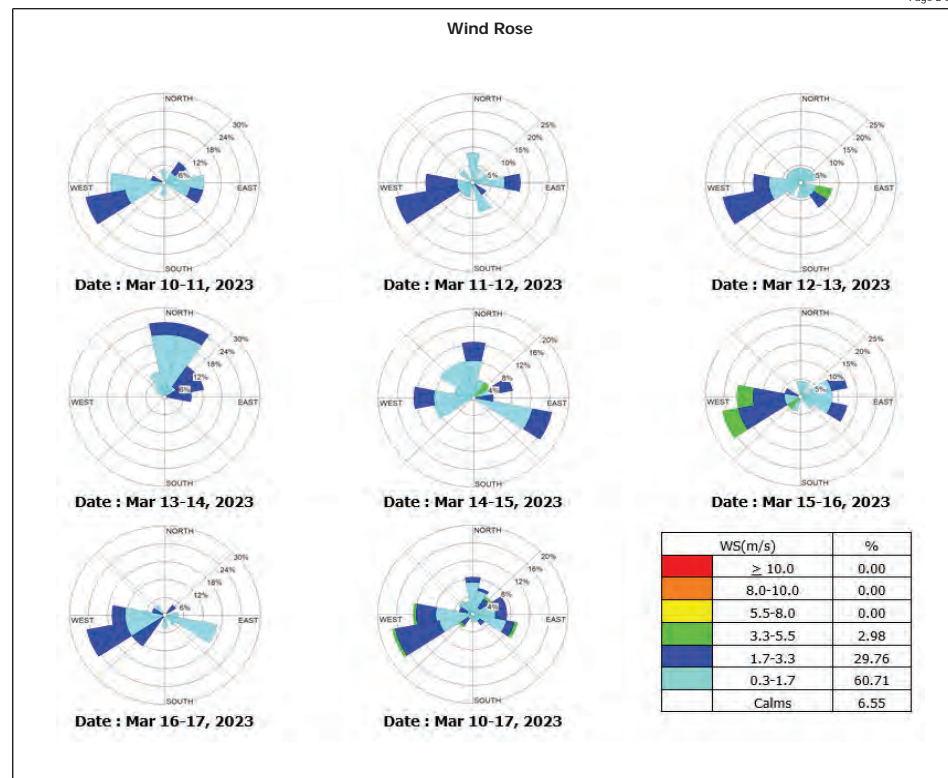
Lot ID : 2326797

Date Received : Mar 21, 2023

Date Reported : Mar 29, 2023

Report Number : 2588759-1

Page 2 of 2



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Analysis / Test Report

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59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID : 2326797

Date Received : Mar 21, 2023

Date Reported : Mar 29, 2023

Report Number : 2588759-1

Page 1 of 2

Sample Number : 2326797-8 to 14

Parameter : Wind Speed / Wind Direction

Location : โรงพยาบาลส่งเสริมสุขภาพตำบลเชียงรากน้อย (GPS 47P 0670791, 1560756)

Sampling Date : Mar 10 - Mar 17, 2023

Sampling by : Teeravut Sukdee

Time	Mar 10 - Mar 11, 2023			Mar 11 - Mar 12, 2023			Mar 12 - Mar 13, 2023			Mar 13 - Mar 14, 2023			Mar 14 - Mar 15, 2023			Mar 15 - Mar 16, 2023			Mar 16 - Mar 17, 2023		
	WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)		WS (m/s)	WD (deg)	
12:00 PM - 01:00 PM	2.4	215.0	SW	1.8	219.0	SW	0.9	209.0	SSW	3.0	22.0	NNE	2.6	83.0	E	2.0	223.0	SW	3.5	235.0	SW
01:00 PM - 02:00 PM	2.2	233.0	SW	2.4	191.0	S	1.0	6.0	N	2.5	359.0	N	2.8	91.0	E	2.5	197.0	SSW	4.7	234.0	SW
02:00 PM - 03:00 PM	1.7	10.0	N	1.1	0.0	N	2.2	274.0	W	3.3	23.0	NNE	2.3	56.0	NE	2.6	261.0	W	3.3	260.0	W
03:00 PM - 04:00 PM	1.4	29.0	NNE	1.9	282.0	WNW	2.3	230.0	SW	4.3	3.0	N	4.5	166.0	SSE	2.9	216.0	SW	5.3	227.0	SW
04:00 PM - 05:00 PM	0.6	333.0	NNW	0.0	-	-	1.3	252.0	WSW	4.5	29.0	NNE	0.7	307.0	NW	3.7	262.0	W	1.0	334.0	WNW
05:00 PM - 06:00 PM	0.0	-	-	1.7	233.0	SW	1.4	274.0	W	3.7	29.0	NNE	1.7	318.0	NW	1.4	238.0	WSW	3.2	243.0	WSW
06:00 PM - 07:00 PM	0.0	-	-	4.8	268.0	W	1.6	222.0	SW	3.6	56.0	NE	1.2	325.0	NW	2.0	202.0	SSW	3.9	234.0	SW
07:00 PM - 08:00 PM	0.7	270.0	W	1.6	243.0	WSW	3.4	192.0	SSW	1.4	30.0	NNE	0.3	16.0	NNE	3.2	187.0	S	3.0	220.0	SW
08:00 PM - 09:00 PM	0.7	249.0	WSW	1.7	204.0	SSW	1.9	275.0	W	2.2	5.0	N	0.4	16.0	NNE	1.2	229.0	SW	2.0	231.0	SW
09:00 PM - 10:00 PM	1.1	251.0	WSW	2.7	186.0	S	2.3	203.0	SSW	1.1	13.0	NNE	0.7	16.0	NNE	3.0	207.0	SW	0.8	233.0	SW
10:00 PM - 11:00 PM	1.4	237.0	WSW	3.8	198.0	SSW	2.5	165.0	SSE	2.8	13.0	NNE	1.4	259.0	W	3.1	200.0	SSW	0.9	204.0	SSW
11:00 PM - 12:00 AM	0.0	-	-	0.3	178.0	S	1.2	143.0	SE	2.1	26.0	NNE	0.0	-	-	0.9	203.0	SSW	0.0	-	-
12:00 AM - 01:00 AM	0.0	-	-	0.7	147.0	SSE	0.4	310.0	NW	2.3	25.0	NNE	0.0	-	-	2.5	209.0	SSW	2.2	202.0	SSW
01:00 AM - 02:00 AM	0.0	-	-	1.1	137.0	SE	0.0	-	-	0.0	-	-	0.0	-	-	2.2	194.0	SSW	0.8	229.0	SW
02:00 AM - 03:00 AM	1.2	201.0	SSW	1.1	152.0	SSE	0.0	-	-	0.8	17.0	NNE	0.0	-	-	0.3	137.0	SE	0.5	189.0	S
03:00 AM - 04:00 AM	0.0	-	-	0.2	-	-	1.2	72.0	ENE	3.0	8.0	N	0.6	319.0	NW	1.2	145.0	SE	1.4	152.0	SSE
04:00 AM - 05:00 AM	0.0	-	-	0.0	-	-	0.0	-	-	1.9	27.0	NNE	0.0	-	-	1.0	126.0	SE	1.5	135.0	SE
05:00 AM - 06:00 AM	1.8	49.0	NE	0.6	8.0	N	1.4	318.0	NW	2.6	44.0	NE	0.0	-	-	3.3	145.0	SE	1.0	149.0	SSE
06:00 AM - 07:00 AM	1.7	69.0	ENE	1.0	94.0	E	0.9	205.0	SSW	4.8	0.0	N	1.6	88.0	E	1.9	218.0	ESE	2.1	188.0	S
07:00 AM - 08:00 AM	2.9	184.0	S	2.1	166.0	SSE	3.5	6.0	N	1.9	37.0	NE	1.7	170.0	S	0.4	104.0	SSW	0.4	204.0	SSW
08:00 AM - 09:00 AM	1.4	130.0	SE	2.7	298.0	WNW	1.6	119.0	ESE	4.8	53.0	NE	3.1	215.0	SW	2.4	203.0	SSW	2.0	233.0	SW
09:00 AM - 10:00 AM	5.3	220.0	SW	4.6	238.0	WSW	2.2	100.0	E	1.5	86.0	E	2.8	162.0	SSE	0.5	62.0	ENE	2.9	184.0	S
10:00 AM - 11:00 AM	3.1	253.0	WSW	1.7	219.0	SW	2.7	62.0	ENE	2.0	81.0	E	3.8	244.0	WSW	1.6	298.0	WNW	1.2	183.0	S
11:00 AM - 12:00 PM	0.9	111.0	ESE	4.0	69.0	ENE	5.3	62.0	ENE	0.4	350.0	N	4.5	218.0	SW	0.9	306.0	NW	1.0	177.0	N

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

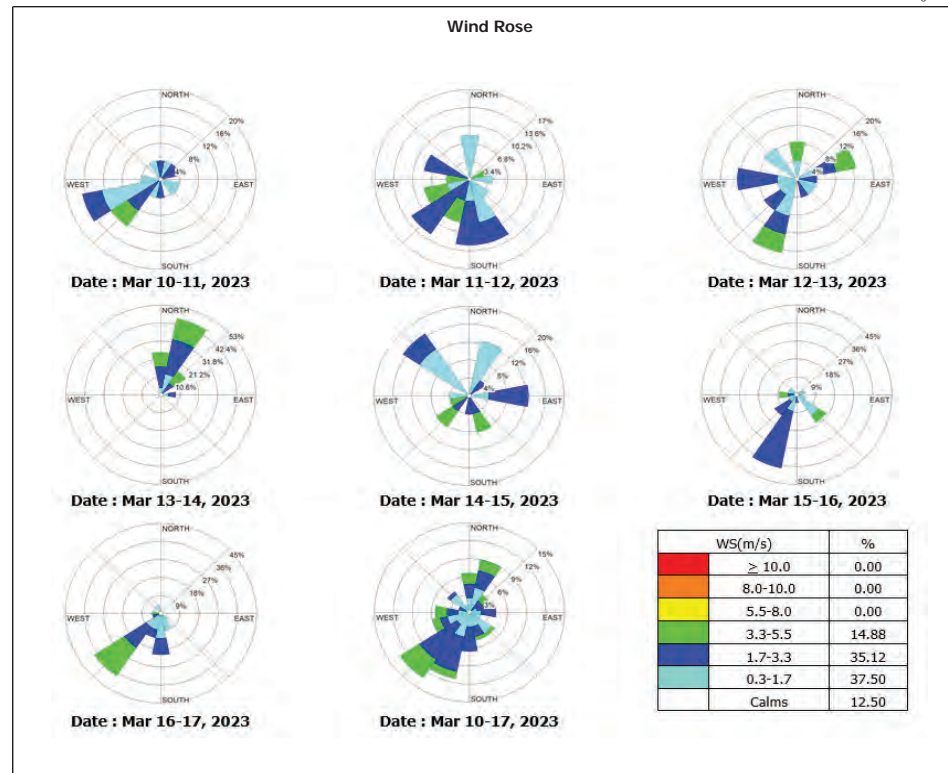
Lot ID : 2326797

Date Received : Mar 21, 2023

Date Reported : Mar 29, 2023

Report Number : 2588759-1

Page 2 of 2



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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID : 2326797

Date Received : Mar 21, 2023

Date Reported : Mar 29, 2023

Report Number : 2588759-1

Page 1 of 2

Sample Number 2326797-15 to 21

Parameter Wind Speed / Wind Direction

Location โรงเรียนคลองบ้านพร้าว (GPS 47P 0669758, 1557619)

Sampling Date Mar 10 - Mar 17, 2023

Sampling by Teeravut Sukdee

Time	Mar 10 - Mar 11, 2023		Mar 11 - Mar 12, 2023		Mar 12 - Mar 13, 2023		Mar 13 - Mar 14, 2023		Mar 14 - Mar 15, 2023		Mar 15 - Mar 16, 2023		Mar 16 - Mar 17, 2023	
	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)	WS (m/s)	WD (deg)
11:00 AM - 12:00 PM	1.1	169.0	S	0.9	131.0	SE	1.4	167.0	SSE	1.1	0.0	N	0.0	-
12:00 PM - 01:00 PM	1.7	146.0	SE	0.7	53.0	NE	0.3	181.0	S	3.2	0.0	N	0.0	-
01:00 PM - 02:00 PM	1.0	136.0	SE	1.5	160.0	SSE	1.8	147.0	SSE	3.6	0.0	N	1.0	0.0
02:00 PM - 03:00 PM	0.6	0.0	N	0.6	134.0	SE	1.1	154.0	SSE	2.7	0.0	N	0.0	-
03:00 PM - 04:00 PM	0.1	-	-	2.2	154.0	SSE	1.3	126.0	SE	0.8	0.0	N	0.0	-
04:00 PM - 05:00 PM	0.4	52.0	NE	1.9	122.0	ESE	0.0	-	1.3	0.0	N	0.0	-	0.9
05:00 PM - 06:00 PM	0.0	-	-	2.1	102.0	ESE	0.4	136.0	SE	1.2	0.0	N	0.7	157.0
06:00 PM - 07:00 PM	0.0	-	-	3.4	115.0	ESE	1.3	142.0	SE	1.5	214.0	SW	0.0	-
07:00 PM - 08:00 PM	0.0	-	-	1.7	148.0	SSE	2.1	155.0	SSE	0.4	211.0	SSW	0.0	-
08:00 PM - 09:00 PM	0.1	-	-	2.1	154.0	SSE	0.5	128.0	SE	0.0	-	-	0.0	-
09:00 PM - 10:00 PM	0.2	-	-	0.6	149.0	SSE	0.0	-	0.0	-	-	0.0	-	0.3
10:00 PM - 11:00 PM	0.2	-	-	1.0	145.0	SE	0.9	181.0	S	1.5	0.0	N	0.0	-
11:00 PM - 12:00 AM	0.6	157.0	SSE	2.3	151.0	SSE	1.2	135.0	SE	0.5	0.0	N	0.0	-
12:00 AM - 01:00 AM	0.7	123.0	ESE	0.9	158.0	SSE	0.0	-	0.0	-	-	0.0	-	0.9
01:00 AM - 02:00 AM	0.0	-	-	0.9	173.0	S	0.0	-	0.0	-	-	1.1	0.0	N
02:00 AM - 03:00 AM	0.6	153.0	SSE	0.0	-	-	0.0	-	0.0	-	-	0.8	172.0	S
03:00 AM - 04:00 AM	0.5	179.0	S	0.8	156.0	SSE	0.0	-	2.1	0.0	N	1.5	145.0	SE
04:00 AM - 05:00 AM	0.0	-	-	0.0	-	-	1.8	138.0	SE	1.6	0.0	N	0.8	160.0
05:00 AM - 06:00 AM	0.0	-	-	0.8	153.0	SSE	0.0	-	0.4	0.0	N	2.0	154.0	SSE
06:00 AM - 07:00 AM	0.2	-	-	0.0	-	-	0.0	-	0.9	0.0	N	3.1	122.0	ESE
07:00 AM - 08:00 AM	1.7	156.0	SSE	0.3	185.0	S	0.8	133.0	SE	0.8	199.0	SSW	1.2	143.0
08:00 AM - 09:00 AM	2.3	176.0	S	2.3	127.0	SE	0.5	138.0	SE	0.9	206.0	SSW	1.0	96.0
09:00 AM - 10:00 AM	0.2	-	-	1.6	179.0	S	1.5	0.0	N	1.9	0.0	N	1.2	94.0
10:00 AM - 11:00 AM	0.8	131.0	SE	0.4	224.0	SW	2.5	218.0	SW	0.5	214.0	SW	0.3	125.0

Reference Method : Cup Anemometer & Anodized Aluminium Vane Method

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

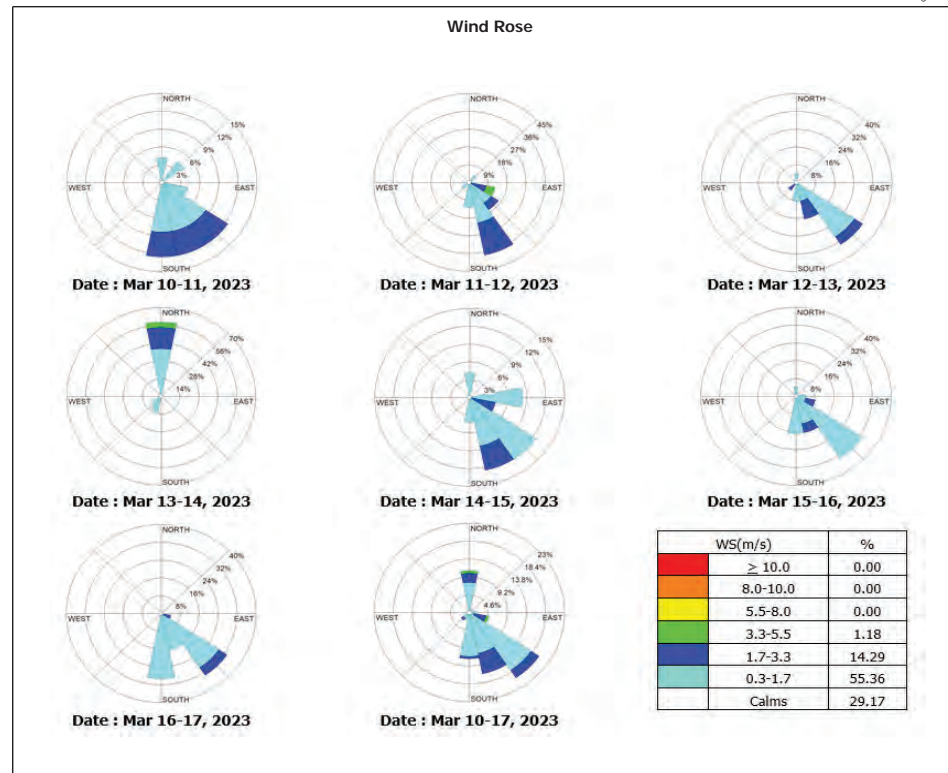
Lot ID : 2326797

Date Received : Mar 21, 2023

Date Reported : Mar 29, 2023

Report Number : 2588759-1

Page 2 of 2



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ภาคผนวก ง-2

คุณภาพอากาศจากปล่องระบาย



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2327399
Date Received : Mar 14, 2023
Date Reported : Mar 21, 2023
Report Number: 2590187-1

Page 1 of 2

Sample Number 2327399-1
Sampled Date Mar 13, 2023
Sample Description Emission from Stationary Source
Location แปลง HRSG 1
Date Analysis Commenced Mar 16, 2023
Condition of Sample Extracted into one filter paper placed in plastic petri dish

Stack Description

Ambient Pressure	760	mmHg	Diameter	2.96	m	Oxygen	14.6	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	4.0	%
Type of Process	Combustion		Stack Temperature	101	°C	Gas Velocity	18.2	m/s
Type of Fuel	Natural Gas		Moisture	7.08	%	Flow Rate (Actual O2)	334509	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 %O ₂	Result at 14.6 % O ₂	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing										
Total Suspended Particulate	10:40 AM - 11:28 AM	mg/m3	-	0.5	8.3	3.76	32.7	60	United States Environmental Protection Agency, EPA Method 5	Bangkok

Guideline :
Guideline (1) Environmental Impact Assessment Report of Gulf JP CRN Co., Ltd.
Guideline (2) Notification of the Ministry of Natural Resources and Environment, 2010 (B.E. 2553) on Emission Standard from New Power Plants.

Technical Management

Orawan R.
Orawan Rakyong
Scientist (3)
ทะเบียนเลขที่ ว-204-จ-6115

Approved by

Kanokkorn Anek
Kanokkorn Anek
Senior Manager
ทะเบียนเลขที่ ว-204-ก-6111

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11726-21/ EMAIL

S:\Reports_Air Stack_O2_2GL.rpt (7:06PM)



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2327399
Date Received : Mar 14, 2023
Date Reported : Mar 21, 2023
Report Number: 2590187-1

Page 2 of 2

Sample Number 2327399-1
Sampled Date Mar 13, 2023
Sample Description Emission from Stationary Source
Location แปลง HRSG 1
Date Analysis Commenced Mar 16, 2023
Condition of Sample Extracted into one filter paper placed in plastic petri dish

Stack Description

Ambient Pressure	760	mmHg	Diameter	2.96	m	Oxygen	14.6	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	4.0	%
Type of Process	Combustion		Stack Temperature	101	°C	Gas Velocity	18.2	m/s
Type of Fuel	Natural Gas		Moisture	7.08	%	Flow Rate (Actual O2)	334509	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	10:40 AM - 11:28 AM	g/s	-	-	0.35	1.72	-	Calculated	Bangkok

Guideline :
Guideline (1) Environmental Impact Assessment Report of Gulf JP CRN Co., Ltd.
Guideline (2) Notification of the Ministry of Natural Resources and Environment, 2010 (B.E. 2553) on Emission Standard from New Power Plants.

Sampled By : Prasert Surakhan

Remark :

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

Technical Management

Orawan R.
Orawan Rakyong
Scientist (3)
ทะเบียนเลขที่ ว-204-จ-6115

Approved by

Kanokkorn Anek
Kanokkorn Anek
Senior Manager
ทะเบียนเลขที่ ว-204-ก-6111

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11726-21/ EMAIL

S:\Reports_Air Stack_O2_2GL.rpt (7:06PM)



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2327396
Date Received :Mar 14, 2023
Date Reported :Mar 20, 2023
Report Number :2590163-1

Page 1 of 1

Sample Number 2327396-1
Sample Description Emission from Stationary Source
Location โรงผลิต HRSG 1
Measurement Date Mar 13, 2023

Stack Description							
Ambient Temperature	32 °C	Diameter	2.96 m	Oxygen	14.60 %		
Ambient Pressure	760 mmHg	Shape	Circle	Carbon dioxide	3.96 %		
Type of Process	Combustion	Stack Temperature	101 °C	Gas Velocity	18.27 m/s		
Type of Fuel	Natural Gas	Moisture	7.04 %	Flow Rate	334963 Nm3/hr		

Run No.	Sampling Time	Oxygen (%)	Carbon Dioxide (%)	Oxides of Nitrogen (ppm)		Sulfur Dioxide (ppm)	
				at Actual O ₂	at 7% O ₂	at Actual O ₂	at 7% O ₂
1	10:40 AM - 11:00 AM	14.58	3.97	19.15	42.09	0.29	0.64
2	11:01 AM - 11:21 AM	14.60	3.96	19.93	44.00	0.29	0.64
3	11:22 AM - 11:42 AM	14.61	3.95	20.16	44.53	0.22	0.49
Average (ppm)		14.60	3.96	19.75	43.54	0.27	0.59
Guideline ^{1/} (ppm)				-	60	-	7.14
Guideline ^{2/} (ppm)				-	120	-	20
Result (mg/Nm ³)				37.15	81.92	0.70	1.54
Emission Rate at Actual O ₂ (g/s)				3.4570		0.0649	
Guideline ^{1/} (g/s)				5.92		0.98	
Method				US EPA Method 7E		US EPA Method 6C	

Sampled By : Boonyarith Iamted

Guideline : ^{1/} Environmental Impact Assessment Report of Gulf JP CRN Co., Ltd.

^{2/} Notification of the Ministry of Natural Resources and Environment, 2010 (B.E. 2553) on Emission Standard from New Power Plants.

Technical Management



Wichan Choonharat
Manager
ทะเบียนเลขที่ ว-204-ค-6113

Approved by



Sarayuth Jittranont
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-4702

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2327396
Date Received :Mar 14, 2023
Date Reported :Mar 20, 2023
Report Number :2590163-1

Page 1 of 1

Sample Number 2327396-1
Sample Description Emission from Stationary Source
Location โรงผลิต HRSG 1
Measurement Date Mar 13, 2023

Stack Description							
Ambient Temperature	32 °C	Diameter	2.96 m	Oxygen	14.60 %		
Ambient Pressure	760 mmHg	Shape	Circle	Carbon dioxide	3.96 %		
Type of Process	Combustion	Stack Temperature	101 °C	Gas Velocity	18.27 m/s		
Type of Fuel	Natural Gas	Moisture	7.04 %	Flow Rate	334963 Nm3/hr		

Run No.	Sampling Time	Oxygen (%)	Carbon Dioxide (%)	Carbon Monoxide (ppm)	
				at Actual O ₂	at 7% O ₂
1	10:40 AM - 11:00 AM	14.58	3.97	0.06	0.13
2	11:01 AM - 11:21 AM	14.60	3.96	0.57	1.26
3	11:22 AM - 11:42 AM	14.61	3.95	0.66	1.47
Average (ppm)		14.60	3.96	0.43	0.95
Guideline (ppm)				-	690
Result (mg/Nm ³)				0.49	1.09
Emission Rate at Actual O ₂ (g/s)				0.0459	
Method				US EPA Method 10	

Sampled By : Boonyarith Iamted

Guideline : 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)

Technical Management



Wichan Choonharat
Manager
ทะเบียนเลขที่ ว-204-ค-6113

Approved by



Sarayuth Jittranont
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-4702

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2327402
Date Received : Mar 14, 2023
Date Reported : Mar 21, 2023
Report Number: 259019281

Page 1 of 2

Sample Number 232- 40281
Sampled Date Mar 14, 2023
Sample Description Emission from Stationary Source
Location แปลง บ RSG 2
Date Analysis Commenced Mar 16, 2023
Condition of Sample Extracted into one filter paper placed in plastic petri dish

Stack Description

Ambient Pressure	-60	mmHg	Diameter	2.96	m	Oxygen	14.5	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	4.0	%
Type of Process	Combustion		Stack Temperature	102	°C	Gas Velocity	19.5	m/s
Type of Fuel	Natural Gas		Moisture	F.62	%	Flow Rate (Actual O2)	350446	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result at 7 %O ₂	Result at 14.5 %O ₂	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing										
Total Suspended Particulate	09:45 AM 8:10:21 AM	mg/m3	8	0.5	9.2	4.24	32.-	60	United States Environmental Protection Agency, EPA Method 5	Bangkok

Guideline :
Guideline (1) Environmental Impact Assessment Report of Gulf JP CRN Co., Ltd.
Guideline (2) Notification of the Ministry of Natural Resources and Environment, 2010 (B.E. 2553) on Emission Standard from New Power Plants.

Technical Management

Orawan R.
Orawan Rakyong
Scientist (3)
ทะเบียนเลขที่ ๖๕๐๔๘๕๑๑๕

Approved by

Kanokkorn Anek
Kanokkorn Anek
Senior Manager
ทะเบียนเลขที่ ๖๕๐๔๘๕๑๑๑

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2327402
Date Received : Mar 14, 2023
Date Reported : Mar 21, 2023
Report Number: 259019281

Page 2 of 2

Sample Number 232- 40281
Sampled Date Mar 14, 2023
Sample Description Emission from Stationary Source
Location แปลง บ RSG 2
Date Analysis Commenced Mar 16, 2023
Condition of Sample Extracted into one filter paper placed in plastic petri dish

Stack Description

Ambient Pressure	-60	mmHg	Diameter	2.96	m	Oxygen	14.5	%
Ambient Temperature	32.0	°C	Shape	Circle		Carbon Dioxide	4.0	%
Type of Process	Combustion		Stack Temperature	102	°C	Gas Velocity	19.5	m/s
Type of Fuel	Natural Gas		Moisture	F.62	%	Flow Rate (Actual O2)	350446	Nm3/hr

Analyte	Sampled Time	Unit	LOD	LOQ (LOR)	Result Emission Rate	Guideline (1)	Guideline (2)	Method	Testing Location
Air Testing									
Total Suspended Particulate	09:45 AM 8:10:21 AM	g/s	8	8	0.42	1.-2	8	Calculated	Bangkok

Guideline :
Guideline (1) Environmental Impact Assessment Report of Gulf JP CRN Co., Ltd.
Guideline (2) Notification of the Ministry of Natural Resources and Environment, 2010 (B.E. 2553) on Emission Standard from New Power Plants.

Sampled By : Prasert Surakhan

Remark :

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

Technical Management

Orawan R.
Orawan Rakyong
Scientist (3)
ทะเบียนเลขที่ ๖๕๐๔๘๕๑๑๕

Approved by

Kanokkorn Anek
Kanokkorn Anek
Senior Manager
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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2327398
Date Received :Mar 14, 2023
Date Reported :Mar 20, 2023
Report Number :2590172-1

Page 1 of 1

Sample Number 2327398-1
Sample Description Emission from Stationary Source
Location โรงผลิต HRSG 2
Measurement Date Mar 14, 2023

Stack Description							
Ambient Temperature	32 °C	Diameter	2.96 m	Oxygen	14.48 %		
Ambient Pressure	760 mmHg	Shape	Circle	Carbon dioxide	3.97 %		
Type of Process	Combustion	Stack Temperature	102 °C	Gas Velocity	19.48 m/s		
Type of Fuel	Natural Gas	Moisture	8.59 %	Flow Rate	351001 Nm3/hr		

Run No.	Sampling Time	Oxygen (%)	Carbon Dioxide (%)	Oxides of Nitrogen (ppm)		Sulfur Dioxide (ppm)	
				at Actual O ₂	at 7% O ₂	at Actual O ₂	at 7% O ₂
1	09:45 AM - 10:05 AM	14.45	3.98	23.11	49.83	0.23	0.49
2	10:06 AM - 10:26 AM	14.48	3.97	22.49	48.68	0.25	0.53
3	10:27 AM - 10:47 AM	14.50	3.96	22.62	49.10	0.23	0.50
Average (ppm)		14.48	3.97	22.74	49.20	0.23	0.51
Guideline ^{1/} (ppm)				-	60	-	7.14
Guideline ^{2/} (ppm)				-	120	-	20
Result (mg/Nm ³)				42.79	92.57	0.61	1.33
Emission Rate at Actual O ₂ (g/s)				4.1720		0.0599	
Guideline ^{1/} (g/s)				5.92		0.98	
Method				US EPA Method 7E		US EPA Method 6C	

Sampled By : Worawich Tongpoom

Guideline : ^{1/} Environmental Impact Assessment Report of Gulf JP CRN Co., Ltd.

^{2/} Notification of the Ministry of Natural Resources and Environment, 2010 (B.E. 2553) on Emission Standard from New Power Plants.

Technical Management



Wichan Choonharat
Manager
ทะเบียนเลขที่ ว-204-ค-6113

Approved by



Sarayuth Jittranont
Assistant General Manager
ทะเบียนเลขที่ ว-204-ค-4702

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2327398
Date Received :Mar 14, 2023
Date Reported :Mar 20, 2023
Report Number :2590172-1

Page 1 of 1

Sample Number 2327398-1
Sample Description Emission from Stationary Source
Location โรงผลิต HRSG 2
Measurement Date Mar 14, 2023

Stack Description							
Ambient Temperature	32 °C	Diameter	2.96 m	Oxygen	14.48 %		
Ambient Pressure	760 mmHg	Shape	Circle	Carbon dioxide	3.97 %		
Type of Process	Combustion	Stack Temperature	102 °C	Gas Velocity	19.48 m/s		
Type of Fuel	Natural Gas	Moisture	8.59 %	Flow Rate	351001 Nm3/hr		

Run No.	Sampling Time	Oxygen (%)	Carbon Dioxide (%)	Carbon Monoxide (ppm)	
				at Actual O ₂	at 7% O ₂
1	09:45 AM - 10:05 AM	14.45	3.98	1.22	2.64
2	10:06 AM - 10:26 AM	14.48	3.97	1.21	2.62
3	10:27 AM - 10:47 AM	14.50	3.96	1.17	2.54
Average (ppm)		14.48	3.97	1.20	2.60
Guideline (ppm)				-	690
Result (mg/Nm ³)				1.38	2.98
Emission Rate at Actual O ₂ (g/s)				0.1342	
Method				US EPA Method 10	

Sampled By : Worawich Tongpoom

Guideline : 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)

Technical Management



Wichan Choonharat
Manager
ทะเบียนเลขที่ ว-204-ค-6113

Approved by



Sarayuth Jittranont
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ทะเบียนเลขที่ ว-204-ค-4702

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ภาคผนวก ง-3

การตรวจสอบความถูกต้องของ CEMs (Audit/RAA/RATA)



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Report Number : 2590141-1
Date Reported : Mar 23, 2023
Date Received : Mar 14, 2023
Sample Number : 2327393-1
Sample Date : Mar 13, 2023
Sample Description : Emission from Stationary Source
Location : ไซต์ HRSG 1
Parameter : NOx

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	13-Mar-23	10:40	11:00	18.79	19.15	40.64	42.09	1.45
2	13-Mar-23	11:01	11:21	19.68	19.93	42.55	44.00	1.25
3	13-Mar-23	11:22	11:42	19.60	20.16	42.55	44.53	1.97
Average								
Relative Accuracy Audit Criteria ^{1/} (Compared with RM)								
Relative Accuracy Audit Criteria ^{1/} (Compared with RM)								
Relative Accuracy Audit Criteria ^{1/} (Compared with RM)								
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Relative Accuracy Audit Criteria ^{1/} (Compared with RM)								
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Relative Accuracy Audit Criteria ^{1/} (Compared with RM)								
Relative Accuracy Audit Criteria ^{1/} (Compared with RM)								
Relative Accuracy Audit Criteria ^{1/} (Compared with RM)								
Relative Accuracy Audit Criteria ^{1/} (Compared with RM								



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN
Sample Number 2327393-1
Sample Date Mar 13, 2023
Sample Description Emission from Stationary Source
Location 14a4 HRS6 1
Parameter O2

Run No.	Date	Time				Raw Data at Actual		Difference
		Start	Stop	CEMs (%)	RM (%)	CEMs (%)	RM (%)	
1	13-Mar-23	10:40	11:00	14.47	14.58	0.10	0.10	
2	13-Mar-23	11:01	11:21	14.50	14.60	0.10	0.10	
3	13-Mar-23	11:22	11:42	14.50	14.61	0.11	0.10	
Average		11:42		14.49	14.60	0.10	0.10	
Relative Accuracy Audit Criteria '1' (Compared with RM) (%)								
Relative Accuracy Audit Criteria '1' (Compared with RM)								
± 15%								

Reference Method : US EPA Method 3A
Remark : '1' Relative Accuracy Criteria of O2 is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 3 (PS-3)
RAA Result is within Criteria

Sampled By : Booyarith Iamled

Technical Management
Wichan Choonharat
Manager
โทรศัพท์ 3-204-8-6113

Approved by
Sarayu Jittanon
Assistant General Manager
โทรศัพท์ 3-204-8-4702

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Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN
Sample Number 2327395-1
Sample Date Mar 14, 2023
Sample Description Emission from Stationary Source
Location 14a4 HRS6 2
Parameter NOx

Run No.	Date	Time				Raw Data at Actual O2		Difference
		Start	Stop	CEMs (ppm)	RM (ppm)	CEMs (ppm)	RM (ppm)	
1	14-Mar-23	9:45	10:05	21.09	23.11	47.85	49.83	1.98
2	14-Mar-23	10:06	10:26	20.63	22.49	46.92	48.68	1.77
3	14-Mar-23	10:27	10:47	20.91	22.62	47.68	49.10	1.42
Average		10:47		20.91	22.62	47.48	49.20	1.72
Relative Accuracy Audit Criteria '1' (Compared with RM) (%)								
Relative Accuracy Audit Criteria '1' (Compared with RM)								
± 15%								

Reference Method : US EPA Method 7E
Remark : '1' Relative Accuracy Criteria of NOx is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 2 (PS-2)
RAA Result is within Criteria

Technical Management
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Approved by
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Assistant General Manager
โทรศัพท์ 3-204-8-4702

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Analysis / Test Report

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59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Date Received : Mar 14, 2023
Date Reported : Mar 23, 2023
Project Name : Monitoring EIA
Report Number : 2590150-1
Project Location : GCRN

Page 2 of 3

Sample Number	2327395-1
Sampled Date	Mar 14, 2023
Sample Description	Emission from Stationary Source
Location	Wabai HRS# 2
Parameter	CO

Run No.	Date	Time		Raw Data at Actual O2		Corrected Value at 7% O2		Difference
		Start	Stop	CEMs (ppm)	RM (ppm)	CEMs (ppm)	RM (ppm)	
1	14-Mar-23	9:45	10:05	1.13	1.28	2.57	2.75	0.18
2	14-Mar-23	10:06	10:26	1.14	1.26	2.60	2.73	0.13
3	14-Mar-23	10:27	10:47	1.12	1.22	2.55	2.65	0.10
Average								
Relative Accuracy Audit (Compared with RM) (%)								
Relative Accuracy Audit Criteria 1' (Compared with RM)								
± 15%								
4.9								
0.13								

Reference Method : US EPA Method 10
Remark: 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
RAA Result is within Criteria

Technical Management
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Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Date Received : Mar 14, 2023
Date Reported : Mar 23, 2023
Project Name : Monitoring EIA
Report Number : 2590150-1
Project Location : GCRN

Page 3 of 3

Sample Number	2327395-1
Sampled Date	Mar 14, 2023
Sample Description	Emission from Stationary Source
Location	Wabai HRS# 2
Parameter	O2

Run No.	Date	Time		Raw Data at Actual		Difference
		Start	Stop	CEMs (%)	RM (%)	
1	14-Mar-23	9:45	10:05	14.77	14.45	-0.32
2	14-Mar-23	10:06	10:26	14.79	14.48	-0.31
3	14-Mar-23	10:27	10:47	14.80	14.48	-0.31
Average				14.79	14.48	-0.31
Relative Accuracy Audit Criteria 1' (Compared with RM)						
Relative Accuracy Audit Criteria 1' (Compared with RM)						
± 15%						

Reference Method : US EPA Method 3A
Remark: 1' Relative Accuracy Criteria of O2 is refer to 40 CFR Part 60 Appendix B : Performance Specification Test 3 (PS-3)
RAA Result is within Criteria

Technical Management
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Approved by
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Assistant General Manager
saryuhtj@13-204-a-4702

Sampled By : Worawich Tongpoom

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ภาคผนวก ง-4

ระดับเสียงในบรรยากาศ



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2326798
Date Received : Mar 21, 2023
Date Reported : Mar 28, 2023
Report Number: 2607469-1

Page 1 of 1

Sample Number 2326798-1
Parameter Noise (Leq 24 hrs.)
Location พื้นที่โรงไฟฟ้า (GPS 47P 0669782, 1559176)
Measurement Date Mar 10 - Mar 11, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572552

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	65.3	78.9	64.4
11:00 AM - 12:00 PM	64.8	75.6	64.3
12:00 PM - 01:00 PM	64.9	77.7	64.2
01:00 PM - 02:00 PM	65.0	81.2	64.2
02:00 PM - 03:00 PM	64.9	79.8	64.2
03:00 PM - 04:00 PM	65.0	75.1	64.4
04:00 PM - 05:00 PM	64.8	75.2	64.2
05:00 PM - 06:00 PM	66.0	74.1	64.4
06:00 PM - 07:00 PM	65.1	74.9	64.4
07:00 PM - 08:00 PM	64.8	77.9	64.3
08:00 PM - 09:00 PM	64.6	69.1	64.3
09:00 PM - 10:00 PM	64.7	70.8	64.3
10:00 PM - 11:00 PM	64.7	71.6	64.4
11:00 PM - 12:00 AM	64.9	67.9	64.5
12:00 AM - 01:00 AM	65.5	91.6	64.7
01:00 AM - 02:00 AM	65.0	68.9	64.7
02:00 AM - 03:00 AM	65.2	72.4	64.9
03:00 AM - 04:00 AM	65.2	68.9	64.9
04:00 AM - 05:00 AM	65.3	70.7	64.9
05:00 AM - 06:00 AM	65.7	75.1	65.0
06:00 AM - 07:00 AM	65.3	74.1	64.8
07:00 AM - 08:00 AM	64.8	75.8	64.4
08:00 AM - 09:00 AM	65.2	76.8	64.4
09:00 AM - 10:00 AM	65.0	73.9	64.4

Leq Average 24 hrs. (dB(A)) 65.1
Lmax (dB(A)) 91.6
L90 (dB(A)) 64.4
Ldn (dB(A)) 71.6
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

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2326798
Date Received : Mar 21, 2023
Date Reported : Mar 28, 2023
Report Number: 2607470-1

Page 1 of 1

Sample Number 2326798-2
Parameter Noise (Leq 24 hrs.)
Location พื้นที่โรงไฟฟ้า (GPS 47P 0669782, 1559176)
Measurement Date Mar 11 - Mar 12, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572552

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	64.8	77.6	64.2
11:00 AM - 12:00 PM	64.7	73.7	64.1
12:00 PM - 01:00 PM	64.6	69.9	64.1
01:00 PM - 02:00 PM	64.8	79.3	64.2
02:00 PM - 03:00 PM	64.9	83.1	64.2
03:00 PM - 04:00 PM	64.9	82.7	64.2
04:00 PM - 05:00 PM	65.0	76.5	64.2
05:00 PM - 06:00 PM	66.2	79.5	64.6
06:00 PM - 07:00 PM	65.3	78.2	64.5
07:00 PM - 08:00 PM	64.9	76.8	64.4
08:00 PM - 09:00 PM	64.9	69.0	64.5
09:00 PM - 10:00 PM	64.8	72.0	64.4
10:00 PM - 11:00 PM	64.8	77.1	64.4
11:00 PM - 12:00 AM	64.4	87.5	63.2
12:00 AM - 01:00 AM	63.4	70.6	63.0
01:00 AM - 02:00 AM	63.6	68.1	63.0
02:00 AM - 03:00 AM	63.3	72.7	63.0
03:00 AM - 04:00 AM	63.4	68.4	63.0
04:00 AM - 05:00 AM	64.0	69.6	63.3
05:00 AM - 06:00 AM	63.8	73.9	63.1
06:00 AM - 07:00 AM	63.5	80.1	62.9
07:00 AM - 08:00 AM	63.5	74.8	62.9
08:00 AM - 09:00 AM	63.7	81.3	62.9
09:00 AM - 10:00 AM	63.5	76.1	62.8

Leq Average 24 hrs. (dB(A)) 64.4
Lmax (dB(A)) 87.5
L90 (dB(A)) 64.1
Ldn (dB(A)) 70.4
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

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326798

Date Received : Mar 21, 2023

Date Reported : Mar 28, 2023

Report Number: 2607471-1

Page 1 of 1

Sample Number 2326798-3
Parameter Noise (Leq 24 hrs.)
Location พื้นที่โรงไฟฟ้า (GPS 47P 0669782, 1559176)
Measurement Date Mar 12 - Mar 13, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572552

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	63.4	72.0	62.8
11:00 AM - 12:00 PM	63.3	77.0	62.7
12:00 PM - 01:00 PM	63.2	83.0	62.5
01:00 PM - 02:00 PM	63.3	74.9	62.5
02:00 PM - 03:00 PM	63.2	80.1	62.5
03:00 PM - 04:00 PM	63.8	78.2	62.7
04:00 PM - 05:00 PM	66.7	73.6	65.7
05:00 PM - 06:00 PM	66.2	79.0	64.9
06:00 PM - 07:00 PM	65.3	82.4	64.5
07:00 PM - 08:00 PM	64.9	72.8	64.5
08:00 PM - 09:00 PM	65.0	84.5	64.5
09:00 PM - 10:00 PM	64.8	71.1	64.5
10:00 PM - 11:00 PM	65.0	68.6	64.6
11:00 PM - 12:00 AM	64.8	76.6	64.2
12:00 AM - 01:00 AM	64.6	75.8	64.1
01:00 AM - 02:00 AM	64.4	68.7	64.1
02:00 AM - 03:00 AM	64.4	70.1	64.0
03:00 AM - 04:00 AM	64.5	70.6	64.2
04:00 AM - 05:00 AM	64.8	68.7	64.4
05:00 AM - 06:00 AM	65.2	74.1	64.5
06:00 AM - 07:00 AM	65.6	78.7	64.8
07:00 AM - 08:00 AM	65.1	79.2	64.4
08:00 AM - 09:00 AM	65.1	83.6	64.4
09:00 AM - 10:00 AM	64.9	73.7	64.4

Leq Average 24 hrs. (dB(A))

64.7

Lmax (dB(A))

84.5

L90 (dB(A))

64.4

Ldn (dB(A))

71.2

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
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Technical Management

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Orawan Rakyong
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Approved by

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Supot Salamteh
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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326798

Date Received : Mar 21, 2023

Date Reported : Mar 28, 2023

Report Number: 2607472-1

Page 1 of 1

Sample Number 2326798-4
Parameter Noise (Leq 24 hrs.)
Location พื้นที่โรงไฟฟ้า (GPS 47P 0669782, 1559176)
Measurement Date Mar 13 - Mar 14, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572552

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	65.0	75.4	64.5
11:00 AM - 12:00 PM	64.8	72.0	64.2
12:00 PM - 01:00 PM	64.7	71.6	64.0
01:00 PM - 02:00 PM	64.5	74.4	63.8
02:00 PM - 03:00 PM	64.4	72.2	63.8
03:00 PM - 04:00 PM	65.6	75.2	64.4
04:00 PM - 05:00 PM	65.0	76.3	64.2
05:00 PM - 06:00 PM	66.2	78.7	64.7
06:00 PM - 07:00 PM	65.1	80.6	64.4
07:00 PM - 08:00 PM	64.8	78.9	64.3
08:00 PM - 09:00 PM	64.7	69.8	64.4
09:00 PM - 10:00 PM	64.7	69.0	64.4
10:00 PM - 11:00 PM	64.6	67.0	64.2
11:00 PM - 12:00 AM	64.7	67.8	64.4
12:00 AM - 01:00 AM	64.8	69.1	64.5
01:00 AM - 02:00 AM	64.8	69.1	64.5
02:00 AM - 03:00 AM	64.9	70.4	64.7
03:00 AM - 04:00 AM	65.1	71.1	64.8
04:00 AM - 05:00 AM	65.4	75.6	65.0
05:00 AM - 06:00 AM	65.6	73.9	65.1
06:00 AM - 07:00 AM	65.7	85.1	65.0
07:00 AM - 08:00 AM	65.3	81.5	64.3
08:00 AM - 09:00 AM	65.0	74.6	64.3
09:00 AM - 10:00 AM	65.1	78.2	64.4

Leq Average 24 hrs. (dB(A))

65.0

Lmax (dB(A))

85.1

L90 (dB(A))

64.4

Ldn (dB(A))

71.5

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป
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Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (6:32PM)



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2326798
Date Received : Mar 21, 2023
Date Reported : Mar 28, 2023
Report Number: 2607473-1

Page 1 of 1

Sample Number 2326798-5
Parameter Noise (Leq 24 hrs.)
Location พื้นที่โรงไฟฟ้า (GPS 47P 0669782, 1559176)
Measurement Date Mar 14 - Mar 15, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572552

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
10:00 AM - 11:00 AM	65.0	75.3	64.4
11:00 AM - 12:00 PM	64.9	75.2	64.1
12:00 PM - 01:00 PM	64.8	72.5	64.0
01:00 PM - 02:00 PM	64.9	74.5	64.2
02:00 PM - 03:00 PM	64.7	76.2	64.1
03:00 PM - 04:00 PM	64.9	80.2	64.3
04:00 PM - 05:00 PM	65.0	72.8	64.3
05:00 PM - 06:00 PM	66.8	92.4	64.4
06:00 PM - 07:00 PM	65.1	74.4	64.3
07:00 PM - 08:00 PM	64.7	74.1	64.3
08:00 PM - 09:00 PM	64.8	78.9	64.3
09:00 PM - 10:00 PM	64.6	75.0	64.2
10:00 PM - 11:00 PM	64.7	83.6	64.3
11:00 PM - 12:00 AM	64.9	71.6	64.5
12:00 AM - 01:00 AM	65.1	68.7	64.8
01:00 AM - 02:00 AM	65.3	74.3	65.0
02:00 AM - 03:00 AM	65.3	70.4	65.0
03:00 AM - 04:00 AM	65.2	70.4	64.9
04:00 AM - 05:00 AM	65.5	68.9	65.1
05:00 AM - 06:00 AM	65.7	73.6	65.2
06:00 AM - 07:00 AM	65.8	78.4	65.0
07:00 AM - 08:00 AM	65.2	79.4	64.5
08:00 AM - 09:00 AM	64.9	73.1	64.4
09:00 AM - 10:00 AM	64.9	74.0	64.3

Leq Average 24 hrs. (dB(A)) 65.1
Lmax (dB(A)) 92.4
L90 (dB(A)) 64.3
Ldn (dB(A)) 71.7
Standard (dB(A)) 70 115

Reference Method : ISO1996-1 and 1996-2

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

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (6:33PM)



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2326798
Date Received : Mar 21, 2023
Date Reported : Mar 28, 2023
Report Number: 2607474-1

Page 1 of 1

Sample Number 2326798-6
Parameter Noise (Leq 24 hrs.)
Location โรงพยาบาลส่งเสริมสุขภาพตำบลเชิงรกรน้อย (GPS 47P 0670745, 1560740)
Measurement Date Mar 10 - Mar 11, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572564

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	55.2	91.0	49.0
01:00 PM - 02:00 PM	56.3	75.5	49.4
02:00 PM - 03:00 PM	53.9	80.0	48.8
03:00 PM - 04:00 PM	55.4	91.1	49.5
04:00 PM - 05:00 PM	55.7	80.8	50.9
05:00 PM - 06:00 PM	57.4	80.4	50.8
06:00 PM - 07:00 PM	56.3	78.7	50.0
07:00 PM - 08:00 PM	52.2	68.4	49.5
08:00 PM - 09:00 PM	52.5	73.1	48.9
09:00 PM - 10:00 PM	50.4	67.5	47.6
10:00 PM - 11:00 PM	51.6	73.2	46.6
11:00 PM - 12:00 AM	49.0	64.3	45.4
12:00 AM - 01:00 AM	48.3	63.1	44.0
01:00 AM - 02:00 AM	46.0	63.0	41.5
02:00 AM - 03:00 AM	47.3	70.2	41.0
03:00 AM - 04:00 AM	47.3	65.1	42.8
04:00 AM - 05:00 AM	48.5	68.4	45.0
05:00 AM - 06:00 AM	53.5	70.8	46.9
06:00 AM - 07:00 AM	60.7	80.2	50.3
07:00 AM - 08:00 AM	56.3	83.7	49.3
08:00 AM - 09:00 AM	54.3	72.6	48.0
09:00 AM - 10:00 AM	54.7	72.3	48.7
10:00 AM - 11:00 AM	58.6	76.4	50.3
11:00 AM - 12:00 PM	54.7	70.7	49.1

Leq Average 24 hrs. (dB(A)) 54.7
Lmax (dB(A)) 91.1
L90 (dB(A)) 48.8
Ldn (dB(A)) 60.0
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

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (6:33PM)



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326798

Date Received : Mar 21, 2023

Date Reported : Mar 28, 2023

Report Number: 2607475-1

Page 1 of 1

Sample Number 2326798-7
Parameter Noise (Leq 24 hrs.)
Location โรงพยาบาลส่งเสริมสุขภาพตำบลเชิงรกรน้อย (GPS 47P 0670745, 1560740)
Measurement Date Mar 11 - Mar 12, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572564

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	53.6	75.2	48.6
01:00 PM - 02:00 PM	52.7	67.7	49.1
02:00 PM - 03:00 PM	54.1	78.9	49.2
03:00 PM - 04:00 PM	54.3	78.1	49.5
04:00 PM - 05:00 PM	54.2	69.3	50.6
05:00 PM - 06:00 PM	55.2	72.1	51.3
06:00 PM - 07:00 PM	55.3	73.3	51.6
07:00 PM - 08:00 PM	53.6	71.6	50.8
08:00 PM - 09:00 PM	51.8	65.3	48.9
09:00 PM - 10:00 PM	51.0	66.4	48.0
10:00 PM - 11:00 PM	50.5	70.9	46.0
11:00 PM - 12:00 AM	48.0	70.2	44.7
12:00 AM - 01:00 AM	47.3	66.8	43.7
01:00 AM - 02:00 AM	46.9	71.4	41.8
02:00 AM - 03:00 AM	47.7	71.4	41.4
03:00 AM - 04:00 AM	46.9	71.9	41.4
04:00 AM - 05:00 AM	47.6	61.9	43.9
05:00 AM - 06:00 AM	53.1	69.7	45.8
06:00 AM - 07:00 AM	59.6	81.0	48.2
07:00 AM - 08:00 AM	56.3	74.8	47.8
08:00 AM - 09:00 AM	54.4	69.8	47.8
09:00 AM - 10:00 AM	54.7	77.1	48.0
10:00 AM - 11:00 AM	53.7	70.0	49.0
11:00 AM - 12:00 PM	55.3	75.7	48.6

Leq Average 24 hrs. (dB(A)) 53.6

Lmax (dB(A)) 81.0

L90 (dB(A)) 48.0

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

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326798

Date Received : Mar 21, 2023

Date Reported : Mar 28, 2023

Report Number: 2607476-1

Page 1 of 1

Sample Number 2326798-8
Parameter Noise (Leq 24 hrs.)
Location โรงพยาบาลส่งเสริมสุขภาพตำบลเชิงรกรน้อย (GPS 47P 0670745, 1560740)
Measurement Date Mar 12 - Mar 13, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572564

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	54.5	70.1	46.8
01:00 PM - 02:00 PM	52.7	70.4	46.9
02:00 PM - 03:00 PM	54.1	75.3	46.7
03:00 PM - 04:00 PM	53.4	71.1	47.8
04:00 PM - 05:00 PM	54.1	70.8	49.7
05:00 PM - 06:00 PM	55.0	71.3	50.9
06:00 PM - 07:00 PM	66.2	87.1	51.4
07:00 PM - 08:00 PM	53.2	67.3	50.2
08:00 PM - 09:00 PM	52.2	74.0	47.9
09:00 PM - 10:00 PM	50.7	67.5	46.9
10:00 PM - 11:00 PM	50.6	72.6	46.4
11:00 PM - 12:00 AM	48.7	71.0	45.3
12:00 AM - 01:00 AM	55.3	77.0	46.2
01:00 AM - 02:00 AM	51.5	77.5	44.8
02:00 AM - 03:00 AM	50.6	58.2	42.5
03:00 AM - 04:00 AM	47.4	66.6	43.9
04:00 AM - 05:00 AM	47.3	64.3	43.6
05:00 AM - 06:00 AM	53.2	72.1	45.6
06:00 AM - 07:00 AM	59.8	80.6	49.1
07:00 AM - 08:00 AM	56.1	74.9	51.3
08:00 AM - 09:00 AM	54.5	76.4	49.4
09:00 AM - 10:00 AM	56.1	77.5	49.6
10:00 AM - 11:00 AM	55.3	71.5	48.2
11:00 AM - 12:00 PM	56.5	77.0	48.1

Leq Average 24 hrs. (dB(A)) 56.2

Lmax (dB(A)) 87.1

L90 (dB(A)) 46.9

Ldn (dB(A)) 60.8

Standard (dB(A)) 70

115

Reference Method : ISO1996-1 and 1996-2

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

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (6:33PM)



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326798

Date Received : Mar 21, 2023

Date Reported : Mar 28, 2023

Report Number: 2607477-1

Page 1 of 1

Sample Number 2326798-9
Parameter Noise (Leq 24 hrs.)
Location โรงพยาบาลส่งเสริมสุขภาพตำบลเชิงรกรน้อย (GPS 47P 0670745, 1560740)
Measurement Date Mar 13 - Mar 14, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572564

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	54.9	73.0	48.8
01:00 PM - 02:00 PM	55.0	72.4	49.6
02:00 PM - 03:00 PM	55.8	80.8	50.9
03:00 PM - 04:00 PM	56.5	74.2	52.6
04:00 PM - 05:00 PM	57.4	77.3	53.4
05:00 PM - 06:00 PM	58.6	84.3	52.6
06:00 PM - 07:00 PM	54.8	71.6	50.0
07:00 PM - 08:00 PM	51.9	66.4	48.7
08:00 PM - 09:00 PM	50.0	70.1	46.8
09:00 PM - 10:00 PM	50.3	64.3	46.6
10:00 PM - 11:00 PM	50.2	65.7	46.5
11:00 PM - 12:00 AM	49.0	66.0	45.3
12:00 AM - 01:00 AM	47.3	59.0	43.9
01:00 AM - 02:00 AM	47.4	59.1	43.4
02:00 AM - 03:00 AM	46.6	60.7	42.5
03:00 AM - 04:00 AM	46.4	64.4	42.1
04:00 AM - 05:00 AM	48.5	66.3	43.9
05:00 AM - 06:00 AM	52.5	68.8	46.5
06:00 AM - 07:00 AM	61.2	83.1	51.4
07:00 AM - 08:00 AM	58.1	76.6	52.9
08:00 AM - 09:00 AM	55.5	74.0	49.6
09:00 AM - 10:00 AM	56.1	75.0	47.7
10:00 AM - 11:00 AM	55.3	72.3	47.4
11:00 AM - 12:00 PM	56.1	76.8	47.4

Leq Average 24 hrs. (dB(A)) 54.9

Lmax (dB(A))

84.3

L90 (dB(A))

47.4

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 และระดับเสียงที่เกิดจากการประกอบกิจการ
โรงงาน พ.ศ. 2548

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (6:34PM)



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326798

Date Received : Mar 21, 2023

Date Reported : Mar 28, 2023

Report Number: 2607478-1

Page 1 of 1

Sample Number 2326798-10
Parameter Noise (Leq 24 hrs.)
Location โรงพยาบาลส่งเสริมสุขภาพตำบลเชิงรกรน้อย (GPS 47P 0670745, 1560740)
Measurement Date Mar 14 - Mar 15, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572564

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
12:00 PM - 01:00 PM	53.5	72.0	48.3
01:00 PM - 02:00 PM	50.9	70.2	46.1
02:00 PM - 03:00 PM	52.0	72.3	46.7
03:00 PM - 04:00 PM	54.2	74.4	49.6
04:00 PM - 05:00 PM	57.8	83.1	49.9
05:00 PM - 06:00 PM	59.8	97.5	49.4
06:00 PM - 07:00 PM	55.2	78.3	50.0
07:00 PM - 08:00 PM	53.3	73.4	49.1
08:00 PM - 09:00 PM	51.7	72.9	48.0
09:00 PM - 10:00 PM	50.1	63.7	46.8
10:00 PM - 11:00 PM	50.0	66.3	46.4
11:00 PM - 12:00 AM	49.2	63.4	45.5
12:00 AM - 01:00 AM	48.1	66.4	43.8
01:00 AM - 02:00 AM	48.3	65.9	43.6
02:00 AM - 03:00 AM	47.2	61.5	42.4
03:00 AM - 04:00 AM	48.1	64.6	43.6
04:00 AM - 05:00 AM	51.1	72.2	44.9
05:00 AM - 06:00 AM	54.0	72.9	47.3
06:00 AM - 07:00 AM	59.0	81.6	51.0
07:00 AM - 08:00 AM	56.9	80.3	52.1
08:00 AM - 09:00 AM	55.4	77.0	49.4
09:00 AM - 10:00 AM	55.1	82.2	48.7
10:00 AM - 11:00 AM	53.1	69.6	47.7
11:00 AM - 12:00 PM	53.5	76.3	47.6

Leq Average 24 hrs. (dB(A)) 54.2

Lmax (dB(A))

97.5

L90 (dB(A))

47.6

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 และระดับเสียงที่เกิดจากการประกอบกิจการ
โรงงาน พ.ศ. 2548

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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S:\Reports_Air Noise.rpt (6:34PM)



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326798

Date Received : Mar 21, 2023

Date Reported : Mar 28, 2023

Report Number: 2607479-1

Page 1 of 1

Sample Number 2326798-11
Parameter Noise (Leq 24 hrs.)
Location โรงเรียนคลองบ้านพร้าว (GPS 47P 0669730, 1557618)
Measurement Date Mar 10 - Mar 11, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572563

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	50.5	72.8	41.6
12:00 PM - 01:00 PM	49.8	72.0	41.1
01:00 PM - 02:00 PM	51.5	72.2	42.7
02:00 PM - 03:00 PM	53.2	79.0	43.8
03:00 PM - 04:00 PM	55.0	76.7	45.8
04:00 PM - 05:00 PM	52.8	74.2	45.4
05:00 PM - 06:00 PM	51.0	70.9	45.7
06:00 PM - 07:00 PM	50.3	73.7	44.9
07:00 PM - 08:00 PM	50.2	70.4	45.3
08:00 PM - 09:00 PM	49.0	73.8	43.4
09:00 PM - 10:00 PM	47.2	71.1	42.1
10:00 PM - 11:00 PM	46.4	67.0	42.4
11:00 PM - 12:00 AM	43.9	62.0	41.3
12:00 AM - 01:00 AM	45.9	70.3	41.1
01:00 AM - 02:00 AM	46.3	66.4	42.0
02:00 AM - 03:00 AM	48.6	67.0	42.3
03:00 AM - 04:00 AM	52.7	70.4	44.7
04:00 AM - 05:00 AM	55.2	74.3	45.6
05:00 AM - 06:00 AM	55.7	74.1	45.9
06:00 AM - 07:00 AM	55.0	80.8	44.5
07:00 AM - 08:00 AM	55.0	77.7	43.3
08:00 AM - 09:00 AM	54.0	77.9	45.4
09:00 AM - 10:00 AM	52.3	69.2	46.5
10:00 AM - 11:00 AM	50.1	74.3	42.0

Leq Average 24 hrs. (dB(A)) 52.0

Lmax (dB(A)) 80.8

L90 (dB(A)) 43.4

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

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326798

Date Received : Mar 21, 2023

Date Reported : Mar 28, 2023

Report Number: 2607480-1

Page 1 of 1

Sample Number 2326798-12
Parameter Noise (Leq 24 hrs.)
Location โรงเรียนคลองบ้านพร้าว (GPS 47P 0669730, 1557618)
Measurement Date Mar 11 - Mar 12, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572563

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	52.4	71.7	42.2
12:00 PM - 01:00 PM	51.5	75.0	41.9
01:00 PM - 02:00 PM	56.4	78.6	45.6
02:00 PM - 03:00 PM	54.8	72.9	48.8
03:00 PM - 04:00 PM	54.5	75.6	48.2
04:00 PM - 05:00 PM	54.0	77.2	48.1
05:00 PM - 06:00 PM	51.7	72.3	47.6
06:00 PM - 07:00 PM	51.3	70.3	48.0
07:00 PM - 08:00 PM	51.4	72.3	47.5
08:00 PM - 09:00 PM	51.6	74.9	47.6
09:00 PM - 10:00 PM	50.1	79.4	46.6
10:00 PM - 11:00 PM	48.9	80.9	43.9
11:00 PM - 12:00 AM	48.1	74.3	43.8
12:00 AM - 01:00 AM	50.9	74.8	42.0
01:00 AM - 02:00 AM	46.0	69.0	41.1
02:00 AM - 03:00 AM	49.1	66.9	43.2
03:00 AM - 04:00 AM	55.1	73.9	44.8
04:00 AM - 05:00 AM	56.8	72.7	50.0
05:00 AM - 06:00 AM	56.0	84.9	45.8
06:00 AM - 07:00 AM	55.4	76.0	47.2
07:00 AM - 08:00 AM	53.9	75.3	44.0
08:00 AM - 09:00 AM	56.4	92.8	47.2
09:00 AM - 10:00 AM	53.4	74.4	44.0
10:00 AM - 11:00 AM	51.7	69.2	43.8

Leq Average 24 hrs. (dB(A)) 53.4

Lmax (dB(A)) 92.8

L90 (dB(A)) 45.6

Ldn (dB(A)) 59.7

Standard (dB(A)) 70

115

Reference Method : ISO1996-1 and 1996-2

Standard : 1. ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ 15 (พ.ศ. 2540) เรื่องกำหนดมาตรฐานระดับเสียงโดยทั่วไป

2. ประกาศกระทรวงอุตสาหกรรม เรื่องกำหนดค่าระดับเสียงการรบกวน และระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน พ.ศ. 2548

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326798

Date Received : Mar 21, 2023

Date Reported : Mar 28, 2023

Report Number: 2607481-1

Page 1 of 1

Sample Number 2326798-13
Parameter Noise (Leq 24 hrs.)
Location โรงเรียนคลองบ้านพร้าว (GPS 47P 0669730, 1557618)
Measurement Date Mar 12 - Mar 13, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572563

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	52.4	75.3	42.9
12:00 PM - 01:00 PM	53.0	77.4	42.5
01:00 PM - 02:00 PM	52.0	75.3	41.9
02:00 PM - 03:00 PM	51.3	73.4	42.3
03:00 PM - 04:00 PM	52.6	74.8	44.8
04:00 PM - 05:00 PM	52.6	74.5	46.7
05:00 PM - 06:00 PM	52.1	79.9	44.5
06:00 PM - 07:00 PM	51.2	86.1	45.1
07:00 PM - 08:00 PM	49.6	72.2	45.5
08:00 PM - 09:00 PM	50.0	76.1	46.6
09:00 PM - 10:00 PM	47.3	64.4	43.2
10:00 PM - 11:00 PM	54.4	78.7	43.5
11:00 PM - 12:00 AM	49.2	71.3	42.1
12:00 AM - 01:00 AM	46.1	66.0	40.4
01:00 AM - 02:00 AM	46.9	66.0	43.1
02:00 AM - 03:00 AM	52.8	82.4	44.4
03:00 AM - 04:00 AM	54.6	73.9	45.4
04:00 AM - 05:00 AM	56.3	79.8	46.3
05:00 AM - 06:00 AM	55.3	75.2	46.4
06:00 AM - 07:00 AM	54.8	79.1	44.2
07:00 AM - 08:00 AM	53.8	79.3	42.9
08:00 AM - 09:00 AM	52.2	73.9	42.4
09:00 AM - 10:00 AM	51.1	70.7	43.7
10:00 AM - 11:00 AM	51.9	73.9	41.5

Leq Average 24 hrs. (dB(A))

52.5

Lmax (dB(A))

86.1

L90 (dB(A))

43.5

Ldn (dB(A))

59.7

Standard (dB(A))

70

115

Reference Method : ISO1996-1 and 1996-2

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

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.

59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2326798

Date Received : Mar 21, 2023

Date Reported : Mar 28, 2023

Report Number: 2607482-1

Page 1 of 1

Sample Number 2326798-14
Parameter Noise (Leq 24 hrs.)
Location โรงเรียนคลองบ้านพร้าว (GPS 47P 0669730, 1557618)
Measurement Date Mar 13 - Mar 14, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572563

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	50.0	74.1	42.1
12:00 PM - 01:00 PM	52.1	76.1	43.1
01:00 PM - 02:00 PM	52.3	78.3	42.9
02:00 PM - 03:00 PM	52.9	74.5	43.5
03:00 PM - 04:00 PM	53.3	77.0	45.3
04:00 PM - 05:00 PM	52.8	75.2	45.3
05:00 PM - 06:00 PM	51.8	72.6	46.2
06:00 PM - 07:00 PM	50.9	73.8	47.0
07:00 PM - 08:00 PM	49.9	69.8	47.2
08:00 PM - 09:00 PM	49.5	71.2	47.0
09:00 PM - 10:00 PM	48.2	63.7	46.2
10:00 PM - 11:00 PM	48.4	74.3	44.8
11:00 PM - 12:00 AM	45.9	67.1	43.0
12:00 AM - 01:00 AM	45.7	62.8	44.0
01:00 AM - 02:00 AM	47.4	68.1	44.2
02:00 AM - 03:00 AM	49.9	67.8	43.3
03:00 AM - 04:00 AM	52.7	72.6	45.1
04:00 AM - 05:00 AM	56.4	78.8	46.9
05:00 AM - 06:00 AM	54.7	75.7	47.8
06:00 AM - 07:00 AM	54.4	75.1	45.2
07:00 AM - 08:00 AM	51.6	71.0	43.6
08:00 AM - 09:00 AM	51.1	69.5	43.2
09:00 AM - 10:00 AM	52.0	74.8	43.3
10:00 AM - 11:00 AM	50.2	72.7	41.7

Leq Average 24 hrs. (dB(A))

51.7

Lmax (dB(A))

78.8

L90 (dB(A))

44.2

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 และระดับเสียงที่เกิดจากการประกอบกิจการ
โรงงาน พ.ศ. 2548

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

Lot ID: 2326798
Date Received : Mar 21, 2023
Date Reported : Mar 28, 2023
Report Number: 2607483-1

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Page 1 of 1

Sample Number 2326798-15
Parameter Noise (Leq 24 hrs.)
Location โรงเรียนคลองบ้านพร้าว (GPS 47P 0669730, 1557618)
Measurement Date Mar 14 - Mar 15, 2023
Measurement by Teeravut Sukdee
Sound Level meter Serial No. 572563

Time	Leq (dB(A))	Lmax (dB(A))	L90 (dB(A))
11:00 AM - 12:00 PM	49.6	68.3	41.6
12:00 PM - 01:00 PM	52.0	78.8	41.4
01:00 PM - 02:00 PM	52.0	78.5	41.9
02:00 PM - 03:00 PM	50.3	72.7	42.5
03:00 PM - 04:00 PM	52.9	71.4	43.5
04:00 PM - 05:00 PM	53.2	76.7	45.4
05:00 PM - 06:00 PM	51.6	80.1	45.4
06:00 PM - 07:00 PM	52.3	81.3	46.8
07:00 PM - 08:00 PM	55.2	70.6	53.6
08:00 PM - 09:00 PM	54.6	76.6	45.9
09:00 PM - 10:00 PM	46.8	70.2	42.1
10:00 PM - 11:00 PM	48.3	68.7	42.9
11:00 PM - 12:00 AM	46.2	61.8	44.3
12:00 AM - 01:00 AM	47.4	74.5	43.3
01:00 AM - 02:00 AM	48.5	78.6	43.6
02:00 AM - 03:00 AM	50.0	74.6	43.8
03:00 AM - 04:00 AM	52.4	68.4	45.2
04:00 AM - 05:00 AM	57.2	72.4	46.8
05:00 AM - 06:00 AM	56.5	75.9	48.3
06:00 AM - 07:00 AM	54.8	76.5	43.9
07:00 AM - 08:00 AM	53.4	76.1	41.2
08:00 AM - 09:00 AM	52.9	74.9	41.5
09:00 AM - 10:00 AM	53.1	72.4	43.3
10:00 AM - 11:00 AM	56.2	79.6	41.5

Leq Average 24 hrs. (dB(A)) 52.9
Lmax (dB(A)) 81.3
L90 (dB(A)) 43.5
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
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โรงงาน พ.ศ. 2548

Technical Management

Orawan R.

Orawan Rakyong
Scientist (3)

Approved by

Supot S.

Supot Salamteh
Section Head

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ภาคผนวก ง-5

คุณภาพน้ำทิ้ง



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 22154201
Date Received : Jan 05, 2023
Date Reported : Jan 12, 2023
Report Number : 2530641-1

Page 1 of 2

Sample Number	22154201-1						
Sampled Date	Jan 05, 2023 8:40 AM						
Sample Description	Wastewater						
Location	บ่อกักน้ำทิ้งสุดท้ายของโครงการ						
Date Analysis Commenced	Jan 06, 2023						
Condition of Sample	Contained in one amber glass bottle and five plastic bottles, 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	0.02	≤2.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Lead	mg/L	0.0003	0.0005	0.001	≤0.2	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	0.61	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2	<2	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O C	Bangkok
COD	mg/L	1.5	5	117	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Color (at Original pH) *	ADMI	-	5	49	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Bangkok
Color (at pH 7.0) *	ADMI	-	5	51	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Bangkok
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	Bangkok

Technical Management

Sawitree N.

Sawitree Naisangiam
Manager

ทะเบียนเลขที่ ว-204-จ-4709

Approved by

Kanok Korn Anek

Kanokkorn Anek
Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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11726-21/ EMAIL



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 22154201
Date Received : Jan 05, 2023
Date Reported : Jan 12, 2023
Report Number : 2530641-1

Page 2 of 2

Sample Number	22154201-1						
Sampled Date	Jan 05, 2023 8:40 AM						
Sample Description	Wastewater						
Location	บ่อกักน้ำทิ้งสุดท้ายของโครงการ						
Date Analysis Commenced	Jan 06, 2023						
Condition of Sample	Contained in one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
pH at 25 degree C *		-	-	8.0	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Residual Free Chlorine *	mg/L	-	0.1	0.3	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-CI (F)	Bangkok
Temperature *	Degree C	-	-	26.5	≤40	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	2508	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
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	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 : Aittipon Yaso ทะเบียนเลขที่ ว-204-จ-7108

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 Naisangiam
Manager

ทะเบียนเลขที่ ว-204-จ-4709

Approved by

Kanok Korn Anek

Kanokkorn Anek
Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 22154201
Date Received : Jan 05, 2023
Date Reported : Jan 12, 2023
Report Number : 2530641-2

Page 1 of 1

Sample Number	22154201-1						
Sampled Date	Jan 05, 2023 8:40 AM						
Sample Description	Wastewater						
Location	บ่อพักน้ำทิ้งสุดท้ายของโครงการ						
Date Analysis Commenced	Jan 06, 2023						
Condition of Sample	Contained in one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.10	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Total Chlorine *	mg/L	-	0.1	1.5	No Standard	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (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 vy :

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

Sawitree N.

Sawitree Noisangiam
Manager

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2310313
- ate Rebelled : 3eD 0c, 202v
- ate Reported : 3eD 14, 202v
Report NumDer : 255v5WWL

Page 1 of 2

Sample Number	2v10v1vv1						
Sampled Date	3eD 0c, 202v 9:v0 AM						
Sample Description	น้ำ asté ater						
Location	สำนักงาน,ตึกบร 15, 3 (H" H						
Date Analysis Commenced	3eD 0W 202v						
Condition of Sample	Contained in one amDer glass Dottle and fiße plastib Dottles, sample containers bompily to pretreatment wpreserBation standards IAP) A, xSEPA&						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.000v	0.0005	0.02	≤2.0	Standard Methods for the EFamination of u ater and u asté ater. AP) A, Au u A 7 u E3, 2vrd ed., 201c, part v125 B, v0v0 3	Bangkok
Lead	mg/L	0.000v	0.0005	Z 0.0005	≤0.2	Standard Methods for the EFamination of u ater and u asté ater. AP) A, Au u A 7 u E3, 2vrd ed., 201c, part v125 B, v0v0 3	Bangkok
Qinb	mg/L	0.00v	0.005	1.12	≤5.0	Standard Methods for the EFamination of u ater and u asté ater. AP) A, Au u A 7 u E3, 2vrd ed., 201c, part v125 B, v0v0 3	Bangkok
Water Testing							
B<- U5 days at 20 degree C&	mg/L	w	2.0	Z 2.0	≤20	Standard Methods for the EFamination of u ater and u asté ater. AP) A, Au u A 7 u E3, 2vrd ed., 201c, part 5210 B, part 4500 w< C	Bangkok
C<-	mg/L	w	25	W	≤120	Standard Methods for the EFamination of u ater and u asté ater. AP) A, Au u A 7 u E3, 2vrd ed., 201c, part 5220 -	Bangkok
Color lat <original p) & *	A- MI	w	5	14	≤v00	Standard Methods for the EFamination of u ater and u asté ater. AP) A, Au u A 7 u E3, 2vrd ed., 201c, part 2120 3	Bangkok
Color lat p) c.0& *	A- MI	w	5	14	≤v00	Standard Methods for the EFamination of u ater and u asté ater. AP) A, Au u A 7 u E3, 2vrd ed., 201c, part 2120 3	Bangkok
<il 7 Grease *	mg/L	w	v	v	≤5	Standard Methods for the EFamination of u ater and u asté ater. AP) A, Au u A 7 u E3, 2vrd ed., 201c, part 5520 B	Bangkok

Technical Management

Sawitree N.

Sa itree Noisangiam
Manager

งะเฒเฒาเลคร์ วะ204จพค09

Approved by

Kanok Korn

Kanok Korn Anek
Senior Manager

งะเฒเฒาเลคร์ วะ204จพค09

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P/O :
Project Name : Monitoring EIA
Project Location: GCRN



Page 1 of 2

Sample Number	232840W1
Sampled Date	Mar 14, 2023 10:20 AM
Sample Description	waste water
Location	บึงน้ำจืด ตำบลหนองบัว (สระ)
Date Analysis Commenced	Mar 15, 2023
Condition of Sample	Contained in one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.02	≤2.0	Standard Methods for the Examination of water and wastewater. APUA, Aw w A F w E7, 23rd ed., 2018, part 3125 B, 3030 7	Bangkok
Lead	mg/L	0.0003	0.0005	0.000W	≤0.2	Standard Methods for the Examination of water and wastewater. APUA, Aw w A F w E7, 23rd ed., 2018, part 3125 B, 3030 7	Bangkok
Zinc	mg/L	0.003	0.005	4.1W	≤5.0	Standard Methods for the Examination of water and wastewater. APUA, Aw w A F w E7, 23rd ed., 2018, part 3125 B, 3030 7	Bangkok
Water Testing							
BOD H5 days at 20 degree Cx	mg/L	-	2.0	2.1	≤20	Standard Methods for the Examination of water and wastewater. APUA, Aw w A F w E7, 23rd ed., 2018, part 5210 B, part 4500 - O C	Bangkok
COD	mg/L	-	25	68	≤120	Standard Methods for the Examination of water and wastewater. APUA, Aw w A F w E7, 23rd ed., 2018, part 5220 D	Bangkok
Color Hdt Original pUx <	ADMI	-	5	14	≤300	Standard Methods for the Examination of water and wastewater. APUA, Aw w A F w E7, 23rd ed., 2018, part 2120 7	Bangkok
Color Hdt pU 8.0x <	ADMI	-	5	15	≤300	Standard Methods for the Examination of water and wastewater. APUA, Aw w A F w E7, 23rd ed., 2018, part 2120 7	Bangkok
Oil F Grease <	mg/L	-	3	* 3	≤5	Standard Methods for the Examination of water and wastewater. APUA, Aw w A F w E7, 23rd ed., 2018, part 5520 B	Bangkok

Savitree N.
Savitree Noisangiam
Manager
☎ ๒๕๖๒ ๒-204-๓-4809

Kanokkorn Anek
Senior Manager
☎ โทร. 02-204-6111

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P/O :
Project Name : Monitoring EIA
Project Location: GCRN



Page 2 of 2

Sample Number	232840W1
Sampled Date	Mar 14, 2023 10:20 AM
Sample Description	waste water
Location	พื้นที่ข้างใต้ของอาคาร (ภายใน)
Date Analysis Commenced	Mar 15, 2023
Condition of Sample	Contained in one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards HAPUA-1-SFP4x

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
pU at 25 degree C <		-	-	8.2	5.5-9.0	In-house method : STM 04-003 based on Standard Methods for the E8amination of w ater and wasteuater. APUA, Aw w A F w E7, 23rd ed., 2018, part 4500 - U Hx	Bangkok
Residual Free Chlorine <	mg/L	-	0.1	* 0.1	≤1.0	Standard Methods for the E8amination of water and wasteuater. APUA, Aw w A F w E7, 23rd ed., 2018, part 4500-Cl Hx	Bangkok
Temperature <	Degree C	-	-	2W8	≤40	Standard Methods for the E8amination of water and wasteuater. APUA, Aw w A F w E7, 23rd ed., 2018, part 2550 B	Bangkok
Total Chlorine <	mg/L	-	0.1	0.3	No Standard	Based on Standard Methods for the E8amination of water and wasteuater. APUA, Aw w A F w E7, 23rd ed., 2018, part 4500-Cl Hx	Bangkok
Total Dissolved solids Dried at 1V0 degree C	mg/L	-	5	2496	≤3000	Standard Methods for the E8amination of water and wasteuater. APUA, Aw w A F w E7, 23rd ed., 2018, part 2540 C	Bangkok
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	6	≤50	Standard Methods for the E8amination of water and wasteuater. APUA, Aw w A F w E7, 23rd ed., 2018, part 2540 D	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 estate park set by Notification of The Ministry of Industry dated June 08, B.E.2560 H018x.

Sampling By : Aittipon Yaso^{*} “๕”๑๔”๓-204-z-810W

Remark :

- LOD : Limit of Detection
- "n" : Lower than LOQ Limit of Quantitation/ LOR Limit of Reporting
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Savitree N.
Savitree Noisangiam
Manager
☎ โทร ๐๖-๒๐๔-๓-๔๘๐๙

Kanok Korn Anek
Senior Manager
๖๕๔๒๓๑๗-๖-๒๐๔-ร-๖๑๑๑

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P/O :
Project Name : Monitoring EIA
Project Location: GCRN



Page 1 of 1

Sample Number	2F2v408□□
Sampled Date	Mar 14, 202F 10:20 AM
Sample Description	- asteWater
Location	พมฉำพำน้ำพุส่ำด ฝั บำลัษั ด
Date Analysis Commenced	Mar 15, 202F
Condition of Sample	Contained in one amcer glass cottle and fife plasti7 cottles, sample 7ontainers 7omply to pretreatment Dpreser3ation standards

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.00F	0.005	0.15	No Standard	Standard Methods for the Examination of Water and Wastewater: AP(A, A- x - E8, 2Frd ed., 201v, part F125 B, F0F0 &	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 09, B.E.2560 2017U

Remark :

- LYb : Limit of detection
- Q Q : Lower than LYb Limit of Quantitation/ LYR Limit of Reporting
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- The laboratory has been accredited as an accredited laboratory complying with the ISO/IEC 17025.

Approved by

Saimitree N.

SaWtree Noisangiam
Manager

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P/O :
Project Name : Monitoring EIA
Project Location: GCRN



Page 1 of 2

Sample Number	2337397-1
Sampled Date	Apr 04, 2023 9:10 AM
Sample Description	Wastewater
Location	บ่อพักน้ำทิ้งสุดท้ายของโครงการ
Date Analysis Commenced	Apr 05, 2023
Condition of Sample	Contained in two glass vials, two amber glass bottles and nine plastic bottles, 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	0.01	≤2.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Lead	mg/L	0.0003	0.0005	<0.0005	≤0.2	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	0.85	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
BOD (5 days at 20 degree C)	mg/L	-	2.0	2.1	≤20	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5210 B, part 4500 - O C	Bangkok
COD	mg/L	-	25	48	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Color (at Original pH) *	ADMI	-	5	13	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Bangkok
Color (at pH 7.0) *	ADMI	-	5	13	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Bangkok
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	Bangkok

Technical Management

Saumitree N

Sawitree Noisangiam
Manager
ทะเบียนเลขที่ ๖-204-๖-4709

Approved by

Leak Leak

Kanokkorn Anek
Senior Manager

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TESTING
No.0009

Lot ID: 2337397
Date Received : Apr 04, 2023
Date Reported : Apr 19, 2023
Report Number : 2611970-1 C12-1

Page 2 of 2

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
pH at 25 degree C *		-	-	6.9	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
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)	Bangkok
Temperature *	Degree C	-	-	30.9	≤40	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	2508	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	7	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	Bangkok

Remark :

- LOD : Limit of Detection
- "<" : Lower than LOQ (Limit of Quantitation) / LOR (Limit of Reporting)
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Sawitree N.
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TESTING
No.0009

Lot ID: 2337397
 Date Received : Apr 04, 202F
 Date Reported : Apr 1D, 202F
 Report Number : 26119c0v2

Page 1 of 1

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.00F	0.005	0.10	No Standard	Standard Methods for the Examination of Water and Wastewater, APHA, 18th ed., 2011, part 3125 B, F0F0 &	Bangkok
Water Testing							
Conductivity at 25 degree C *	microhmhos/cm		0.5	F45D	No Standard	Based on Standard Methods for the Examination of Water and Wastewater, APHA, 18th ed., 2011, part 2510 B	Bangkok
Turbidity *	mg/L	0.5	1.0	Not detected	No Standard	Inhouse method Based on United States Environmental Protection Agency, EPA Method 8150 b	Bangkok

Remark :

- LOB : Limit of detection
- "<" : Lower than LOQ Limit of Quantitation/ LOR Limit of Reporting
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SaVMtree Noisangiam
Manager

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location: GCRN



TESTING
No.0009
Lot ID: 2339461
Date Received : May 25, 2023
Date Reported : Jun 01, 2023
Report Number : 2617314-1 C12-1

Page 1 of 2

Sample Number 2339461-1
Sampled Date May 25, 2023 8:35 AM
Sample Description Wastewater
Location บ่อพักน้ำทิ้งสุดท้ายของโครงการ
Date Analysis Commenced May 26, 2023
Condition of Sample Contained in one amber glass bottle and five plastic bottles, 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	0.02	≤2.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Lead	mg/L	0.0003	0.0005	<0.0005	≤0.2	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	0.84	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
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 C	Bangkok
COD	mg/L	-	25	66	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Color (at Original pH) *	ADMI	-	5	8	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Bangkok
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	Bangkok
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	Bangkok

Technical Management

Savitree N.

Savitree Noisangiam
Manager

ทะเบียนเลขที่ ว-204-จ-4709

Approved by

Kanok Korn Anek

Kanok Korn Anek
Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location: GCRN



TESTING
No.0009
Lot ID: 2339461
Date Received : May 25, 2023
Date Reported : Jun 01, 2023
Report Number : 2617314-1 C12-1

Page 2 of 2

Sample Number 2339461-1
Sampled Date May 25, 2023 8:35 AM
Sample Description Wastewater
Location บ่อพักน้ำทิ้งสุดท้ายของโครงการ
Date Analysis Commenced May 26, 2023
Condition of Sample Contained in one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
pH at 25 degree C *	-	-	-	7.7	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Residual Free Chlorine *	mg/L	-	0.1	0.2	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Bangkok
Temperature *	Degree C	-	-	30.3	≤40	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	2976	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	6	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	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).

Sampled By : Aittipon Yaso

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

Savitree N.

Savitree Noisangiam
Manager

ทะเบียนเลขที่ ว-204-จ-4709

Approved by

Kanok Korn Anek

Kanok Korn Anek
Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location: GCRN



TESTING
No.0009

Lot ID: 2339461
Date Received : May 25, 2023
Date Reported : Jun 01, 2023
Report Number : 2617314-2 C12-1

Page 1 of 1

Sample Number 2339461-1
Sampled Date May 25, 2023 8:35 AM
Sample Description Wastewater
Location บ่อพักน้ำทิ้งสุดท้ายของโครงการ
Date Analysis Commenced May 26, 2023
Condition of Sample Contained in one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.003	0.005	0.10	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Total Chlorine *	mg/L	-	0.1	0.6	No Standard	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (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).

Sampled By : Aittipon Yaso

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.

Approved by

Sawitree N.

Sawitree Naisangiam
Manager

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location: GCRN



TESTING
No.0009

Lot ID: 2355085
Date Received : Jun 13, 2023
Date Reported : Jun 20, 2023
Report Number : 2651521-1

Page 1 of 2

Sample Number 2355085-1
Sampled Date Jun 13, 2023 9:30 AM
Sample Description Wastewater
Location บ่อพักน้ำทิ้งสุดท้ายของโครงการ
Date Analysis Commenced Jun 14, 2023
Condition of Sample Contained in one amber glass bottle and five plastic bottles, 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	0.02	≤2.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Lead	mg/L	0.0003	0.0005	0.0006	≤0.2	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	0.71	≤5.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
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	Bangkok
COD	mg/L	-	25	55	≤120	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5220 D	Bangkok
Color (at Original pH) <	ADMI	-	5	11	≤300	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2120 F	Bangkok
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	Bangkok
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	Bangkok

Technical Management

Sawitree N.

Sawitree Naisangiam
Manager

ทะเบียนเลขที่ ว-204-จ-4709

Approved by

Kanokorn Anek

Kanokorn Anek
Senior Manager

ทะเบียนเลขที่ ว-204-ค-6111

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2355085
Date Received : Jun 13, 2023
Date Reported : Jun 20, 2023
Report Number : 2651521-1

Page 2 of 2

Sample Number	2355085-1
Sampled Date	Jun 13, 2023 9:30 AM
Sample Description	Wastewater
Location	บ่อพักน้ำทิ้งสุดท้ายของโครงการ
Date Analysis Commenced	Jun 14, 2023
Condition of Sample	Contained in one amber glass bottle and five plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
pH at 25 degree C <		-	-	6.8	5.5-9.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Residual Free Chlorine <	mg/L	-	0.1	0.3	≤1.0	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Bangkok
Temperature <	Degree C	-	-	31.9	≤40	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Bangkok
Total Dissolved solids Dried at 180 degree C	mg/L	-	5	2384	≤3000	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok
Total Suspended Solids Dried at 103-105 degree C	mg/L	-	5	7	≤50	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D	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 : Aittipon Yaso ทะเบียนเลขที่ 7-204-จ-7108

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

Savitree N.

Savitree Noisangiam

Manager

ทะเบียนเลขที่ 7-204-จ-4709

Approved by

Kanok Korn Anek

Kanok Korn Anek

Senior Manager

ทะเบียนเลขที่ 7-204-ก-6111

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2355085
bate Re/te3ed : Jun 1F, 202F
bate Reported : Jun 20, 202F
Report Numcer : 2651521D2

Page 1 of 1

Sample Number	2F550v5Q
Sampled Date	Jun 1F, 202F 9:F0 AM
Sample Description	8 aste- ater
Location	บ่อพักน้ำทิ้งสุดท้ายของโครงการ
Date Analysis Commenced	Jun 14, 202F
Condition of Sample	Contained in one amcer glass cottle and fi3e plasti7 cottes, sample 7ontainers 7omply to pretreatment Dpreser3ation standards ๗AP7 A7 (SEPAH

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Iron	mg/L	0.00F	0.005	0.1F	No Standard	Standard Methods for the ELamination of 8 ater and 8 aste- ater. AP7 A, A8 8 A) 8 Ex, 2Frd ed., 201&, part F125 B, F0F0 x	Bangkok
Water Testing							
Total Chlorine *	mg/L	D	0.1	0.F	No Standard	Based on Standard Methods for the ELamination of 8 ater and 8 aste- ater. AP7 A, A8 8 A) 8 Ex, 2Frd ed., 201&, part 4500D2 ๗H	Bangkok

Guideline : Effluent standard for fa7ories, industrial estate and industrial park set cy Notifi7ation of the Ministry of Natural Resour7e and En3ironment and effluent standard for fa7ories and industrial park set cy Notifi7ation of The Ministry of Industry dated June 0&, B.E.2560 ๗201&H

Sampling yy : Aittipon Yaso

Remark :
- LOB : Limit of betetion
- " < " : Lo- er than LOQ ๗Limit of QuantitationH/ LOR ๗Limit of ReportingH
- Analyte๗Hmarked * is/are not in7luded in s7ope of A77reditation ISO/IEC 1&025.
- The lacoratory has ceen a77epted as an a77redited lacoratory 7omplying - ith the ISO/IEC 1&025.

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ApproBd by

Savitree N.

Sa- itree Noisangiam

Manager

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ภาคผนวก ง-6

คุณภาพน้ำผิวดิน



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2319341
Date Received : Feb 21, 2023
Date Reported : Feb 25, 2023
Report Number : 2573371-1

Page 1 of 6

Sample Number 2319341-1
Sampled Date Feb 21, 2023 9:45 AM
Sample Description Surface water
Location แม่น้ำเจ้าพระยาที่ 500 เมตรเหนือจุดสูบน้ำของโครงการ
Date Analysis Commenced Feb 22, 2023
Condition of Sample Contained in one amber glass bottle, two BOD bottles and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.002	≤0.10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Iron	mg/L	0.003	0.005	0.33	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.05	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	0.006	≤1	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Dissolved Oxygen *	mg/L	-	0.1	5.2	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Bangkok
Oil & Grease	mg/L	-	3	3	No Standard	In-house method : STM 04-014 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C	-	-	-	7.8	5.0-9.0	In-house method : STM 04-003 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Residual Free Chlorine *	mg/L	-	0.1	<0.1	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Bangkok

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Approved by

Chanatt L.

Chanattagarn Imchom
Supervisor

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2319341
Date Received : Feb 21, 2023
Date Reported : Feb 25, 2023
Report Number : 2573371-1

Page 2 of 6

Sample Number 2319341-1
Sampled Date Feb 21, 2023 9:45 AM
Sample Description Surface water
Location แม่น้ำเจ้าพระยาที่ 500 เมตรเหนือจุดสูบน้ำของโครงการ
Date Analysis Commenced Feb 22, 2023
Condition of Sample Contained in one amber glass bottle, two BOD bottles and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Temperature *	Degree C	-	-	29.1	n'	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Bangkok
Total Chlorine *	mg/L	-	0.1	<0.1	No Standard	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Bangkok
Total Dissolved solids Dried at 180 degree C *	mg/L	-	5	204	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok

Guideline : Notification of the National Environmental Board, No. 8, B.E.2537 issued under the Enhancement and Conservation of National Environmental Quality Act. B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 3)

n': Change from Natural condition not more than 3 degree C

n : Not Change from natural condition

Sampling By : Aittipon Yaso

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.

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Chanatt L.

Chanattagarn Imchom
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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2319341
Date Received : Feb 21, 2023
Date Reported : Feb 25, 2023
Report Number : 2573371-1

Page 3 of 6

Sample Number 2319341-2
Sampled Date Feb 21, 2023 9:55 AM
Sample Description Surface water
Location แม่น้ำเจ้าพระยาบริเวณจุดสูบ - ระบายน้ำของโครงการ
Date Analysis Commenced Feb 22, 2023
Condition of Sample Contained in one amber glass bottle, two BOD bottles and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.002	≤0.10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Iron	mg/L	0.003	0.005	0.39	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Lead	mg/L	0.0003	0.0005	Not Detected	≤0.05	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	<0.005	≤1	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Dissolved Oxygen *	mg/L	-	0.1	4.7	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Bangkok
Oil & Grease	mg/L	-	3	3	No Standard	In-house method : STM 04-014 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C	-	-	-	7.8	5.0-9.0	In-house method : STM 04-003 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Residual Free Chlorine *	mg/L	-	0.1	<0.1	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Bangkok

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Approved by

Chanatt L.

Chanattagarn Imchom
Supervisor

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11726-21/ EMAIL



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2319341
Date Received : Feb 21, 2023
Date Reported : Feb 25, 2023
Report Number : 2573371-1

Page 4 of 6

Sample Number 2319341-2
Sampled Date Feb 21, 2023 9:55 AM
Sample Description Surface water
Location แม่น้ำเจ้าพระยาบริเวณจุดสูบ - ระบายน้ำของโครงการ
Date Analysis Commenced Feb 22, 2023
Condition of Sample Contained in one amber glass bottle, two BOD bottles and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Temperature *	Degree C	-	-	28.8	n'	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Bangkok
Total Chlorine *	mg/L	-	0.1	<0.1	No Standard	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Bangkok
Total Dissolved solids Dried at 180 degree C *	mg/L	-	5	194	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok

Guideline : Notification of the National Environmental Board, No. 8, B.E.2537 issued under the Enhancement and Conservation of National Environmental Quality Act. B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 3)

n': Change from Natural condition not more than 3 degree C

n : Not Change from natural condition

Sampling By : Aittipon Yaso

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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Approved by

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Chanattagarn Imchom
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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN



Lot ID: 2319341
Date Received : Feb 21, 2023
Date Reported : Feb 25, 2023
Report Number : 2573371-1

Page 5 of 6

Sample Number	2319341-3						
Sampled Date	Feb 21, 2023 10:05 AM						
Sample Description	Surface water						
Location	แม่น้ำเจ้าพระยาที่ 500 เมตรท้ายจุดสูบน้ำของโครงการ						
Date Analysis Commenced	Feb 22, 2023						
Condition of Sample	Contained in one amber glass bottle, two BOD bottles and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.0003	0.0005	0.003	≤0.10	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Iron	mg/L	0.003	0.005	0.33	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Lead	mg/L	0.0003	0.0005	<0.0005	≤0.05	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	0.005	≤1	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 3125 B, 3030 F	Bangkok
Water Testing							
Dissolved Oxygen *	mg/L	-	0.1	5.0	≥4	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-O (C)	Bangkok
Oil & Grease	mg/L	-	3	<3	No Standard	In-house method : STM 04-014 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 5520 B	Bangkok
pH at 25 degree C	-	-	-	7.8	5.0-9.0	In-house method : STM 04-003 based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H (B)	Bangkok
Residual Free Chlorine *	mg/L	-	0.1	<0.1	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Bangkok

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN



Lot ID: 2319341
Date Received : Feb 21, 2023
Date Reported : Feb 25, 2023
Report Number : 2573371-1

Page 6 of 6

Sample Number	2319341-3						
Sampled Date	Feb 21, 2023 10:05 AM						
Sample Description	Surface water						
Location	แม่น้ำเจ้าพระยาที่ 500 เมตรท้ายจุดสูบน้ำของโครงการ						
Date Analysis Commenced	Feb 22, 2023						
Condition of Sample	Contained in one amber glass bottle, two BOD bottles and two plastic bottles, sample containers comply to pretreatment - preservation standards (APHA, USEPA)						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Temperature *	Degree C	-	-	28.9	n'	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2550 B	Bangkok
Total Chlorine *	mg/L	-	0.1	<0.1	No Standard	Based on Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl (F)	Bangkok
Total Dissolved solids Dried at 180 degree C *	mg/L	-	5	204	No Standard	Standard Methods for the Examination of Water and Wastewater. APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C	Bangkok

Guideline : Notification of the National Environmental Board, No. 8, B.E.2537 issued under the Enhancement and Conservation of National Environmental Quality Act. B.E.2535, published in the Royal Government Gazette, Vol. 111, Part 16, Dated February 24, B.E. 2537 (Class 3)

n': Change from Natural condition not more than 3 degree C

n : Not Change from natural condition

Sampling By : Aittipon Yaso

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2339416
bated Re3eIDed : May 25, 202F
bated Reported : May F0, 202F
Report Num7er : 2616c94v1

Page 1 of 6

Sample Number	2FF9416v1						
Sampled Date	May 25, 202F 9:20 AM						
Sample Description	Surfa3e - ater						
Location	พมณเฑาะฐะ ๒๖00 เดื พด๑ห๑อ๑ล๑พ๑ ๑๑๑ม๑ น๑น๑น๑น๑ พ						
Date Analysis Commenced	May 26, 202F						
Condition of Sample	Contained in t- o nBb 7ottles, one am7er glass 7ottle and t- o plasti3 7ottles, sample 3ontainers 3omply to pretreatment v preserDation standards QAP(A, HSEPAU						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.000F	0.0005	0.002	Z 0.10	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part F125 n, F0F0 &	nangkok
Iron	mg/L	0.00F	0.005	0.26	No Standard	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part F125 n, F0F0 &	nangkok
Lead	mg/L	0.000F	0.0005	* 0.0005	Z 0.05	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part F125 n, F0F0 &	nangkok
๑n3	mg/L	0.00F	0.005	0.006	Z 1	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part F125 n, F0F0 &	nangkok
Water Testing							
bissolDed B)ygen 8	mg/L	v	0.1	5.c	<4	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part 4500v ๑U	nangkok
Bil WGRease	mg/L	v	F	* F	No Standard	Inhouse method : STM 04v014 7ased on Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part 5520 n	nangkok
p(at 25 degree C		v	v	๑F	5.0v9.0	Inhouse method : STM 04v00F 7ased on Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part 4500 v(๑U	nangkok
Residual 8ree Chlorine 8	mg/L	v	0.1	* 0.1	No Standard	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part 4500v ๑U	nangkok

The a7oDe results are Delid only for the analyzed/tested sample๑Uas ind3tated in this report. No part of this report or 3ertif3ate may 7e reproduced in any form - lthout - ritten 3onsent from the La7oratory. ALS La7oratory Group (Thailand) strongly re3ommends that this report is not reproduced 3ept in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2339416
bated Re3eIDed : May 25, 202F
bated Reported : May F0, 202F
Report Num7er : 2616c94v1

Page 2 of 6

Sample Number	2FF9416v1						
Sampled Date	May 25, 202F 9:20 AM						
Sample Description	Surfa3e - ater						
Location	พมณเฑาะฐะ ๒๖00 เดื พด๑ห๑อ๑ล๑พ๑ ๑๑๑ม๑ น๑น๑น๑น๑ พ						
Date Analysis Commenced	May 26, 202F						
Condition of Sample	Contained in t- o nBb 7ottles, one am7er glass 7ottle and t- o plasti3 7ottles, sample 3ontainers 3omply to pretreatment v preserDation standards QAP(A, HSEPAU						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Temperature 8	egree C	v	v	F2.6	n'	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part 2550 n	nangkok
Total Chlorine 8	mg/L	v	0.1	* 0.1	No Standard	nased on Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part 4500v ๑U	nangkok
Total bissolDed solids bried at 1๐0 degree C 8	mg/L	v	5	162	No Standard	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201๑, part 2540 C	nangkok

Guideline : Notifi3ation of the National EnDronmental noard, No. c, n.E.25F๑ issued under the Enhance3ment and ConserDation of National EnDronmental Quality A3t. n.E.25F5, pu7lished in the Royal GoDernment Gazette, Vol. 111, Part 16, bated 8e7ruary 24, n.E. 25F๑ Class FU
n': Change from Natural 3ondition not more than F degree C
n : Not Change from natural 3ondition
Sampling By : Aittipon Yaso

Remark :

- LBb : Limit of bete3tion
- " " : Lo- er than LBQ Qlimit of QuantitationU/ LBR Qlimit of ReportingU
- Analyte๑Umarked 8 is/are not in3luded in s3ope of A33reditation ISB/IEC 1๑025.
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Analysis / Test Report

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59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2339416
bated Re3eiDed : May 25, 202F
bated Reported : May F0, 202F
Report Num7er : 2616c94v1

Page F of 6

Sample Number	2FF9416v2						
Sampled Date	May 25, 202F 9:55 AM						
Sample Description	Surfa3e - ater						
Location	พฒณำวำง พช. พวมลจลลส วทง. ะ. นมป มงโพศ พ						
Date Analysis Commenced	May 26, 202F						
Condition of Sample	Contained in t- o nBb 7ottles, one am7er glass 7ottle and t- o plasti 7ottles, sample 3ontainers 3omply to pretreatment v preserDation standards QAP(A, HSEPAU						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.000F	0.0005	0.002	Z 0.10	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part F125 n, F0F0 &	nantkok
Iron	mg/L	0.00F	0.005	0.25	No Standard	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part F125 n, F0F0 &	nantkok
Lead	mg/L	0.000F	0.0005	Not bete3ted	Z 0.05	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part F125 n, F0F0 &	nantkok
3in3	mg/L	0.00F	0.005	0.005	Z 1	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part F125 n, F0F0 &	nantkok
Water Testing							
bissolDed B)ygen 8	mg/L	v	0.1	5.≤	<4	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part 4500B QIU	nantkok
Bil WGrease	mg/L	v	F	* F	No Standard	Inhouse method : STM 04v014 7ased on Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part 5520 n	nantkok
p(at 25 degree C		v	v	≤F	5.0v9.0	Inhouse method : STM 04v00F 7ased on Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part 4500 v(QIU	nantkok
Residual 8ree Chlorine 8	mg/L	v	0.1	* 0.1	No Standard	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part 4500vCI QIU	nantkok

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN



TESTING
No.0009
Lot ID: 2339416
bated Re3eiDed : May 25, 202F
bated Reported : May F0, 202F
Report Num7er : 2616c94v1

Page 4 of 6

Sample Number	2FF9416v2						
Sampled Date	May 25, 202F 9:55 AM						
Sample Description	Surfa3e - ater						
Location	พฒณำวำง พช. พวมลจลลส วทง. ะ. นมป มงโพศ พ						
Date Analysis Commenced	May 26, 202F						
Condition of Sample	Contained in t- o nBb 7ottles, one am7er glass 7ottle and t- o plasti 7ottles, sample 3ontainers 3omply to pretreatment v preserDation standards QAP(A, HSEPAU						

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Temperature 8	egree C	v	v	F2.≤	n'	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part 2550 n	nantkok
Total Chlorine 8	mg/L	v	0.1	* 0.1	No Standard	nased on Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part 4500vCI QIU	nantkok
Total bissolDed solids bried at 1c0 degree C 8	mg/L	v	5	1F2	No Standard	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E8, 2Frd ed., 201≤, part 2540 C	nantkok

Guideline : Notifi3ation of the National EnDronmental noard, No. c., n.E.25F≤ issued under the Enhance3ment and ConserDation of National EnDronmental Quality A3t. n.E.25F5, pu7lished in the Royal GoDernment Gazette, Vol. 111, Part 16, bated 8e7ruary 24, n.E. 25F≤ Class FU
n': Change from Natural 3ondition not more than F degree C
n : Not Change from natural 3ondition
Sampling By : Aittipon Yaso

Remark :

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN



Lot ID: 2339416

bate Re3eiDed : May 25, 202F
bate Reported : May F0, 202F
Report Num7er : 2616c94v1

Page 5 of 6

Sample Number	2FF9416V
Sampled Date	May 25, 202F 10:10 AM
Sample Description	Surfa3e - ater
Location	พมณเฝ้า ๒๕๐0 เด พวจาออสพท : ๒ ันนิ นวโพค พ
Date Analysis Commenced	May 26, 202F
Condition of Sample	Contained in t- o nBb 7ottles, one am7er glass 7ottle and t- o plasti3 7ottles, sample 3ontainers 3omply to pretreatment v preserDation standards QAP(A, HSEPAU

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Metals Testing							
Copper	mg/L	0.000F	0.0005	0.001	Z 0.10	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part F125 n, F0F0 &	nantkok
Iron	mg/L	0.00F	0.005	0.F1	No Standard	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part F125 n, F0F0 &	nantkok
Lead	mg/L	0.000F	0.0005	* 0.0005	Z 0.05	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part F125 n, F0F0 &	nantkok
≥in3	mg/L	0.00F	0.005	Not bete3ted	Z 1	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part F125 n, F0F0 &	nantkok
Water Testing							
bissolDed B)ygen 8	mg/L	v	0.1	5.c	<4	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part 4500B QU	nantkok
Bil WGrease	mg/L	v	F	* F	No Standard	Inhouse method : STM 04v014 7ased on Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part 5520 n	nantkok
p(at 25 degree C		v	v	≤6	5.0v9.0	Inhouse method : STM 04v00F 7ased on Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part 4500 v(QU	nantkok
Residual &ree Chlorine 8	mg/L	v	0.1	* 0.1	No Standard	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part 4500vCI QU	nantkok

The a7oDe results are Delid only for the analyzed/tested sampleQJas ind3tated in this report. No part of this report or 3ertif3ate may 7e reproduced in any form - lthout - ritten 3onsent from the La7oratory. ALS La7oratory Group (Thailand) strongly re3ommends that this report is not reproduced e)3ept in full.

Approved by

Savitree N.

Sa- itree Noisangiam
Manager

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11:26v21/ EMAIL



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN



Lot ID: 2339416

bate Re3eiDed : May 25, 202F
bate Reported : May F0, 202F
Report Num7er : 2616c94v1

Page 6 of 6

Sample Number	2FF9416V
Sampled Date	May 25, 202F 10:10 AM
Sample Description	Surfa3e - ater
Location	พมณเฝ้า ๒๕๐0 เด พวจาออสพท : ๒ ันนิ นวโพค พ
Date Analysis Commenced	May 26, 202F
Condition of Sample	Contained in t- o nBb 7ottles, one am7er glass 7ottle and t- o plasti3 7ottles, sample 3ontainers 3omply to pretreatment v preserDation standards QAP(A, HSEPAU

Analyte	Unit	LOD	LOQ (LOR)	Result	Guideline / Specification	Method	Testing Location
Water Testing							
Temperature 8	egree C	v	v	F2.≤	n'	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part 2550 n	nantkok
Total Chlorine 8	mg/L	v	0.1	* 0.1	No Standard	nased on Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part 4500vCI QU	nantkok
Total bissolDed solids bried at 1c0 degree C 8	mg/L	v	5	150	No Standard	Standard Methods for the E)amination of x ater and x aste- ater. AP(A, Ax x A Wx E&, 2Frd ed., 201< part 2540 C	nantkok

Guideline : Notifi3ation of the National EnDronmental noard, No. c., n.E.25F< issued under the Enhance3ment and ConserDation of National EnDronmental Quality A3t. n.E.25FS, pu7lished in the Royal GoDernment Gazette, Vol. 111, Part 16, bated 8e7ruary 24, n.E. 25F< Class FU
n': Change from Natural 3ondition not more than F degree C
n : Not Change from natural 3ondition
Sampling By : Aittipon Yaso

Remark :

- LBb : Limit of bete3tion
- " " : Lo- er than LBQ Qlimit of QuantitationU/ LBR Qlimit of ReportingU
- AnalyteQJmarked 8 is/are not in3luded in s3ope of A33reditation ISB/IEC 1<025.
- The la7oratory has 7een a33e3ted as an a33redited la7oratory 3omplying - lth the ISB/IEC 1<025.

The a7oDe results are Delid only for the analyzed/tested sampleQJas ind3tated in this report. No part of this report or 3ertif3ate may 7e reproduced in any form - lthout - ritten 3onsent from the La7oratory. ALS La7oratory Group (Thailand) strongly re3ommends that this report is not reproduced e)3ept in full.

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Savitree N.

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ภาคผนวก ง-7

นิเวศวิทยาในน้ำ



สถานีวิจัยประมงศรีราชา
101/12 หมู่ 9 ต. บางพระ
อ. ศรีราชา จ. ชลบุรี 20110
โทร./โทรสาร. (038) 311379

Client : Gulf JP CRN Co., Ltd.

Address : 59/4 Moo 4 Chiang Rak Noi, Sam Khok, Pathumthani, Thailand, 12160

Project Name : Monitoring EIA

Project Location : GCRN

รายงานผลการวิเคราะห์แพลงก์ตอนพืช

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลิตร)		
	2339478-1	2339478-2	2339478-3
Division Cyanophyta			
Class Cyanophyceae			
Order Chroococcales			
Family Chroococcaceae			
1. <i>Chroococcus minutus</i>	-	-	13
2. <i>Microcystis aeruginosa</i>	-	21	26
Order Nostocales			
Family Oscillatoriaceae			
3. <i>Lyngbya contorta</i>	2,652	1,040	1,114
4. <i>Lyngbya</i> sp.	31	-	13
5. <i>Oscillatoria</i> sp.	1,716	560	98
6. <i>Oscillatoria tenuis</i>	-	7	-
7. <i>Spirulina platensis</i>	-	21	20

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566)

(ต่อ)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลิตร)		
	2339478-1	2339478-2	2339478-3
Family Nostocaceae			
8. <i>Anabaena azollae</i>	-	14	-
9. <i>Cylindrospermum majus</i>	4,056	5,040	3,144
Division Chlorophyta			
Class Chlorophyceae			
Order Volvocales			
Family Volvocaceae			
10. <i>Eudorina elegans</i>	1,872	1,820	1,153
11. <i>Pandorina morum</i>	31	-	-
12. <i>Volvox aureus</i>	117	308	59
13. <i>Volvox tertius</i>	47	119	25
Order Tetrasporales			
Family Palmellaceae			
14. <i>Sphaerocystis shroeteri</i>	117	35	59
Order Chlorococcales			
Family Hydrodictyaceae			
15. <i>Pediastrum duplex</i>	133	140	66
16. <i>Pediastrum simplex</i>	4,524	3,920	3,423
17. <i>Pediastrum tetras</i>	390	105	328
Family Coelastraceae			
18. <i>Coelastrum microporum</i>	156	-	46
19. <i>Coelastrum</i> sp.	-	35	-
20. <i>Coelastrum sphaericum</i>	-	84	46
Family Oocystaceae			
21. <i>Dictyosphaerium pulchellum</i>	140	168	39
22. <i>Kirchneriella lunaris</i>	-	21	-
23. <i>Selenastrum gracile</i>	-	91	39

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566)
(ต่อ)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลิตร)		
	2339478-1	2339478-2	2339478-3
24. <i>Tetraedron gracile</i>	23	7	-
Family Scenedesmaceae			
25. <i>Actinastrum gracillimum</i>	70	-	25
26. <i>Actinastrum hantzschii</i>	374	112	183
27. <i>Micractinium bornhemense</i>	-	84	-
28. <i>Micractinium pusillum</i>	1,911	192	360
29. <i>Scenedesmus armatus</i>	23	-	-
30. <i>Scenedesmus dimorphus</i>	16	-	-
31. <i>Scenedesmus opoliensis</i>	62	112	39
Order Ulotrichales			
Family Ulotrichaceae			
32. <i>Ulothrix</i> sp.	-	-	20
Order Zygomatales			
Family Desmidiaceae			
33. <i>Closterium gracile</i>	78	-	-
34. <i>Closterium</i> sp.	-	14	-
35. <i>Staurastrum gracile</i>	16	-	13
Class Euglenophyceae			
Order Euglenales			
Family Euglenaceae			
36. <i>Euglena oxyuris</i>	-	49	7
37. <i>Euglena viridis</i>	94	-	-
38. <i>Lepocinclis ovum</i>	-	-	20
39. <i>Phacus myersi</i>	39	7	-
40. <i>Phacus ranula</i>	-	7	13
41. <i>Strombomonas deflandrei</i>	218	-	-
42. <i>Strombomonas fluviatilis</i>	218	7	-

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566)
(ต่อ)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลิตร)		
	2339478-1	2339478-2	2339478-3
43. <i>Strombomonas gibberosa</i>	70	-	-
44. <i>Trachelomonas crebea</i>	187	49	-
45. <i>Trachelomonas hispida</i>	148	49	46
46. <i>Trachelomonas lacustris</i>	125	-	-
47. <i>Trachelomonas similis</i>	250	-	-
48. <i>Trachelomonas volzii</i>	-	28	-
Division Chromophyta			
Class Bacillariophyceae			
Order Biddulphiales			
Suborder Coscinodiscineae			
Family Thalassiosiraceae			
49. <i>Cyclotella meneghiniana</i>	2,808	2,800	1,703
50. <i>Stephanodiscus</i> sp.	23	7	20
Family Aulacoseiraceae			
51. <i>Aulacoseira baicalensis</i>	2,496	1,400	2,096
52. <i>Aulacoseira granulata</i>	60,528	55,440	53,186
Order Bacillariales			
Suborder Fragilariineae			
Family Fragilariaceae			
53. <i>Fragilaria capucina</i>	39	-	-
54. <i>Synedra acus</i>	62	-	-
55. <i>Synedra ulna</i>	55	56	-
Suborder Bacillariineae			
Family Eunotiaceae			
56. <i>Eunotia pectinalis</i>	-	-	13
Family Naviculaceae			
57. <i>Amphora ovalis</i>	-	-	28

ตาราง ผลการวิเคราะห์แพลงก์ตอนพืช (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566)
(ต่อ)

ชนิดแพลงก์ตอนพืช	ปริมาณแพลงก์ตอนพืช (หน่วยต่อลิตร)		
	2339478-1	2339478-2	2339478-3
58. <i>Craticula cuspidata</i>	8	-	-
Family Bacillariaceae			
59. <i>Bacillaria paxillifer</i>	-	-	66
60. <i>Nitzschia lorenziana</i>	1,763	602	1,441
Family Surirellaceae			
61. <i>Surirella elegans</i>	31	56	25
62. <i>Surirella ovata</i>	78	21	26
63. <i>Surirella robusta</i>	86	42	52
Class Dinophyceae			
Order Peridinales			
Family Peridiniaceae			
64. <i>Peridinium</i> sp.	8	42	157
ชนิดแพลงก์ตอนพืช	45	42	40
ปริมาณแพลงก์ตอนพืช	87,889	74,732	69,250
ดัชนีความหลากหลายแพลงก์ตอนพืช	1.4480	1.1683	1.0894
ดัชนีความสม่ำเสมอแพลงก์ตอนพืช	0.3804	0.3126	0.2953

Sample Location : 1. สถานี 2339478-1 : แม่น้ำเจ้าพระยาที่ 500 เมตรเหนือจุดสูบ-ระบายน้ำของ
โครงการ
2. สถานี 2339478-2 : แม่น้ำเจ้าพระยาบริเวณจุดสูบ-ระบายน้ำของโครงการ
3. สถานี 2339478-3 : แม่น้ำเจ้าพระยาที่ 500 เมตรท้ายจุดสูบ-ระบายน้ำของ
โครงการ

Condition of Sample : contained in one plastic bottle, sample containers comply to pretreatment-
preservation standards (APHA, USEPA)

(นางสาวกนกวรรณ ขาวค้อน)
ผู้วิเคราะห์

(นายอลงกต อินทรชาติ)
หัวหน้าสถานีวิจัยประมงศรีราชา



สถานีวิจัยประมงศรีราชา

101/12 หมู่ 9 ต. บางพระ

อ. ศรีราชา จ. ชลบุรี 20110

โทร./โทรสาร. (038) 311379

Client : Gulf JP CRN Co., Ltd.

Address : 59/4 Moo 4 Chiang Rak Noi, Sam Khok, Pathumthani, Thailand, 12160

Project Name : Monitoring EIA

Project Location : GCRN

รายงานผลการวิเคราะห์แหล่งกักต่อนสัตว์

ตาราง ผลการวิเคราะห์แหล่งกักต่อนสัตว์ (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566)

ชนิดแหล่งกักต่อนสัตว์	ปริมาณแหล่งกักต่อนสัตว์ (หน่วยต่อลิตร)		
	2339478-1	2339478-2	2339478-3
Phylum Protozoa			
Subphylum Plasmodroma			
Class Sarcodina			
Subclass Rhizopoda			
Order Testacida			
Family Euglyphidae			
1. <i>Euglypha</i> sp.	8	-	-
Subphylum Ciliophora			
Class Ciliata			
Subclass Holotricha			
Order Gymnostomatida			
2. <i>Coleps</i> sp.	-	-	7

ตาราง ผลการวิเคราะห์แหล่งกักต่อนสัตว์ (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566)

(ต่อ)

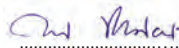
ชนิดแหล่งกักต่อนสัตว์	ปริมาณแหล่งกักต่อนสัตว์ (หน่วยต่อลิตร)		
	2339478-1	2339478-2	2339478-3
Subclass Spirotricha			
Order Tintinnida			
Family Tintinnididae			
3. <i>Tintinnidium</i> sp.	156	105	72
Family Codonellidae			
4. <i>Tintinnopsis</i> sp.	86	28	66
Subclass Peritricha			
Order Peritrichida			
5. <i>Pyxicola</i> sp.	-	-	7
Phylum Rotifera			
Class Monogononta			
Order Ploima			
Family Brachionidae			
6. <i>Anuraeopsis fissa</i>	16	14	13
7. <i>Brachionus angularis</i>	-	7	13
8. <i>Keratella cochlearis</i>	8	-	13
9. <i>Keratella vulga</i>	-	-	7
Family Lecanidae			
10. <i>Lecane papuana</i>	-	7	-
Family Notommatidae			
11. <i>Cephalodella forficula</i>	8	7	-
12. <i>Cephalodella gibba</i>	8	-	-
Family Tricocercidae			
13. <i>Trichocerca pusilla</i>	23	35	7
14. <i>Trichocerca similis</i>	8	-	-
Family Asplanchnidae			
15. <i>Asplanchna priodonta</i>	8	14	13

ตาราง ผลการวิเคราะห์แพลงก์ตอนสัตว์ (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566)
(ต่อ)

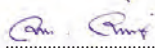
ชนิดแพลงก์ตอนสัตว์	ปริมาณแพลงก์ตอนสัตว์ (หน่วยต่อลิตร)		
	2339478-1	2339478-2	2339478-3
Family Synchaetidae			
16. <i>Polyarthra dolichoptera</i>	8	14	7
17. <i>Polyarthra vulgaris</i>	31	7	13
Order Flosculariaceae			
Family Hexarthridae			
18. <i>Hexarthra mira</i>	8	-	7
Phylum Arthropoda			
Class Crustacea			
Subclass Branchiopoda			
Order Diplostraca			
Suborder Cladocera			
Family Bosminidae			
19. <i>Bosminopsis deitersi</i>	-	7	20
Family Moinidae			
20. <i>Moina macrocopa</i>	23	-	-
Subclass Copepoda			
21. Copepod naulius	55	70	46
Order Cyclopoida			
22. Cyclopoid copepod	8	-	7
Phylum Mollusca			
Class Bivalvia			
23. Pelecypod larvae	-	-	7
ชนิดแพลงก์ตอนสัตว์	16	12	17
ปริมาณแพลงก์ตอนสัตว์	462	315	325
ดัชนีความหลากหลายแพลงก์ตอนสัตว์	2.1615	1.9978	2.4110
ดัชนีความสม่ำเสมอแพลงก์ตอนสัตว์	0.7796	0.8040	0.8510

Sample Location : 1. สถานี 2339478-1 : แม่น้ำเจ้าพระยาที่ 500 เมตรเหนือจุดสูบ-ระบายน้ำของ
โครงการ
2. สถานี 2339478-2 : แม่น้ำเจ้าพระยาบริเวณจุดสูบ-ระบายน้ำของโครงการ
3. สถานี 2339478-3 : แม่น้ำเจ้าพระยาที่ 500 เมตรท้ายจุดสูบ-ระบายน้ำของ
โครงการ

Condition of Sample : contained in one plastic bottle, sample containers comply to pretreatment-
preservation standards (APHA, USEPA)



(นางสาวกนกวรรณ ขวค้อน)
ผู้วิเคราะห์



(นายอลงกต อินทรชาติ)
หัวหน้าสถานีวิจัยประมงศรีราชา



สถานีวิจัยประมงศรีราชา

101/12 หมู่ 9 ต. บางพระ

อ. ศรีราชา จ. ชลบุรี 20110

โทร./โทรสาร. (038) 311379

Client : Gulf JP CRN Co., Ltd.

Address : 59/4 Moo 4 Chiang Rak Noi, Sam Khok, Pathumthani, Thailand, 12160

Project Name : Monitoring EIA

Project Location : GCRN

รายงานผลการวิเคราะห์ไข่น้ำและลูกปลา

ตาราง ผลการวิเคราะห์ไข่น้ำและลูกปลา (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566)

ชนิดไข่น้ำและลูกปลา	ปริมาณไข่น้ำและลูกปลา (ตัว/ฟอง 1,000 ลูกบาศก์เมตร)		
	2339478-1	2339478-2	2339478-3
Phylum Chordata			
Subphylum Vertebrata			
Superclass Osteichthyes			
Class Actinopterygii			
Order Clupeiformes			
Family Clupeidae			
<i>Clupeichthys aesarnensis</i> (ปลาชีวก้าว)	-	-	6
Order Perciformes			
Family Toxotidae			
<i>Toxotes chatareus</i> (ปลาเสือพ่นน้ำ)	141	492	430
ชนิดลูกปลา	1	1	2
ปริมาณลูกปลาทั้งหมด	141	492	436
ค่าดัชนีความหลากหลายลูกปลา	0.0000	0.0000	0.0726
ปริมาณไข่น้ำ	-	-	-

Sample Location : 1. สถานี 2339478-1 : แม่น้ำเจ้าพระยาที่ 500 เมตร เหนือจุดสูบน้ำของโครงการ
2. สถานี 2339478-2 : แม่น้ำเจ้าพระยาบริเวณจุดสูบน้ำของโครงการ
3. สถานี 2339478-3 : แม่น้ำเจ้าพระยาที่ 500 เมตร ท้ายจุดสูบน้ำของโครงการ

Condition of Sample : contained in one plastic bottle, add 10% formalin sample containers comply to pretreatment-preservation standards (APHA, USEPA)

(นางสาวกนกวรรณ ขาวด่อน)

ผู้วิเคราะห์

(นายอลงกต อินทชาติ)

หัวหน้าสถานีวิจัยประมงศรีราชา



ภาพที่ 1 ลูกปลาขี้แก้ว (*Clupeichthys aesarnensis*)



ภาพที่ 2 ลูกปลาเสือพ่นน้ำ (*Toxotes chatareus*)



สถานีวิจัยประมงศรีราชา
101/12 หมู่ 9 ต. บางพระ
อ. ศรีราชา จ. ชลบุรี 20110
โทร./โทรสาร. (038) 311379

Client : Gulf JP CRN Co., Ltd.

Address : 59/4 Moo 4 Chiang Rak Noi, Sam Khok, Pathumthani, Thailand, 12160

Project Name : Monitoring EIA

Project Location : GCRN

รายงานผลการวิเคราะห์สัตว์หน้าดิน

ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566)

ชนิดสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)		
	2339483-1	2339483-2	2339483-3
Phylum Annelida			
Class Clitellata			
Order Lumbriculida			
Family Lumbriculidae			
<i>Lumbriculus</i> sp. (ไส้เดือนน้ำ)	-	-	15
Class Polychaeta			
Order Phyllodocida			
Family Nephtyidae			
<i>Nephtys</i> sp. (โพลิคีต)	15	30	-
Phylum Arthropoda			
Class Insecta			
Order Diptera			
Family Chironomidae			
<i>Chironomus</i> sp. (หนอนแดง)	15	-	-

ตาราง ผลการวิเคราะห์สัตว์หน้าดิน (เก็บตัวอย่างวันที่ 25 พฤษภาคม 2566) (ต่อ)

ชนิดสัตว์หน้าดิน	ปริมาณสัตว์หน้าดิน (ตัวต่อตารางเมตร)		
	2339483-1	2339483-2	2339483-3
Phylum Mollusca			
Class Gastropoda			
Order Architaenioglossa			
Family Viviparidae			
Mekongia sp. (หอยทราย)	-	45	75
Class Bivalvia			
Order Mytilida			
Family Mytilidae			
Limnoperna sp. (หอยสองฝาชนิดหนึ่ง)	15	-	-
ชนิดสัตว์หน้าดิน	3	2	2
ปริมาณสัตว์หน้าดิน	45	75	90
ค่าดัชนีความหลากหลายสัตว์หน้าดิน	1.0986	0.6730	0.4506

Sample Location : 1. สถานี 2339483-1 : แม่น้ำเจ้าพระยาที่ 500 เมตร เหนือจุดสูบ-ระบายน้ำของโครงการ
2. สถานี 2339483-2 : แม่น้ำเจ้าพระยาบริเวณจุดสูบ-ระบายน้ำของโครงการ
3. สถานี 2339483-3 : แม่น้ำเจ้าพระยาที่ 500 เมตร ท้ายจุดสูบ-ระบายน้ำของโครงการ

Condition of Sample : contained in one plastic zip bag

อรุณรัตน์ นิลวรรณ

(นายอรรถวุฒิ กันทะวงศ์)
ผู้วิเคราะห์

ณ. ณ.

(นายอลงกต อินทราชาติ)
หัวหน้าสถานีวิจัยประมงศรีราชา

ภาคผนวก ง-8

ระดับเสียงเฉลี่ยตลอดเวลาการทำงาน (TWA)



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319344
Date Received : Feb 28, 2023
Date Reported : Mar 02, 2023
Report Number : 2573374-1

Page 1 of 3

Sample Number 2319344-1
Sampled Date Feb 27, 2023
Sample Description Noise Dose
Location พนักงาน Maintenance 1
Personal Sampling คุณเชษฐพงศ์ ชิตพนนท์
Date Analysis Commenced Mar 02, 2023

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	1	4.6	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	08:00 AM - 04:00 PM	dB(A)	-	-	71.6	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

Guideline :

MOL : 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. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

Sampled By : Pongvisit Charoensilp

Remark :

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

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319344
Date Received : Feb 28, 2023
Date Reported : Mar 02, 2023
Report Number : 2573374-1

Page 2 of 3

Sample Number 2319344-2
Sampled Date Feb 27, 2023
Sample Description Noise Dose
Location พนักงาน Maintenance 2
Personal Sampling คุณธีรพล ถนนจรด
Date Analysis Commenced Mar 02, 2023

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	1	12.3	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	08:00 AM - 04:00 PM	dB(A)	-	-	75.9	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

Guideline :

MOL : 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. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

Sampled By : Pongvisit Charoensilp

Remark :

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

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319344
Date Received : Feb 28, 2023
Date Reported : Mar 02, 2023
Report Number : 2573374-1

Page 3 of 3

Sample Number 2319344-3
Sampled Date Feb 27, 2023
Sample Description Noise Dose
Location พนักงาน Maintenance 3
Personal Sampling คุณเนาวรัตน์ สังขกุล
Date Analysis Commenced Mar 02, 2023

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	1	9.1	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	08:00 AM - 04:00 PM	dB(A)	-	-	74.6	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

Guideline :
MOL : 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. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)
Sampled By : Pongvisit Charoensilp

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

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319349
Date Received : Feb 28, 2023
Date Reported : Mar 02, 2023
Report Number : 2573377-1

Page 1 of 2

Sample Number 2319349-1
Sampled Date Feb 27, 2023
Sample Description Noise Dose
Location พนักงาน Operation 1
Personal Sampling คุณเนวินพรณ์ รัตนจันทร์
Date Analysis Commenced Mar 02, 2023

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	%	-	-	10.5	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
Noise Dose (8 hrs.)	07:00 AM - 07:00 PM	%	-	1	10.0	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (12 hrs.) (Calculated from Lavg)	07:00 AM - 07:00 PM	dB(A)	-	-	73.2	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	07:00 AM - 07:00 PM	dB(A)	-	-	75.0	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

Guideline :
MOL : 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. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)
* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

Sampled By : Pongvisit Charoensilp

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

Approved by

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Assistant Manager

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P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2319349

Date Received : Feb 28, 2023

Date Reported : Mar 02, 2023

Report Number : 2573377-1

Page 2 of 2

Sample Number	2319349-2
Sampled Date	Feb 27, 2023
Sample Description	Noise Dose
Location	พนักงาน Operation 2
Personal Sampling	คุณต่อศักดิ์ วงศ์สว่าง
Date Analysis Commenced	Mar 02, 2023

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (12 hrs.) (Calculated from Avg)	07:00 AM - 07:00 PM	%	-	-	9.8	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
Noise Dose (8 hrs.)	07:00 AM - 07:00 PM	%	-	1	9.6	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (12 hrs.) (Calculated from Avg)	07:00 AM - 07:00 PM	dB(A)	-	-	72.9	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	07:00 AM - 07:00 PM	dB(A)	-	-	74.8	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

Guideline :

- MOL : 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. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)
* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

Sampled By : Pongvisit Charoensilp

Remark :

- LOD : Limit of Detection
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Wichan Choonharat

Wichan Choonharat
Assistant Manager

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P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2339296

Date Received : May 29, 2023

Date Reported : Jun 01, 2023

Report Number : 2616731-1

Page 1 of 3

Sample Number	2339296-1
Sampled Date	May 29, 2023
Sample Description	Noise Dose
Location	พนักงาน Maintenance 1
Personal Sampling	คุณรัฐภูมิ ถนนมณูชาติ
Date Analysis Commenced	May 30, 2023

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (8 hrs.)	07:59 AM - 03:59 PM	%	-	1	10.5	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	07:59 AM - 03:59 PM	dB(A)	-	-	75.2	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

Guideline :

- MOL : 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. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

Sampled By : Buranasak Pati

Remark :

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

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Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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Analysis / Test Report

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59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339296
Date Received : May 29, 2023
Date Reported : Jun 01, 2023
Report Number : 2616731-1

Page 2 of 3

Sample Number 2339296-2
Sampled Date May 29, 2023
Sample Description Noise Dose
Location พนักงาน Maintenance 2
Personal Sampling คุณชายณรงค์ ชตทนนท์
Date Analysis Commenced May 30, 2023

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (8 hrs.)	08:00 AM - 04:00 PM	%	-	1	6.3	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	08:00 AM - 04:00 PM	dB(A)	-	-	73.0	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

Guideline :

MOL : 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. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

Sampled By : Buranasak Pati

Remark :

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

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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Analysis / Test Report

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59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339296
Date Received : May 29, 2023
Date Reported : Jun 01, 2023
Report Number : 2616731-1

Page 3 of 3

Sample Number 2339296-3
Sampled Date May 29, 2023
Sample Description Noise Dose
Location พนักงาน Maintenance 3
Personal Sampling คุณอภิสิทธิ์ ลายทอง
Date Analysis Commenced May 30, 2023

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (8 hrs.)	07:59 AM - 03:59 PM	%	-	1	19.0	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	07:59 AM - 03:59 PM	dB(A)	-	-	77.8	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

Guideline :

MOL : 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. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)

Sampled By : Buranasak Pati

Remark :

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

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2339301

Date Received : May 29, 2023

Date Reported : Jun 01, 2023

Report Number : 2616736-1

Page 1 of 2

Sample Number 2339301-1
Sampled Date May 29, 2023
Sample Description Noise Dose
Location พนักงาน Operation 1
Personal Sampling คุณพลวัชร ดุรณ
Date Analysis Commenced May 30, 2023

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (12 hrs.) (Calculated from Lavg)	07:02 AM - 07:02 PM	%	-	-	17.0	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
Noise Dose (8 hrs.)	07:02 AM - 07:02 PM	%	-	1	16.2	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (12 hrs.) (Calculated from Lavg)	07:02 AM - 07:02 PM	dB(A)	-	-	75.3	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	07:02 AM - 07:02 PM	dB(A)	-	-	77.1	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

Guideline :

- MOL : 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. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)
* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

Sampled By : Buranasak Pati

Remark :

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

Approved by

Wichan Choonharat

Wichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :

Project Name : Monitoring EIA

Project Location : GCRN

Lot ID: 2339301

Date Received : May 29, 2023

Date Reported : Jun 01, 2023

Report Number : 2616736-1

Page 2 of 2

Sample Number 2339301-2
Sampled Date May 29, 2023
Sample Description Noise Dose
Location พนักงาน Operation 2
Personal Sampling คุณปฎิญา รังษิพลาสวัสดิ์
Date Analysis Commenced May 30, 2023

Analyte	Sampled Date/time	Unit	LOD	LOQ (LOR)	Result	Guideline Limit	Method	Guideline	Testing Location
Air Testing									
Noise Dose (12 hrs.) (Calculated from Lavg)	07:02 AM - 07:02 PM	%	-	-	8.7	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
Noise Dose (8 hrs.)	07:02 AM - 07:02 PM	%	-	1	8.3	No Standard	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (12 hrs.) (Calculated from Lavg)	07:02 AM - 07:02 PM	dB(A)	-	-	72.4	83*	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok
TWA (8 hrs.)	07:02 AM - 07:02 PM	dB(A)	-	-	74.2	85	MOL, Department Labour Protection and Welfare (B.E.2561)	MOL	Bangkok

Guideline :

- MOL : 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. Notification of Department of Labour Protection and Welfare on the Standard of Time Weighted Average (TWA) Noise Level (B.E. 2561)
* MOL: Recommended guideline limit for 12 working hours should not be over 83 dB(A)

Sampled By : Buranasak Pati

Remark :

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

Approved by

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Wichan Choonharat
Assistant Manager

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ภาคผนวก ง-9

ระดับความร้อนในบริเวณการทำงาน



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319363
Date Received : Feb 28, 2023
Date Reported : Mar 02, 2023
Report Number: 2573380-1

Page 1 of 7

Sample Number 2319363-1
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Feb 27, 2023
Measurement by Phitsanupong Chaiya
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Condenser Exhaust Unit	120	26.6	24.0	33.5	30.8
Average (WBGT)		26.6			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

- 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)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

Supot S.
Supot Salamteh
Section Head

Approved by

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Wichan Choonharat
Assistant Manager

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59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160

P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319363
Date Received : Feb 28, 2023
Date Reported : Mar 02, 2023
Report Number: 2573380-1

Page 2 of 7

Sample Number 2319363-2
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Feb 27, 2023
Measurement by Phitsanupong Chaiya
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ผู้ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณหอกลั่นเอาน้ำ จุดที่ 1	120	27.0	22.7	38.2	34.7
Average (WBGT)		27.0			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

- 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)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

Supot S.
Supot Salamteh
Section Head

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Wichan Choonharat
Assistant Manager

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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319363
Date Received : Feb 28, 2023
Date Reported : Mar 02, 2023
Report Number: 2573380-1

Page 5 of 7

Sample Number 2319363-5
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Feb 27, 2023
Measurement by Phitsanupong Chaiya
Location ปรังคังงาน 1 ฟันที่ (ชื่อ-นามสกุล ปรังคังงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Generator	120	29.9	25.7	39.7	39.6
Average (WBGT)		29.9			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

- 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)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319363
Date Received : Feb 28, 2023
Date Reported : Mar 02, 2023
Report Number: 2573380-1

Page 6 of 7

Sample Number 2319363-6
Parameter Heat Stress (Sampling Time : 10.00 AM - 12.00 PM)
Measurement Date Feb 27, 2023
Measurement by Phitsanupong Chaiya
Location ปรังคังงาน 1 ฟันที่ (ชื่อ-นามสกุล ปรังคังงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Combustion Turbine 1	120	24.7	22.0	31.0	30.5
Average (WBGT)		24.7			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

- 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)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

Supot S.
Supot Salamteh
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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339305
Date Received : May 29, 2023
Date Reported : Jun 01, 2023
Report Number: 2616739-1

Page 1 of 7

Sample Number 2339305-1
Parameter Heat Stress (Sampling Time : 10.40 AM - 12.40 PM)
Measurement Date May 29, 2023
Measurement by Buranasak Pati
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Condenser Exhaust Unit	120	29.2	27.3	33.8	33.2
Average (WBGT)		29.2			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

- 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)
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Technical Management


Supot Salamteh
Section Head

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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339305
Date Received : May 29, 2023
Date Reported : Jun 01, 2023
Report Number: 2616739-1

Page 2 of 7

Sample Number 2339305-2
Parameter Heat Stress (Sampling Time : 10.33 AM - 12.33 PM)
Measurement Date May 29, 2023
Measurement by Buranasak Pati
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ปฏิบัติงาน : - แผนก : -)


Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณหอกลั่นเอทานอล 1	120	29.3	27.2	34.4	33.4
Average (WBGT)		29.3			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

- 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)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management


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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339305
Date Received : May 29, 2023
Date Reported : Jun 01, 2023
Report Number: 2616739-1

Page 5 of 7

Sample Number 2339305-5
Parameter Heat Stress (Sampling Time : 10.53 AM - 12.53 PM)
Measurement Date May 29, 2023
Measurement by Buranasak Pati
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Generator	120	32.1	29.1	39.2	39.1
Average (WBGT)		32.1			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

- 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)
- Ministerial Regulation on Prescribing of Standard for Administration and Management of Occupational Safety, Health and Environment in relation to Heat, Light and Noise, B.E.2559

Technical Management

Supot S.
Supot Salamteh
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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339305
Date Received : May 29, 2023
Date Reported : Jun 01, 2023
Report Number: 2616739-1

Page 6 of 7

Sample Number 2339305-6
Parameter Heat Stress (Sampling Time : 10.37 AM - 12.37 PM)
Measurement Date May 29, 2023
Measurement by Buranasak Pati
Location ปฏิบัติงาน 1 พื้นที่ (ชื่อ-นามสกุล ปฏิบัติงาน : - แผนก : -)

Location	Duration (min)	WBGT (°C)	NWB (°C)	GT (°C)	DB (°C)
บริเวณ Combustion Turbine 11	120	29.1	26.9	34.9	33.3
Average (WBGT)		29.1			
Guideline WBGT (°C)		34.0			

Reference Method : Wet Bulb Globe Temperature

Guideline:

- 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)
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Technical Management

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ภาคผนวก ง-10

ระดับความเข้มของแสงในบริเวณการทำงาน



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319372

Date Received : Mar 03, 2023
Date Reported : Mar 08, 2023
Report Number : 2586661-1

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Boiler Stream Turbine Gas Turbine : 115 Kv Relay Protection									
1.1	2319372-1	27 Feb 2023	Day time	1	455	458.8	100	200	Pass
1.2	2319372-2	27 Feb 2023	Day time	2	523				
1.3	2319372-3	27 Feb 2023	Day time	3	670				
1.4	2319372-4	27 Feb 2023	Day time	4	310				
1.5	2319372-5	27 Feb 2023	Day time	5	360				
1.6	2319372-6	27 Feb 2023	Day time	6	435				
Area - Boiler Stream Turbine Gas Turbine : 22 Kv Switch Gear									
2.1	2319372-7	27 Feb 2023	Day time	1	300	359.0	100	200	Pass
2.2	2319372-8	27 Feb 2023	Day time	2	323				
2.3	2319372-9	27 Feb 2023	Day time	3	262				
2.4	2319372-10	27 Feb 2023	Day time	4	251				
2.5	2319372-11	27 Feb 2023	Day time	5	517				
2.6	2319372-12	27 Feb 2023	Day time	6	501				
Area - Boiler Stream Turbine Gas Turbine : 115 Kv Battery Relay Protection									
3.1	2319372-13	27 Feb 2023	Day time	1	269	284.5	100	200	Pass
3.2	2319372-14	27 Feb 2023	Day time	2	300				
Area - Boiler Stream Turbine Gas Turbine : 115 Kv Battery Terminal Sub									
4.1	2319372-15	27 Feb 2023	Day time	1	347	318.5	100	200	Pass
4.2	2319372-16	27 Feb 2023	Day time	2	290				
Area - Boiler Stream Turbine Gas Turbine : 115 Kv Terminal Sub									
5.1	2319372-17	27 Feb 2023	Day time	1	450	348.8	100	200	Pass
5.2	2319372-18	27 Feb 2023	Day time	2	340				
5.3	2319372-19	27 Feb 2023	Day time	3	281				
5.4	2319372-20	27 Feb 2023	Day time	4	221				
5.5	2319372-21	27 Feb 2023	Day time	5	400				
5.6	2319372-22	27 Feb 2023	Day time	6	401				

Measurement by : Phitsanupong Chaiya Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

Technical Management


Supot Salamteah
Section Head

Approved by


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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319373

Date Received : Mar 03, 2023
Date Reported : Mar 08, 2023
Report Number : 2586664-1

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Spot - Chemical Skid (Cooling Tower)									
1	2319373-1	27 Feb 2023	Day time	1	6,700	-	200-300	-	Pass
1	2319373-2	27 Feb 2023	Day time	2	10,300	-	1,000		
1	2319373-3	27 Feb 2023	Day time	3	10,400	-	400		
1	2319373-4	27 Feb 2023	Night time	1	382	-	200-300	-	Pass
Spot - Chemical Skid (Demineralization Plant)									
2	2319373-5	27 Feb 2023	Day time	1	56,900	-	200-300	-	Pass
2	2319373-6	27 Feb 2023	Day time	2	11,400	-	2,000		
2	2319373-7	27 Feb 2023	Day time	3	9,000	-	600		
Spot - Chemical Skid (Pre-Treatment)									
3	2319373-8	27 Feb 2023	Day time	1	5,940	-	200-300	-	Pass
3	2319373-9	27 Feb 2023	Day time	2	4,330	-	1,000		
3	2319373-10	27 Feb 2023	Day time	3	5,600	-	400		
3	2319373-11	27 Feb 2023	Night time	1	350	-	200-300	-	Pass
Spot - Chemical Skid (Thermal Evaporation)									
4	2319373-12	27 Feb 2023	Day time	1	6,400	-	200-300	-	Pass
4	2319373-13	27 Feb 2023	Day time	2	4,700	-	1,000		
4	2319373-14	27 Feb 2023	Day time	3	5,600	-	400		
4	2319373-15	27 Feb 2023	Night time	1	301	-	200-300	-	Pass
Spot - Chemical Skid (Water Treatment Plant)									
5	2319373-16	27 Feb 2023	Day time	1	1,300	-	200-300	-	Pass
5	2319373-17	27 Feb 2023	Day time	2	1,490	-	300		
5	2319373-18	27 Feb 2023	Day time	3	1,080	-	200		
5	2319373-19	27 Feb 2023	Night time	1	330	-	200-300	-	Pass

Measurement by : Phitsanupong Chaiya Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

Technical Management


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Assistant Manager

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319374

Date Received : Mar 03, 2023
Date Reported : Mar 08, 2023
Report Number : 2586665-1

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Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Control Room Building FL.1 : Corridor									
1.1	2319374-1	27 Feb 2023	Day time	1	551	793.8	50	100	Pass
1.2	2319374-2	27 Feb 2023	Day time	2	347				
1.3	2319374-3	27 Feb 2023	Day time	3	300				
1.4	2319374-4	27 Feb 2023	Day time	4	1,977				
Area - Control Room Building FL.1 : ทางเดิน Cable Room									
2.1	2319374-5	27 Feb 2023	Day time	1	390	372.8	50	100	Pass
2.2	2319374-6	27 Feb 2023	Day time	2	613				
2.3	2319374-7	27 Feb 2023	Day time	3	241				
2.4	2319374-8	27 Feb 2023	Day time	4	247				
Area - Control Room Building FL.1 : หน้าประตูทางเข้าอาคาร CCR									
3.1	2319374-9	27 Feb 2023	Day time	1	15,430	15,605	50	100	Pass
3.2	2319374-10	27 Feb 2023	Day time	2	15,780				

Measurement by : Phitsanupong Chaiya Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017) dated November 27, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319375

Date Received : Mar 03, 2023
Date Reported : Mar 08, 2023
Report Number : 2586668-1


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Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comments
					Spot	Average	Spot/Min	Average	
Area - Control Room Building FL.2 : Battery Room									
1.1	2319375-1	27 Feb 2023	Day time	1	360	458.5	100	200	Pass
1.2	2319375-2	27 Feb 2023	Day time	2	557				
Area - Control Room Building FL.2 : ทางเดินในห้อง MCC									
2.1	2319375-3	27 Feb 2023	Day time	1	343	291.3	50	100	Pass
2.2	2319375-4	27 Feb 2023	Day time	2	239				
2.3	2319375-5	27 Feb 2023	Day time	3	385				
2.4	2319375-6	27 Feb 2023	Day time	4	146				
2.5	2319375-7	27 Feb 2023	Day time	5	399				
2.6	2319375-8	27 Feb 2023	Day time	6	341				
2.7	2319375-9	27 Feb 2023	Day time	7	200				
2.8	2319375-10	27 Feb 2023	Day time	8	431				
2.9	2319375-11	27 Feb 2023	Day time	9	373				
2.10	2319375-12	27 Feb 2023	Day time	10	200				
2.11	2319375-13	27 Feb 2023	Day time	11	201				
2.12	2319375-14	27 Feb 2023	Day time	12	210				
2.13	2319375-15	27 Feb 2023	Day time	13	155				
2.14	2319375-16	27 Feb 2023	Day time	14	253				
2.15	2319375-17	27 Feb 2023	Day time	15	225				
2.16	2319375-18	27 Feb 2023	Day time	16	431				
2.17	2319375-19	27 Feb 2023	Day time	17	370				
2.18	2319375-20	27 Feb 2023	Day time	18	222				
2.19	2319375-21	27 Feb 2023	Day time	19	173				
2.20	2319375-22	27 Feb 2023	Day time	20	282				
2.21	2319375-23	27 Feb 2023	Day time	21	347				
2.22	2319375-24	27 Feb 2023	Day time	22	238				
2.23	2319375-25	27 Feb 2023	Day time	23	165				
2.24	2319375-26	27 Feb 2023	Day time	24	485				
2.25	2319375-27	27 Feb 2023	Day time	25	243				
2.26	2319375-28	27 Feb 2023	Day time	26	280				
2.27	2319375-29	27 Feb 2023	Day time	27	361				
2.28	2319375-30	27 Feb 2023	Day time	28	235				
2.29	2319375-31	27 Feb 2023	Day time	29	448				

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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319375

Date Received : Mar 03, 2023
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Report Number : 2586668-1

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Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Control Room Building FL.2 : ทางเดินในห้อง MCC									
2.30	2319375-32	27 Feb 2023	Day time	30	204				
2.31	2319375-33	27 Feb 2023	Day time	31	367				
2.32	2319375-34	27 Feb 2023	Day time	32	370				
Area - Control Room Building FL.2 : ทางเดินบันไดหน้าห้อง MCC									
3.1	2319375-35	27 Feb 2023	Day time	1	2,860	5,778	50	100	Pass
3.2	2319375-36	27 Feb 2023	Day time	2	2,800				
3.3	2319375-37	27 Feb 2023	Day time	3	8,550				
3.4	2319375-38	27 Feb 2023	Day time	4	8,900				


Measurement by : Phitsanupong Chaiya Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319376

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Report Number : 2586669-1

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Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
1	Spot - Lab Chemical Building : ใต้ทำงาน Operation Demin								
	2319376-1	27 Feb 2023	Day time	1	413	-	400-500	-	Pass
2	Spot - Lab Chemical Building : ใต้ทำงาน นักเคมี								
	2319376-2	27 Feb 2023	Day time	1	411	-	400-500	-	Pass
3	Spot - Lab Chemical Building : ใต้โต๊ะเครื่องดูดกาแฟ								
	2319376-3	27 Feb 2023	Day time	1	503	-	400-500	-	Pass
4.1	Area - Lab Chemical Building : ทางเดิน MCC Demin Plant								
	2319376-4	27 Feb 2023	Day time	1	215	328.8	50	100	Pass
4.2	2319376-5	27 Feb 2023	Day time	2	457				
4.3	2319376-6	27 Feb 2023	Day time	3	200				
4.4	2319376-7	27 Feb 2023	Day time	4	443				
5.1	Area - Lab Chemical Building : ทางเดินอาคาร Lab								
	2319376-8	27 Feb 2023	Day time	1	636	621.0	50	100	Pass
5.2	2319376-9	27 Feb 2023	Day time	2	900				
5.3	2319376-10	27 Feb 2023	Day time	3	595				
5.4	2319376-11	27 Feb 2023	Day time	4	353				

Measurement by : Phitsanupong Chaiya Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, B.E.2560 (2017), and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 B.E.2561 (2018)

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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319377
Date Received : Mar 03, 2023
Date Reported : Mar 08, 2023
Report Num7er : 25866-2bl


Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Maintanance Building FL.1 : Corridor									
1.1	23193--bl	2- Fe7 2023	Day time	1	622	613.9	50	100	Pass
1.2	23193--b2	2- Fe7 2023	Day time	2	6-4				
1.3	23193--b3	2- Fe7 2023	Day time	3	62-				
1.4	23193--b4	2- Fe7 2023	Day time	4	633				
1.5	23193--b5	2- Fe7 2023	Day time	5	662				
1.6	23193--b6	2- Fe7 2023	Day time	6	581				
1.-	23193--b-	2- Fe7 2023	Day time	-	482				
1.8	23193--b8	2- Fe7 2023	Day time	8	-44				
1.9	23193--b9	2- Fe7 2023	Day time	9	500				
Area - Maintanance Building FL.1 : Utility Room									
2.1	23193--bl0	2- Fe7 2023	Day time	1	323	345.5	50	100	Pass
2.2	23193--bl1	2- Fe7 2023	Day time	2	368				
Area - Maintanance Building FL.1 : Work Shop									
3.1	23193--bl2	2- Fe7 2023	Day time	1	316	413.3	150	300	Pass
3.2	23193--bl3	2- Fe7 2023	Day time	2	446				
3.3	23193--bl4	2- Fe7 2023	Day time	3	510				
3.4	23193--bl5	2- Fe7 2023	Day time	4	405				
3.5	23193--bl6	2- Fe7 2023	Day time	5	36-				
3.6	23193--bl-	2- Fe7 2023	Day time	6	460				
3.-	23193--bl8	2- Fe7 2023	Day time	-	330				
3.8	23193--bl9	2- Fe7 2023	Day time	8	2-0				
3.9	23193--b20	2- Fe7 2023	Day time	9	469				
3.10	23193--b21	2- Fe7 2023	Day time	10	510				
3.11	23193--b22	2- Fe7 2023	Day time	11	4-0				
3.12	23193--b23	2- Fe7 2023	Day time	12	40-				
Spot - Maintanance Building FL.1 : โต๊ะทำงาน C&I 1									
4	23193--b24	2- Fe7 2023	Day time	1	410	b	400b500	b	Pass
Spot - Maintanance Building FL.1 : โต๊ะทำงาน C&I 2									
5	23193--b25	2- Fe7 2023	Day time	1	468	b	400b500	b	Pass
Spot - Maintanance Building FL.1 : โต๊ะทำงาน C&I 3									
6	23193--b26	2- Fe7 2023	Day time	1	448	b	400b500	b	Pass

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Project Location : GCRN

Lot ID: 2319377
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Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
-	Spot - Maintenance Building FL.1 : โต๊ะทำงาน C&I 4								
-	23193--b2-	2- Fe7 2023	Day time	1	489	b	400b500	b	Pass
Area - Maintenance Building FL.1 : บันไดทางเดิน									
8.1	23193--b28	2- Fe7 2023	Day time	1	40-	218.3	50	100	Pass
8.2	23193--b29	2- Fe7 2023	Day time	2	138				
8.3	23193--b30	2- Fe7 2023	Day time	3	181				
8.4	23193--b31	2- Fe7 2023	Day time	4	180				
8.5	23193--b32	2- Fe7 2023	Day time	5	199				
8.6	23193--b33	2- Fe7 2023	Day time	6	205				

Measurement by : Phitsanupong Chaia Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, x.E.2560 B201-z dated November 2- , x.E.2560 B201-z, and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 x.E.2561 B2018z

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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319378

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Report Number : 25866-3bl


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Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Maintanance Building FL.2 : Canteen									
1.1	23193- 8bl	2- Fe7 2023	Day time	1	351	435.3	150	300	Pass
1.2	23193- 8bl2	2- Fe7 2023	Day time	2	511				
1.3	23193- 8bl3	2- Fe7 2023	Day time	3	420				
1.4	23193- 8bl4	2- Fe7 2023	Day time	4	459				
Area - Maintanance Building FL.2 : Copy Room									
2.1	23193- 8bl5	2- Fe7 2023	Day time	1	411	388.0	150	300	Pass
2.2	23193- 8bl6	2- Fe7 2023	Day time	2	365				
Area - Maintanance Building FL.2 : Corridor									
3.1	23193- 8bl7	2- Fe7 2023	Day time	1	688	462.4	50	100	Pass
3.2	23193- 8bl8	2- Fe7 2023	Day time	2	55-				
3.3	23193- 8bl9	2- Fe7 2023	Day time	3	655				
3.4	23193- 8bl10	2- Fe7 2023	Day time	4	- 40				
3.5	23193- 8bl11	2- Fe7 2023	Day time	5	683				
3.6	23193- 8bl12	2- Fe7 2023	Day time	6	118				
3.-	23193- 8bl13	2- Fe7 2023	Day time	-	61				
3.8	23193- 8bl14	2- Fe7 2023	Day time	8	120				
3.9	23193- 8bl15	2- Fe7 2023	Day time	9	540				
Area - Maintanance Building FL.2 : Document Room									
4.1	23193- 8bl16	2- Fe7 2023	Day time	1	250	9- 3.0	50	100	Pass
4.2	23193- 8bl17	2- Fe7 2023	Day time	2	500				
4.3	23193- 8bl18	2- Fe7 2023	Day time	3	1,- 00				
4.4	23193- 8bl19	2- Fe7 2023	Day time	4	1,442				
Area - Maintanance Building FL.2 : Metting Room									
5.1	23193- 8bl20	2- Fe7 2023	Day time	1	652	- 54.0	150	300	Pass
5.2	23193- 8bl21	2- Fe7 2023	Day time	2	-- 2				
5.3	23193- 8bl22	2- Fe7 2023	Day time	3	- 02				
5.4	23193- 8bl23	2- Fe7 2023	Day time	4	-- 6				
5.5	23193- 8bl24	2- Fe7 2023	Day time	5	858				
5.6	23193- 8bl25	2- Fe7 2023	Day time	6	- 64				
Spot - Maintanance Building FL.2 : ใต้ห้องงาน Electrical 1									
6	23193- 8bl26	2- Fe7 2023	Day time	1	41-	b	400t500	b	Pass

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P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319378

Date Received : Mar 03, 2023
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Report Number : 25866-3bl

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Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
-	Spot - Maintenance Building FL.2 : ใต้ห้องงาน Electrical 2								
	23193-8bl27	2- Fe7 2023	Day time	1	561	b	400t500	b	Pass
8	Spot - Maintenance Building FL.2 : ใต้ห้องงาน Electrical 3								
	23193-8bl28	2- Fe7 2023	Day time	1	5--	b	400t500	b	Pass
9	Spot - Maintenance Building FL.2 : ใต้ห้องงาน Macanical 1								
	23193-8bl29	2- Fe7 2023	Day time	1	401	b	400t500	b	Pass
10	Spot - Maintenance Building FL.2 : ใต้ห้องงาน Macanical 2								
	23193-8bl30	2- Fe7 2023	Day time	1	541	b	400t500	b	Pass
11	Spot - Maintenance Building FL.2 : ใต้ห้องงาน Macanical 3								
	23193-8bl31	2- Fe7 2023	Day time	1	413	b	400t500	b	Pass
12	Spot - Maintenance Building FL.2 : ใต้ห้องงาน Maintenance Manager								
	23193-8bl32	2- Fe7 2023	Day time	1	1,223	b	400t500	b	Pass
12	23193-8bl33	2- Fe7 2023	Day time	2	- 85	b	300		
12	23193-8bl34	2- Fe7 2023	Day time	3	- 23	b	200		
13	Spot - Maintenance Building FL.2 : ใต้ห้องงานผู้ช่วยวิศวกรกล								
	23193-8bl35	2- Fe7 2023	Day time	1	412	b	400t500	b	Pass
14	Spot - Maintenance Building FL.2 : ใต้ห้องงานผู้ช่วยช่างไฟฟ้า C&I								
	23193-8bl36	2- Fe7 2023	Day time	1	500	b	400t500	b	Pass

Measurement by : Phitsanupong Chaiya Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and) elfare, x.E.2560 B201-z dated Novem7er 2-, x.E.2560 B201-z, and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 x.E.2561 B2018z

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) ichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319379
Date Received : Mar 03, 2023
Date Reported : Mar 08, 2023
Report Num7er : 25866-6bl

Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Control Room Building FL.3 : Canteen									
1.1	23193-9bl	2- Fe7 2023	Day time	1	585	445.0	150	300	Pass
1.2	23193-9bl2	2- Fe7 2023	Day time	2	3 -				
1.3	23193-9bl3	2- Fe7 2023	Day time	3	323				
1.4	23193-9bl4	2- Fe7 2023	Day time	4	495				
1.1	23193-9bl5	2- Fe7 2023	Night time	1	644	491.5	150	300	Pass
1.2	23193-9bl6	2- Fe7 2023	Night time	2	404				
1.3	23193-9bl7	2- Fe7 2023	Night time	3	390				
1.4	23193-9bl8	2- Fe7 2023	Night time	4	528				
Area - Control Room Building FL.3 : Corridor									
2.1	23193-9bl9	2- Fe7 2023	Day time	1	491	362.3	50	100	Pass
2.2	23193-9bl10	2- Fe7 2023	Day time	2	244				
2.3	23193-9bl11	2- Fe7 2023	Day time	3	444				
2.4	23193-9bl12	2- Fe7 2023	Day time	4	261				
2.5	23193-9bl13	2- Fe7 2023	Day time	5	445				
2.6	23193-9bl14	2- Fe7 2023	Day time	6	190				
2.-	23193-9bl15	2- Fe7 2023	Day time	-	461				
2.1	23193-9bl16	2- Fe7 2023	Night time	1	652	- 38.6	50	100	Pass
2.2	23193-9bl17	2- Fe7 2023	Night time	2	516				
2.3	23193-9bl18	2- Fe7 2023	Night time	3	251				
2.4	23193-9bl19	2- Fe7 2023	Night time	4	590				
2.5	23193-9bl20	2- Fe7 2023	Night time	5	460				
2.6	23193-9bl21	2- Fe7 2023	Night time	6	901				
2.-	23193-9bl22	2- Fe7 2023	Night time	-	1,800				
Area - Control Room Building FL.3 : Document Room									
3.1	23193-9bl23	2- Fe7 2023	Day time	1	556	548.0	50	100	Pass
3.2	23193-9bl24	2- Fe7 2023	Day time	2	540				
3.1	23193-9bl25	2- Fe7 2023	Night time	1	622	582.5	50	100	Pass
3.2	23193-9bl26	2- Fe7 2023	Night time	2	543				
Spot - Control Room Building FL.3 : ใต้ห้องงาน Operation 1									
4	23193-9bl27	2- Fe7 2023	Day time	1	456	b	400b500	b	Pass
4	23193-9bl28	2- Fe7 2023	Night time	1	501	b	400b500	b	Pass

Technical Management

Supot S.
Supot Salamteh
Section (ead)

Approved by

Wichan Ch.
) ichan Choonharat
Assistant Manager

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11- 26821/ EMAIL



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2319379
Date Received : Mar 03, 2023
Date Reported : Mar 08, 2023
Report Num7er : 25866-6bl

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Spot - Control Room Building FL.3 : ใต้ห้องงาน Operation 2									
5	23193-9b29	2- Fe7 2023	Day time	1	445	b	400b500	b	Pass
5	23193-9b30	2- Fe7 2023	Night time	1	515	b	400b500	b	Pass
Spot - Control Room Building FL.3 : ใต้ห้องงาน Operation 3									
6	23193-9b31	2- Fe7 2023	Day time	1	402	b	400b500	b	Pass
6	23193-9b32	2- Fe7 2023	Night time	1	589	b	400b500	b	Pass
Spot - Control Room Building FL.3 : ใต้ห้องงาน Operation Manager									
-	23193-9b33	2- Fe7 2023	Day time	1	82-	b	400b500	b	Pass
Spot - Control Room Building FL.3 : ใต้ห้องงาน shift Leader 1									
8	23193-9b34	2- Fe7 2023	Day time	1	8-3	b	400b500	b	Pass
8	23193-9b35	2- Fe7 2023	Night time	1	614	b	400b500	b	Pass
Spot - Control Room Building FL.3 : ใต้ห้องงาน shift Leader 2									
9	23193-9b36	2- Fe7 2023	Day time	1	656	b	400b500	b	Pass
9	23193-9b37	2- Fe7 2023	Night time	1	51-	b	400b500	b	Pass
Area - Control Room Building FL.3 : ทางเดินห้อง Control Cabinet (บริเวณโถงกลางห้อง)									
10.1	23193-9b38	2- Fe7 2023	Day time	1	385	35-.0	50	100	Pass
10.2	23193-9b39	2- Fe7 2023	Day time	2	260				
10.3	23193-9b40	2- Fe7 2023	Day time	3	2--				
10.4	23193-9b41	2- Fe7 2023	Day time	4	506				
10.1	23193-9b42	2- Fe7 2023	Night time	1	260	252.3	50	100	Pass
10.2	23193-9b43	2- Fe7 2023	Night time	2	16-				
10.3	23193-9b44	2- Fe7 2023	Night time	3	226				
10.4	23193-9b45	2- Fe7 2023	Night time	4	356				

Measurement by : Phitsanupong Chaia Personnel of ALS Laboratory Group (Thailand) Co., Ltd.

Guideline : Notification of Department of Labour Protection and Welfare, x.E.2560 B201-z dated Novem7er 2-, x.E.2560 B201-z, and published in the Royal Government Gazette, Vol.135, Part 39D dated February 21 x.E.2561 B2018z

Technical Management

Supot S.
Supot Salamteh
Section (ead)

Approved by

Wichan Ch.
) ichan Choonharat
Assistant Manager

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339308

eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1D9Db1


Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Administration : Copy Room									
1.1	2DD9D0stbl	29 Ma3 202D	ea3 tmc	1	1,050	s55.5	150	D00	PaFF
1.2	2DD9D0stb2	29 Ma3 202D	ea3 tmc	2	661				
Area - Administration : Corridor									
2.1	2DD9D0stbD	29 Ma3 202D	ea3 tmc	1	412	260.2	50	100	PaFF
2.2	2DD9D0stb4	29 Ma3 202D	ea3 tmc	2	25s				
2.D	2DD9D0stb5	29 Ma3 202D	ea3 tmc	D	2DD				
2.4	2DD9D0stb6	29 Ma3 202D	ea3 tmc	4	21-				
2.5	2DD9D0stb-	29 Ma3 202D	ea3 tmc	5	24-				
2.6	2DD9D0stbs	29 Ma3 202D	ea3 tmc	6	204				
2.-	2DD9D0stb9	29 Ma3 202D	ea3 tmc	-	129				
2.s	2DD9D0stbl0	29 Ma3 202D	ea3 tmc	s	209				
2.9	2DD9D0stbl1	29 Ma3 202D	ea3 tmc	9	2Dl				
2.10	2DD9D0stbl2	29 Ma3 202D	ea3 tmc	10	462				
Area - Administration : Document Room									
D.1	2DD9D0stblD	29 Ma3 202D	ea3 tmc	1	- 09	6Ds.5	150	D00	PaFF
D.2	2DD9D0stbl4	29 Ma3 202D	ea3 tmc	2	56s				
Area - Administration : Electrical Room									
4.1	2DD9D0stbl5	29 Ma3 202D	ea3 tmc	1	216	402.5	100	200	PaFF
4.2	2DD9D0stbl6	29 Ma3 202D	ea3 tmc	2	21-				
4.D	2DD9D0stbl-	29 Ma3 202D	ea3 tmc	D	554				
4.4	2DD9D0stbls	29 Ma3 202D	ea3 tmc	4	62D				
Area - Administration : Meeting Room 1									
5.1	2DD9D0stbl9	29 Ma3 202D	ea3 tmc	1	1,090	1,s56	150	D00	PaFF
5.2	2DD9D0stb20	29 Ma3 202D	ea3 tmc	2	92-				
5.D	2DD9D0stb21	29 Ma3 202D	ea3 tmc	D	406				
5.4	2DD9D0stb22	29 Ma3 202D	ea3 tmc	4	D51				
5.5	2DD9D0stb2D	29 Ma3 202D	ea3 tmc	5	1,D45				
5.6	2DD9D0stb24	29 Ma3 202D	ea3 tmc	6	1,455				
5.-	2DD9D0stb25	29 Ma3 202D	ea3 tmc	-	5,540				
5.s	2DD9D0stb26	29 Ma3 202D	ea3 tmc	s	Dj- D0				

Technical Management


Su8ot Salamtch
Scvtion y cad

Approved by


(iVhan Choonharat
AFFRtant Managcr

The a7opc rcFullF arc palid onl3 for the anal3cd/tcFcd Fam8lcWBaF indvctcd in thIF rc8ort. No 8art of thIF rc8ort or vcrtlfvatc: ma3 7c rc8roductv in an3 from z thout z rittcn vonFcnt from the La7orator3. ALS La7orator3 Grou8 WthailandBProng3 rcvommcdF that thIF rc8ort IF not rc8roductv cVc8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339308

eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1D9Db1

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Administration : Meeting Room 2									
6.1	2DD9D0stb2-	29 Ma3 202D	ea3 tmc	1	s05	s2- .5	150	D00	PaFF
6.2	2DD9D0stb2s	29 Ma3 202D	ea3 tmc	2	s50				
Area - Administration : Server Room									
s.1	2DD9D0stb29	29 Ma3 202D	ea3 tmc	1	441	4- 6.5	100	200	PaFF
s.2	2DD9D0stbD0	29 Ma3 202D	ea3 tmc	2	512				
Spot - Administration : โต๊ะทำงาน EHS Manager									
9	2DD9D0stbD1	29 Ma3 202D	ea3 tmc	1	1,6- 0	b	400t500	b	PaFF
9	2DD9D0stbD2	29 Ma3 202D	ea3 tmc	2	1,540	b	D00		
9	2DD9D0stbD0	29 Ma3 202D	ea3 tmc	D	1,450	b	200		
Spot - Administration : โต๊ะทำงาน HR Manager									
10	2DD9D0stbD4	29 Ma3 202D	ea3 tmc	1	416	b	400t500	b	PaFF
Spot - Administration : โต๊ะทำงาน Plant Manager									
11	2DD9D0stbD5	29 Ma3 202D	ea3 tmc	1	665	b	400t500	b	PaFF
Spot - Administration : โต๊ะทำงานเจ้าหน้าที่ CR.									
12	2DD9D0stbD6	29 Ma3 202D	ea3 tmc	1	412	b	400t500	b	PaFF
Spot - Administration : โต๊ะทำงานเจ้าหน้าที่จัดซื้อ 1									
1D	2DD9D0stbD-	29 Ma3 202D	ea3 tmc	1	424	b	400t500	b	PaFF
Spot - Administration : โต๊ะทำงานผู้ช่วย HR/Admin									
14	2DD9D0stbDs	29 Ma3 202D	ea3 tmc	1	455	b	400t500	b	PaFF
Area - Administration : ห้องรับแขก									
15.1	2DD9D0stbD9	29 Ma3 202D	ea3 tmc	1	41s	D64.0	50	100	PaFF
15.2	2DD9D0stb40	29 Ma3 202D	ea3 tmc	2	D10				
Spot - Administration : โต๊ะทำงานเจ้าหน้าที่จัดซื้อ 1									
16	2DD9D0stb41	29 Ma3 202D	ea3 tmc	1	1,1D0	b	400t500	b	PaFF
16	2DD9D0stb42	29 Ma3 202D	ea3 tmc	2	1,D90	b	D00		
16	2DD9D0stb4D	29 Ma3 202D	ea3 tmc	D	1,050	b	200		

Measurement by : wuranaFak Pati PcrFonnc1 of ALS La7orator3 Grou8 WthailandBCo., Ltd.

Guideline : Notification of e8Bartmcnt of La7our Protctvion and (clfar, w.E.2560 W01- B dntcd Nopcm7cr 2-, w.E.2560 W01- B and 8u7lilFhcd in the Rc8al Gopcrnmct Ga)cttc, xol.1D5, Part D9c dntcd \c7ruar3 21 w.E.2561 W01sB

Technical Management


Su8ot Salamtch
Scvtion y cad

Approved by


(iVhan Choonharat
AFFRtant Managcr

The a7opc rcFullF arc palid onl3 for the anal3cd/tcFcd Fam8lcWBaF indvctcd in thIF rc8ort. No 8art of thIF rc8ort or vcrtlfvatc: ma3 7c rc8roductv in an3 from z thout z rittcn vonFcnt from the La7orator3. ALS La7orator3 Grou8 WthailandBProng3 rcvommcdF that thIF rc8ort IF not rc8roductv cVc8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339313
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1D94bl

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - วิสัย Switchyard Control Room : วิสัย 115 Kv Relay Protection									
1.1	2DD9D1Db1	29 Ma3 202D	ea3 timc	1	29-	D62.5	100	200	Pass
1.2	2DD9D1Db2	29 Ma3 202D	ea3 timc	2	D29				
1.D	2DD9D1DbD	29 Ma3 202D	ea3 timc	D	419				
1.4	2DD9D1Db4	29 Ma3 202D	ea3 timc	4	406				
1.5	2DD9D1Db5	29 Ma3 202D	ea3 timc	5	419				
1.6	2DD9D1Db6	29 Ma3 202D	ea3 timc	6	D05				
Area - วิสัย Switchyard Control Room : วิสัย 22 Kv Switch Gear									
2.1	2DD9D1Db-	29 Ma3 202D	ea3 timc	1	249	2FF.D	100	200	Pass
2.2	2DD9D1DbF	29 Ma3 202D	ea3 timc	2	1F4				
2.D	2DD9D1DbD	29 Ma3 202D	ea3 timc	D	441				
2.4	2DD9D1Db10	29 Ma3 202D	ea3 timc	4	D91				
2.5	2DD9D1Db11	29 Ma3 202D	ea3 timc	5	215				
2.6	2DD9D1Db12	29 Ma3 202D	ea3 timc	6	250				
Area - วิสัย Switchyard Control Room : วิสัย Battery 115 Kv Relay Protection									
D.1	2DD9D1Db1D	29 Ma3 202D	ea3 timc	1	201	20-.5	100	200	Pass
D.2	2DD9D1Db14	29 Ma3 202D	ea3 timc	2	214				
Area - วิสัย Switchyard Control Room : วิสัย Battery Terminal Sub 115 Kv									
4.1	2DD9D1Db15	29 Ma3 202D	ea3 timc	1	202	205.0	100	200	Pass
4.2	2DD9D1Db16	29 Ma3 202D	ea3 timc	2	20F				
Area - วิสัย Switchyard Control Room : วิสัย Terminal Sub 115 Kv									
5.1	2DD9D1Db1-	29 Ma3 202D	ea3 timc	1	1-4	260.-	100	200	Pass
5.2	2DD9D1Db1F	29 Ma3 202D	ea3 timc	2	1FF				
5.D	2DD9D1Db19	29 Ma3 202D	ea3 timc	D	296				
5.4	2DD9D1Db20	29 Ma3 202D	ea3 timc	4	D66				
5.5	2DD9D1Db21	29 Ma3 202D	ea3 timc	5	D4-				
5.6	2DD9D1Db22	29 Ma3 202D	ea3 timc	6	19D				

Measurement by : yuranasak Pati Pcrsonnel of ALS La7orator3 Grou8 (Thailand) Co., Ltd.

Guideline : Notification of ec8artment of La7our Protctvion and Welcfarc, y.E.2560 (201-) datcd Nopcm7cr 2-, y.E.2560 (201-), and 8u7lishcd in the Rc3al Goprcmmnt Gabcttc, zol.1D5, Part D9e datcd Vc7ruar3 21 y.E.2561 (201F)

Technical Management


Su8ot Salamtch
Scvtion Hcad

Approved by


Wivhan Choonharat
Assistant Managcr

The a7opc results arc palid onl3 for the anal3cd/tcstcd sam8lc(s) as indicatcd in this rc8ort. No 8art of this rc8ort or vcrtifvate: ma3 7c rc8roducd in an3 from without writtcn vonsent from the La7orator3. ALS La7orator3 Grou8 (Thailand) strongl3 rcvommnds that this rc8ort is not rc8roducd cxc8t in full.

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11- 26821/ EMAIL



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339314
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1D9- bl


Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comments
					Spot	Average	Spot/Min	Average	
Area - Chemical Skid (Cooling Tower)									
1.1	2DD9D14bl	29 Ma3 202D	ea3 timc	1	1,020	16,650	150	D00	Pass
1.2	2DD9D14b2	29 Ma3 202D	ea3 timc	2	26,600				
1.D	2DD9D14bD	29 Ma3 202D	ea3 timc	D	D0,000				
1.4	2DD9D14b4	29 Ma3 202D	ea3 timc	4	F,9F0				
1.1	2DD9D14b5	29 Ma3 202D	Night timc	1	6F6	6-4.5	150	D00	Pass
1.2	2DD9D14b6	29 Ma3 202D	Night timc	2	519				
1.D	2DD9D14b-	29 Ma3 202D	Night timc	D	-26				
1.4	2DD9D14bF	29 Ma3 202D	Night timc	4	-6-				
Area - Chemical Skid (Demineralization Plant)									
2.1	2DD9D14b9	29 Ma3 202D	ea3 timc	1	F,F60	12,-90	150	D00	Pass
2.2	2DD9D14bl0	29 Ma3 202D	ea3 timc	2	14,D00				
2.D	2DD9D14bl1	29 Ma3 202D	ea3 timc	D	14,-00				
2.4	2DD9D14bl2	29 Ma3 202D	ea3 timc	4	1D,D00				
Area - Chemical Skid (Pre-Treatment)									
D.1	2DD9D14blD	29 Ma3 202D	ea3 timc	1	6,-40	6,D1-	150	D00	Pass
D.2	2DD9D14bl4	29 Ma3 202D	ea3 timc	2	4,960				
D.D	2DD9D14bl5	29 Ma3 202D	ea3 timc	D	9,-40				
D.4	2DD9D14bl6	29 Ma3 202D	ea3 timc	4	5,F50				
D.5	2DD9D14bl-	29 Ma3 202D	ea3 timc	5	4,410				
D.6	2DD9D14blF	29 Ma3 202D	ea3 timc	6	6,200				
D.1	2DD9D14bl9	29 Ma3 202D	Night timc	1	2FF	D94.F	150	D00	Pass
D.2	2DD9D14b20	29 Ma3 202D	Night timc	2	D20				
D.D	2DD9D14b21	29 Ma3 202D	Night timc	D	4DF				
D.4	2DD9D14b22	29 Ma3 202D	Night timc	4	421				
D.5	2DD9D14b2D	29 Ma3 202D	Night timc	5	50F				
D.6	2DD9D14b24	29 Ma3 202D	Night timc	6	D94				

Technical Management


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Scvtion y cad

Approved by


Wivhan Choonharat
Assistant Managcr

The a7opc results arc palid onl3 for the anal3cd/tcstcd sam8lc(s) as indicatcd in this rc8ort. No 8art of this rc8ort or vcrtifvate: ma3 7c rc8roducd in an3 from without writtcn vonsent from the La7orator3. ALS La7orator3 Grou8 (Thailand) strongl3 rcvommnds that this rc8ort is not rc8roducd cxc8t in full.

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11- 26821/ EMAIL



Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339314
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1D9- bl

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Chemical Skid (Thermal Evaporation)									
4.1	2DD9D14b25	29 Ma3 202D	ea3 timc	1	9,- D0	10,696	150	D00	Pass
4.2	2DD9D14b26	29 Ma3 202D	ea3 timc	2	12,100				
4.D	2DD9D14b2-	29 Ma3 202D	ea3 timc	D	10,100				
4.4	2DD9D14b2F	29 Ma3 202D	ea3 timc	4	10,200				
4.5	2DD9D14b29	29 Ma3 202D	ea3 timc	5	9,020				
4.6	2DD9D14bD0	29 Ma3 202D	ea3 timc	6	10,050				
4.-	2DD9D14bD1	29 Ma3 202D	ea3 timc	-	12,000				
4.F	2DD9D14bD2	29 Ma3 202D	ea3 timc	F	12,D- 0				
4.1	2DD9D14bD0	29 Ma3 202D	Night timc	1	4DF	5- 2.6	150	D00	Pass
4.2	2DD9D14bD4	29 Ma3 202D	Night timc	2	54-				
4.D	2DD9D14bD5	29 Ma3 202D	Night timc	D	425				
4.4	2DD9D14bD6	29 Ma3 202D	Night timc	4	5D-				
4.5	2DD9D14bD-	29 Ma3 202D	Night timc	5	6- 1				
4.6	2DD9D14bDF	29 Ma3 202D	Night timc	6	505				
4.-	2DD9D14bD9	29 Ma3 202D	Night timc	-	561				
4.F	2DD9D14bD0	29 Ma3 202D	Night timc	F	F9-				
Area - Chemical Skid (Water Treatment Plant)									
5.1	2DD9D14bD1	29 Ma3 202D	ea3 timc	1	5,- D0	D,DF5	150	D00	Pass
5.2	2DD9D14bD2	29 Ma3 202D	ea3 timc	2	D,250				
5.D	2DD9D14bD0	29 Ma3 202D	ea3 timc	D	2,0- 0				
5.4	2DD9D14bD4	29 Ma3 202D	ea3 timc	4	2,490				
5.1	2DD9D14bD5	29 Ma3 202D	Night timc	1	6D2	469.5	150	D00	Pass
5.2	2DD9D14bD6	29 Ma3 202D	Night timc	2	DF9				
5.D	2DD9D14bD-	29 Ma3 202D	Night timc	D	490				
5.4	2DD9D14bDF	29 Ma3 202D	Night timc	4	D6-				

Measurement by : wuranasak Pati Pcrsonnel of ALS La7orator3 Grou8 WthailandBCo., Ltd.

Guideline : Notification of ec8artmct of La7our Protctvion and (clfar, w.E.2560 W01- B, and 8u7lishcd in the Rc3al Gopcrmmct Ga)cttc, xol.1D5, Part D9c datcd \c7ruar3 21 w.E.2561 W01FB

Technical Management


Su8ot Salamtch
Scvtion y cad

Approved by


(Wivhan Choonharat
Assistant Manager

The aspc rc8ortF arc palid onl3 for the anal3cd/tc8td sam8lcWBas indicatcd in this rc8ort. No 8art of this rc8ort or vcrtrfvatc: ma3 7c rc8roduvcd in an3 from z ithout z rittcn vonscnt from the La7orator3. ALS La7orator3 Grou8 WthailandBstrong3 rcvommcds that this rc8ort is not rc8roduvcd cxcv8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339315
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Numscr : 26- 1D9b7l

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comments
					Spot	Average	Spot/Min	Average	
Area - Control Room Building FL.1 : Corridor									
1.1	2DD9D157l	29 Ma3 202D	ea3 timc	1	bb	1- 1.0	50	100	PaFF
1.2	2DD9D1572	29 Ma3 202D	ea3 timc	2	91				
1.D	2DD9D157D	29 Ma3 202D	ea3 timc	D	202				
1.4	2DD9D157#	29 Ma3 202D	ea3 timc	4	D0D				
Area - Control Room Building FL.1 : ทางเดิน Cable Room									
2.1	2DD9D1575	29 Ma3 202D	ea3 timc	1	146	1b9.5	50	100	PaFF
2.2	2DD9D1576	29 Ma3 202D	ea3 timc	2	2- 4				
2.D	2DD9D157-	29 Ma3 202D	ea3 timc	D	1D2				
2.4	2DD9D157b	29 Ma3 202D	ea3 timc	4	206				
Area - Control Room Building FL.1 : หน้าประตูทางเข้าอาคาร CCR									
D.1	2DD9D1579	29 Ma3 202D	ea3 timc	1	4,2b0	4,615	50	100	PaFF
D.2	2DD9D157l0	29 Ma3 202D	ea3 timc	2	4,950				

Measurement by : yuranaFak Pati PcrFonnel of ALS Lasorator3 Grou8 (Thailand) Co., Ltd.

Guideline : Notification of ec8artmct of Lasour Protctvion and Wclfar, y.E.2560 (201-) datcd Nopcmscr 2- , y.E.2560 (201-), and 8usliFhcd in the Rc3al Gopcrmmct GaBcttc, zol.1D5, Part D9c datcd Vcsruar3 21 y.E.2561 (201b)

Technical Management


Su8ot Salamtch
Scvtion Hcad

Approved by


Wivhan Choonharat
AFFRtant Manager

The aspc rc8ortF arc palid onl3 for the anal3Bcd/tc8td Fm8lc(F) af indicatcd in this rc8ort. No 8art of this rc8ort or vcrtrfvatc: ma3 sc rc8roduvcd in an3 from without writtcn vonscnt from the Lasorator3. ALS Lasorator3 Grou8 (Thailand) Prongl3 rcvommcdF that this rc8ort if not rc8roduvcd cxcv8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339316
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1401bl

Page 1 of D

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Control Room Building FL.2 : Battery Room									
1.1	2DD9D16bl	29 Ma3 202D	ea3 timc	1	D-D	509.5	100	200	Pass
1.2	2DD9D16b2	29 Ma3 202D	ea3 timc	2	646				
1.1	2DD9D16bD	29 Ma3 202D	Night timc	1	D56	4F2.5	100	200	Pass
1.2	2DD9D16b4	29 Ma3 202D	Night timc	2	609				
Area - Control Room Building FL.2 : ทางเดินในห้อง MCC									
2.1	2DD9D16b5	29 Ma3 202D	ea3 timc	1	2D2	206.D	50	100	Pass
2.2	2DD9D16b6	29 Ma3 202D	ea3 timc	2	209				
2.D	2DD9D16b-	29 Ma3 202D	ea3 timc	D	114				
2.4	2DD9D16bF	29 Ma3 202D	ea3 timc	4	1- 1				
2.5	2DD9D16b9	29 Ma3 202D	ea3 timc	5	12F				
2.6	2DD9D16bl0	29 Ma3 202D	ea3 timc	6	126				
2.-	2DD9D16bl1	29 Ma3 202D	ea3 timc	-	D2D				
2.F	2DD9D16bl2	29 Ma3 202D	ea3 timc	F	14F				
2.9	2DD9D16blD	29 Ma3 202D	ea3 timc	9	1D-				
2.10	2DD9D16bl4	29 Ma3 202D	ea3 timc	10	96				
2.11	2DD9D16bl5	29 Ma3 202D	ea3 timc	11	2FD				
2.12	2DD9D16bl6	29 Ma3 202D	ea3 timc	12	11-				
2.1D	2DD9D16bl-	29 Ma3 202D	ea3 timc	1D	29D				
2.14	2DD9D16blF	29 Ma3 202D	ea3 timc	14	102				
2.15	2DD9D16bl9	29 Ma3 202D	ea3 timc	15	290				
2.16	2DD9D16b20	29 Ma3 202D	ea3 timc	16	152				
2.1-	2DD9D16b21	29 Ma3 202D	ea3 timc	1-	2F2				
2.1F	2DD9D16b22	29 Ma3 202D	ea3 timc	1F	101				
2.19	2DD9D16b2D	29 Ma3 202D	ea3 timc	19	D0-				
2.20	2DD9D16b24	29 Ma3 202D	ea3 timc	20	126				
2.21	2DD9D16b25	29 Ma3 202D	ea3 timc	21	D5D				
2.22	2DD9D16b26	29 Ma3 202D	ea3 timc	22	105				
2.2D	2DD9D16b2-	29 Ma3 202D	ea3 timc	2D	D04				
2.24	2DD9D16b2F	29 Ma3 202D	ea3 timc	24	142				
2.25	2DD9D16b29	29 Ma3 202D	ea3 timc	25	D04				
2.26	2DD9D16bD0	29 Ma3 202D	ea3 timc	26	224				
2.2-	2DD9D16bD1	29 Ma3 202D	ea3 timc	2-	222				

Technical Management

Supt S
Su8ot Salamtch
Scvtion y cad

Approved by

Wichan Ch...
(i vhan Choonharat
Assistant Managcr

The a7opc results arc palid onl3 for the anal3/cd/tcstd sam8lcWBas indatced in this rc8ort. No 8art of this rc8ort or vcrtifvate: ma3 7c rc8roducd in an3 from z ithout z ritten vonsent from the La7orator3. ALS La7orator3 Grou8 Whailand8strong3 rcvommends that this rc8ort is not rc8roducd cVc8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339316
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1401bl

Page 2 of D

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
	Area - Control Room Building FL.2 : ทางเดินในห้อง MCC								
2.2F	2DD9D16bD2	29 Ma3 202D	ea3 timc	2F	D0F				
2.29	2DD9D16bD0	29 Ma3 202D	ea3 timc	29	154				
2.D0	2DD9D16bD4	29 Ma3 202D	ea3 timc	D0	D- 6				
2.D1	2DD9D16bD5	29 Ma3 202D	ea3 timc	D1	125				
2.D2	2DD9D16bD6	29 Ma3 202D	ea3 timc	D2	24-				
2.1	2DD9D16bD-	29 Ma3 202D	Night timc	1	251	20F.1	50	100	Pass
2.2	2DD9D16bDF	29 Ma3 202D	Night timc	2	21-				
2.D	2DD9D16bD9	29 Ma3 202D	Night timc	D	12D				
2.4	2DD9D16b40	29 Ma3 202D	Night timc	4	1F0				
2.5	2DD9D16b41	29 Ma3 202D	Night timc	5	1D6				
2.6	2DD9D16b42	29 Ma3 202D	Night timc	6	140				
2.-	2DD9D16b4D	29 Ma3 202D	Night timc	-	D01				
2.F	2DD9D16b44	29 Ma3 202D	Night timc	F	15-				
2.9	2DD9D16b45	29 Ma3 202D	Night timc	9	155				
2.10	2DD9D16b46	29 Ma3 202D	Night timc	10	102				
2.11	2DD9D16b4-	29 Ma3 202D	Night timc	11	2- 4				
2.12	2DD9D16b4F	29 Ma3 202D	Night timc	12	109				
2.1D	2DD9D16b49	29 Ma3 202D	Night timc	1D	2- 5				
2.14	2DD9D16b50	29 Ma3 202D	Night timc	14	99				
2.15	2DD9D16b51	29 Ma3 202D	Night timc	15	2- F				
2.16	2DD9D16b52	29 Ma3 202D	Night timc	16	1- -				
2.1-	2DD9D16b5D	29 Ma3 202D	Night timc	1-	D1-				
2.1F	2DD9D16b54	29 Ma3 202D	Night timc	1F	115				
2.19	2DD9D16b55	29 Ma3 202D	Night timc	19	2F1				
2.20	2DD9D16b56	29 Ma3 202D	Night timc	20	141				
2.21	2DD9D16b5-	29 Ma3 202D	Night timc	21	D60				
2.22	2DD9D16b5F	29 Ma3 202D	Night timc	22	121				
2.2D	2DD9D16b59	29 Ma3 202D	Night timc	2D	292				
2.24	2DD9D16b60	29 Ma3 202D	Night timc	24	12F				
2.25	2DD9D16b61	29 Ma3 202D	Night timc	25	D12				
2.26	2DD9D16b62	29 Ma3 202D	Night timc	26	19-				
2.2-	2DD9D16b6D	29 Ma3 202D	Night timc	2-	24-				

Technical Management

Supt S
Su8ot Salamtch
Scvtion y cad

Approved by

Wichan Ch...
(i vhan Choonharat
Assistant Managcr

The a7opc results arc palid onl3 for the anal3/cd/tcstd sam8lcWBAs indatced in this rc8ort. No 8art of this rc8ort or vcrtifvate: ma3 7c rc8roducd in an3 from z ithout z ritten vonsent from the La7orator3. ALS La7orator3 Grou8 Whailand8strong3 rcvommends that this rc8ort is not rc8roducd cVc8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339316
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1401bl

Page: D of D

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Control Room Building FL.2 : ทางเดินในห้อง MCC									
2.2F	2DD9D16b64	29 Ma3 202D	Night timc	2F	D12				
2.29	2DD9D16b65	29 Ma3 202D	Night timc	29	166				
2.D0	2DD9D16b66	29 Ma3 202D	Night timc	D0	D56				
2.D1	2DD9D16b6-	29 Ma3 202D	Night timc	D1	114				
2.D2	2DD9D16b6F	29 Ma3 202D	Night timc	D2	225				
Area - Control Room Building FL.2 : ทางเดินบันไดหน้าห้อง MCC									
D.1	2DD9D16b69	29 Ma3 202D	ea3 timc	1	106	2-D.D	50	100	Pass
D.2	2DD9D16b-0	29 Ma3 202D	ea3 timc	2	12F				
D.D	2DD9D16b-1	29 Ma3 202D	ea3 timc	D	12F				
D.4	2DD9D16b-2	29 Ma3 202D	ea3 timc	4	- D1				


Measurement by : wuranasak Pati Pcrsonncil of ALS La7orator3 Grou8 WthailandBCo., Ltd.

Guideline : Notification of ec8artmct of La7our Protecvtion and (clfar, w.E.2560 W01-Bdatcd Nopcm7cr 2-, w.E.2560 W01-B and 8u7lishcd in the Rc3al Gopcrnmct Ga)cttc, xol.1D5, Part D9e datcd \c7ruar3 21 w.E.2561 W01FB

Technical Management


Su8ot Salamtch
Scvtion y cad

Approved by


(iwhan Choonharat
Assistant Managr

The a7opc rcsults arc palid onl3 for the anal3cd/tcstcd sam8lcWBas indicatcd in this rc8ort. No 8art of this rc8ort or vcrtificatc ma3 7c rc8roducd in an3 from z ithout z rittcn vonsent from the La7orator3. ALS La7orator3 Grou8 WthailandBstrong3 rcvommnds that this rc8ort is not rc8roducd cVc8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2331397
catv Rvpxi8vd : Ma3 1D, 202e
catv Rv-ortvd : Jun 02, 202e
Rv-ort Num7vr : 26D140ebl

Page: 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Control Room Building FL.3 : Canteen									
1.1	2ee9e1Dbl	29 Ma3 202e	c a3 timv	1	DD1	669.0	150	e00	Pass
1.2	2ee9e1Dbl2	29 Ma3 202e	c a3 timv	2	64e				
1.e	2ee9e1Dbl	29 Ma3 202e	c a3 timv	e	61e				
1.4	2ee9e1Dbl4	29 Ma3 202e	c a3 timv	4	649				
1.1	2ee9e1Dbl5	29 Ma3 202e	Night timv	1	D56	654.5	150	e00	Pass
1.2	2ee9e1Dbl6	29 Ma3 202e	Night timv	2	59F				
1.e	2ee9e1DblD	29 Ma3 202e	Night timv	e	60e				
1.4	2ee9e1DblF	29 Ma3 202e	Night timv	4	661				
Area - Control Room Building FL.3 : Corridor									
2.1	2ee9e1Dbl9	29 Ma3 202e	c a3 timv	1	2D9	246.e	50	100	Pass
2.2	2ee9e1Dbl0	29 Ma3 202e	c a3 timv	2	26D				
2.e	2ee9e1Dbl1	29 Ma3 202e	c a3 timv	e	1e4				
2.4	2ee9e1Dbl2	29 Ma3 202e	c a3 timv	4	2D2				
2.5	2ee9e1Dbl	29 Ma3 202e	c a3 timv	5	e25				
2.6	2ee9e1Dbl4	29 Ma3 202e	c a3 timv	6	105				
2.D	2ee9e1Dbl5	29 Ma3 202e	c a3 timv	D	e42				
2.1	2ee9e1Dbl6	29 Ma3 202e	Night timv	1	e0e	24D.D	50	100	Pass
2.2	2ee9e1DblD	29 Ma3 202e	Night timv	2	25F				
2.e	2ee9e1DblF	29 Ma3 202e	Night timv	e	154				
2.4	2ee9e1Dbl9	29 Ma3 202e	Night timv	4	266				
2.5	2ee9e1Dbl0	29 Ma3 202e	Night timv	5	e29				
2.6	2ee9e1Dbl21	29 Ma3 202e	Night timv	6	112				
2.D	2ee9e1Dbl22	29 Ma3 202e	Night timv	D	e12				
Area - Control Room Building FL.3 : Document Room									
e.1	2ee9e1Dbl2e	29 Ma3 202e	c a3 timv	1	eD1	ee6.0	50	100	Pass
e.2	2ee9e1Dbl24	29 Ma3 202e	c a3 timv	2	e01				
e.1	2ee9e1Dbl25	29 Ma3 202e	Night timv	1	451	e6D.0	50	100	Pass
e.2	2ee9e1Dbl26	29 Ma3 202e	Night timv	2	2Fe				
Spot - Control Room Building FL.3 : โต๊ะทำงาน Operation 9									
4	2ee9e1Dbl2D	29 Ma3 202e	c a3 timv	1	416	b	400t500	b	Pass
4	2ee9e1Dbl2F	29 Ma3 202e	Night timv	1	405	b	400t500	b	Pass

Technical Management


Su-ot Salamtch
Svpxion y vad

Approved by


(iphan Choonharat
Assistant Managr

The a7o8v rcsults arc palid onl3 for the anal3cd/vd/vstcd sam-lvWBas indicatcd in this rv-ort. No - art of this rv-ort or pvtificatv ma3 7v rv-oduacd in an3 from z ithout z rittcn vonsent from the La7orator3. ALS La7orator3 Grou- WthailandBstrong3 rvommnds that this rv-ort is not rv-oduacd vVpvt 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
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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2331397
catv Rvpv8vd : Ma3 1D, 202e
catv Rv-ortvd : Jun 02, 202e
Rv-ort Num7vr : 26D140ebl

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Spot - Control Room Building FL.3 : โต๊ะทำงาน Operation 2									
5	2ee9e1Dbe9	29 Ma3 202e	c a3 timv	1	405	b	400t500	b	Pass
5	2ee9e1Dbe0	29 Ma3 202e	Night timv	1	410	b	400t500	b	Pass
Spot - Control Room Building FL.3 : โต๊ะทำงาน Operation 3									
6	2ee9e1Dbe1	29 Ma3 202e	c a3 timv	1	412	b	400t500	b	Pass
6	2ee9e1Dbe2	29 Ma3 202e	Night timv	1	404	b	400t500	b	Pass
Spot - Control Room Building FL.3 : โต๊ะทำงาน Operation Manager									
D	2ee9e1Dbe	29 Ma3 202e	c a3 timv	1	69F	b	400t500	b	Pass
Spot - Control Room Building FL.3 : โต๊ะทำงาน shift Leader 9									
F	2ee9e1Dbe4	29 Ma3 202e	c a3 timv	1	4F1	b	400t500	b	Pass
F	2ee9e1Dbe5	29 Ma3 202e	Night timv	1	51e	b	400t500	b	Pass
Spot - Control Room Building FL.3 : โต๊ะทำงาน shift Leader 2									
9	2ee9e1Dbe6	29 Ma3 202e	c a3 timv	1	DDF	b	400t500	b	Pass
9	2ee9e1DbeD	29 Ma3 202e	Night timv	1	594	b	400t500	b	Pass
Area - Control Room Building FL.3 : ทางเดินห้อง Control Cabinet (บริเวณโซนกลางห้อง)									
10.1	2ee9e1DbeF	29 Ma3 202e	c a3 timv	1	4F1	e45.5	50	100	Pass
10.2	2ee9e1Dbe9	29 Ma3 202e	c a3 timv	2	e22				
10.e	2ee9e1Dbf0	29 Ma3 202e	c a3 timv	e	2D4				
10.4	2ee9e1Dbf1	29 Ma3 202e	c a3 timv	4	e05				
10.1	2ee9e1Dbf2	29 Ma3 202e	Night timv	1	44D	ee2.e	50	100	Pass
10.2	2ee9e1Dbf4	29 Ma3 202e	Night timv	2	292				
10.e	2ee9e1Dbf4	29 Ma3 202e	Night timv	e	e14				
10.4	2ee9e1Dbf5	29 Ma3 202e	Night timv	4	2D6				

Measurement by : wuranasak Pati Pvrsonnvi of ALS La7orator3 Grou- VThailandB Co., Ltd.

Guideline : Notification of c-v-artmvt of La7our Prottyon and (vifarv, w.E.2560 W01DBdatvd No8vm7vr 2D, w.E.2560 W01DB and -u7lishvd in thv Ro3al Go8vmmvnt Ga)vtvt, xol.1e5, Part e9c datvd v7ruar3 21 w.E.2561 W01FB

Technical Management

Supt S
Su-ot Salamtvh
Svpton y vad

Approved by

Wichan Choonharat
(Iphan Choonharat
Assistant Managvr

The a7o8v rsvlts arv Balid onl3 for thv anal3/vd/tvsvd sam- lW8B adpatvd in thv rv-ort. No -art of thv rv-ort or prtvtptv 7v rv-ortupvd in an3 from z lthout z rltvvt psvsvt from thv La7orator3. ALS La7orator3 Grou- VThailandBstrong3 rvpommnds that thv rv-ort is not rv-ortupvd vlvv-t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339318
eatc Rvcvpcd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26-1405bl

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comments
					Spot	Average	Spot/Min	Average	
1	Spot - Lab Chemical Building : โต๊ะทำงาน Operation Demin								
	2DD9D1stbl	29 Ma3 202D	ea3 timc	1	410	b	400t500	b	PaFF
2	Spot - Lab Chemical Building : โต๊ะทำงาน นักเคมี								
	2DD9D1stb2	29 Ma3 202D	ea3 timc	1	402	b	400t500	b	PaFF
D	Spot - Lab Chemical Building : โต๊ะวิเคราะห์คุณภาพน้ำ								
	2DD9D1stbD	29 Ma3 202D	ea3 timc	1	595	b	400t500	b	PaFF
4.1	Area - Lab Chemical Building : ทางเดิน MCC Demin Plant								
	2DD9D1stb4	29 Ma3 202D	ea3 timc	1	2D4	29s.D	50	100	PaFF
4.2	2DD9D1stb5	29 Ma3 202D	ea3 timc	2	DsD				
4.D	2DD9D1stb6	29 Ma3 202D	ea3 timc	D	210				
4.4	2DD9D1stb	29 Ma3 202D	ea3 timc	4	D66				
5.1	Area - Lab Chemical Building : ทางเดินอาคาร Lab								
	2DD9D1stb8	29 Ma3 202D	ea3 timc	1	506	491.5	50	100	PaFF
5.2	2DD9D1stb9	29 Ma3 202D	ea3 timc	2	-05				
5.D	2DD9D1stbl0	29 Ma3 202D	ea3 timc	D	5D1				
5.4	2DD9D1stbl1	29 Ma3 202D	ea3 timc	4	224				

Measurement by : yuranaFak Pati PcrFonnci of ALS La7orator3 Grou8 (Thailand) Co., Ltd.

Guideline : Notification of ec8artmct of La7our Protctvtn and Welfarc, y.E.2560 (201-) datcd Nopcm7cr 2-, y.E.2560 (201-), and 8u7llfhcd in thc Ro3al Gopcrmmct Ga8cttc, zol.1D5, Part D9e datcd Vc7ruar3 21 y.E.2561 (201s)

Technical Management

Supt S
Su8ot Salamtch
Scvtn Hcad

Approved by

Wichan Choonharat
Wlvhan Choonharat
AFFPtant Managvr

The a7opc rcFullF-arc palid onl3 for thc anal3kcd/tcRcd Famblc(F) af Indicated in thv Rc8ort. No 8art of thv Rc8ort or vcrvtvatec ma3 7c rc8roductv in an3 from without wrtttn vnfCent from thc La7orator3. ALS La7orator3 Grou8 (Thailand) Prongl3 rcvommndF that thv Rc8ort IF not rc8roductv cxc8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339319
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1406bl

Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Maintenance Building FL.1 : Corridor									
1.1	2DD9D19bl	29 Ma3 202D	ea3 tmc	1	291	D94.9	50	100	Pass
1.2	2DD9D19b2	29 Ma3 202D	ea3 tmc	2	19D				
1.D	2DD9D19bD	29 Ma3 202D	ea3 tmc	D	D55				
1.4	2DD9D19b4	29 Ma3 202D	ea3 tmc	4	52-				
1.5	2DD9D19b5	29 Ma3 202D	ea3 tmc	5	5FD				
1.6	2DD9D19b6	29 Ma3 202D	ea3 tmc	6	246				
1.-	2DD9D19b-	29 Ma3 202D	ea3 tmc	-	425				
1.F	2DD9D19bF	29 Ma3 202D	ea3 tmc	F	612				
1.9	2DD9D19b9	29 Ma3 202D	ea3 tmc	9	D22				
Area - Maintenance Building FL.1 : Utility Room									
2.1	2DD9D19bl0	29 Ma3 202D	ea3 tmc	1	519	405.0	50	100	Pass
2.2	2DD9D19bl1	29 Ma3 202D	ea3 tmc	2	291				
Area - Maintenance Building FL.1 : Work Shop									
D.1	2DD9D19bl2	29 Ma3 202D	ea3 tmc	1	256	D5- .D	150	D00	Pass
D.2	2DD9D19blD	29 Ma3 202D	ea3 tmc	2	DF5				
D.D	2DD9D19bl4	29 Ma3 202D	ea3 tmc	D	42F				
D.4	2DD9D19bl5	29 Ma3 202D	ea3 tmc	4	422				
D.5	2DD9D19bl6	29 Ma3 202D	ea3 tmc	5	2F5				
D.6	2DD9D19bl-	29 Ma3 202D	ea3 tmc	6	42F				
D.-	2DD9D19blF	29 Ma3 202D	ea3 tmc	-	25-				
D.F	2DD9D19bl9	29 Ma3 202D	ea3 tmc	F	210				
D.9	2DD9D19b20	29 Ma3 202D	ea3 tmc	9	411				
D.10	2DD9D19b21	29 Ma3 202D	ea3 tmc	10	41F				
D.11	2DD9D19b22	29 Ma3 202D	ea3 tmc	11	4DF				
D.12	2DD9D19b2D	29 Ma3 202D	ea3 tmc	12	D49				
Spot - Maintenance Building FL.1 : โต๊ะทำงาน C&I 1									
4	2DD9D19b24	29 Ma3 202D	ea3 tmc	1	412	b	400L500	b	Pass
Spot - Maintenance Building FL.1 : โต๊ะทำงาน C&I 2									
5	2DD9D19b25	29 Ma3 202D	ea3 tmc	1	40D	b	400L500	b	Pass
Spot - Maintenance Building FL.1 : โต๊ะทำงาน C&I 3									
6	2DD9D19b26	29 Ma3 202D	ea3 tmc	1	46-	b	400L500	b	Pass

Technical Management

Supt S
Su8ot Salamtch
Scvtion y cad

Approved by

Wichan Ch...
(i vhan Choonharat
Assistant Managr

The a7opc results are valid onl3 for the anal3cd/tscd sam8lcWBas indicated in this rc8ort. No 8art of this rc8ort or vcrtrfvc: ma3 7c rc8roductd in an3 from z lthout z rittcn vonscrnt from the La7orator3. ALS La7orator3 Grou8 Wthailand8strong3 rcvommnds that this rc8ort is not rc8roductd cVc8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339319
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1406bl

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Spot - Maintenance Building FL.1 : โต๊ะทำงาน C&I 4									
-	2DD9D19b2-	29 Ma3 202D	ea3 tmc	1	409	b	400L500	b	Pass
Area - Maintenance Building FL.1 : บันไดทางเดิน									
F.1	2DD9D19b2F	29 Ma3 202D	ea3 tmc	1	D65	1- 5.2	50	100	Pass
F.2	2DD9D19b29	29 Ma3 202D	ea3 tmc	2	92				
F.D	2DD9D19bD0	29 Ma3 202D	ea3 tmc	D	F1				
F.4	2DD9D19bD1	29 Ma3 202D	ea3 tmc	4	--				
F.5	2DD9D19bD2	29 Ma3 202D	ea3 tmc	5	125				
F.6	2DD9D19bD0	29 Ma3 202D	ea3 tmc	6	D21				

Measurement by : wuranasak Pati Pcrsonnel of ALS La7orator3 Grou8 WthailandBCo., Ltd.

Guideline : Notification of e8artmct of La7our Protctvtn and (clrfarc, w.E.2560 W01- Bdatcd Nopcm7cr 2-, w.E.2560 W01- B and 8u7lshcd in the Rc3al Gopcrnmct Ga)cttc, xol.1D5, Part D9e datcd \c7ruar3 21 w.E.2561 W01FB

Technical Management

Supt S
Su8ot Salamtch
Scvtion y cad

Approved by

Wichan Ch...
(i vhan Choonharat
Assistant Managr

The a7opc results are valid onl3 for the anal3cd/tscd sam8lcWBas indicated in this rc8ort. No 8art of this rc8ort or vcrtrfvc: ma3 7c rc8roductd in an3 from z lthout z rittcn vonscrnt from the La7orator3. ALS La7orator3 Grou8 Wthailand8strong3 rcvommnds that this rc8ort is not rc8roductd cVc8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339320
eatc Rcvcpjcd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1409bl

Page 1 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Maintanance Building FL.2 : Canteen									
1.1	2DD9D20bl	29 Ma3 202D	ea3 tmc	1	42s	D- 5.D	150	D00	PaFF
1.2	2DD9D20b2	29 Ma3 202D	ea3 tmc	2	451				
1.D	2DD9D20bD	29 Ma3 202D	ea3 tmc	D	D16				
1.4	2DD9D20b4	29 Ma3 202D	ea3 tmc	4	D06				
Area - Maintanance Building FL.2 : Copy Room									
2.1	2DD9D20b5	29 Ma3 202D	ea3 tmc	1	D- 5	D96.0	150	D00	PaFF
2.2	2DD9D20b6	29 Ma3 202D	ea3 tmc	2	41-				
Area - Maintanance Building FL.2 : Corridor									
D.1	2DD9D20b-	29 Ma3 202D	ea3 tmc	1	494	D6- .9	50	100	PaFF
D.2	2DD9D20b8	29 Ma3 202D	ea3 tmc	2	446				
D.D	2DD9D20b9	29 Ma3 202D	ea3 tmc	D	551				
D.4	2DD9D20bD	29 Ma3 202D	ea3 tmc	4	55-				
D.5	2DD9D20b11	29 Ma3 202D	ea3 tmc	5	529				
D.6	2DD9D20b12	29 Ma3 202D	ea3 tmc	6	1--				
D.-	2DD9D20b1D	29 Ma3 202D	ea3 tmc	-	4D6				
D.s	2DD9D20b14	29 Ma3 202D	ea3 tmc	s	5-				
D.9	2DD9D20b15	29 Ma3 202D	ea3 tmc	9	64				
Area - Maintanance Building FL.2 : Document Room									
4.1	2DD9D20b16	29 Ma3 202D	ea3 tmc	1	105	5s9.D	50	100	PaFF
4.2	2DD9D20b1-	29 Ma3 202D	ea3 tmc	2	404				
4.D	2DD9D20b1s	29 Ma3 202D	ea3 tmc	D	- 2s				
4.4	2DD9D20b19	29 Ma3 202D	ea3 tmc	4	1,120				
Area - Maintanance Building FL.2 : Metting Room									
5.1	2DD9D20b20	29 Ma3 202D	ea3 tmc	1	61D	654.2	150	D00	PaFF
5.2	2DD9D20b21	29 Ma3 202D	ea3 tmc	2	5DD				
5.D	2DD9D20b22	29 Ma3 202D	ea3 tmc	D	604				
5.4	2DD9D20b2D	29 Ma3 202D	ea3 tmc	4	- DD				
5.5	2DD9D20b24	29 Ma3 202D	ea3 tmc	5	- Ds				
5.6	2DD9D20b25	29 Ma3 202D	ea3 tmc	6	- 04				
Spot - Maintanance Building FL.2 : ใต้ทำงาน Electrical 1									
6	2DD9D20b26	29 Ma3 202D	ea3 tmc	1	4DD	b	400t500	b	PaFF

Technical Management


Su8ot Salamtch
Scvtion y cad

Approved by


(iwhan Choonharat
AFFRtant Managcr

The a7opc rcFullFarc palid onl3 for the anal3cd/tcRcd Fam8lcWBaF indatived in thif rc8ort. No 8art of thif rc8ort or vcrtilvatc: ma3 7c rc8roduvcd in an3 from z ithout z rittcn vcrFcnt from the La7orator3. ALS La7orator3 Grou8 Wthailand8Prong3 rcvommendF that thif rc8ort IF not rc8roduvcd cVc8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339320
eatc Rcvcpjcd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1409bl

Page 2 of 2

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot /Area No.	Illuminance (Lux)		Guideline Limit		Comments
					Spot	Average	Spot/Min	Average	
	Spot - Maintenance Building FL.2 : ใต้ทำงาน Electrical 2								
-	2DD9D20b2-	29 Ma3 202D	ea3 tmc	1	522	b	400t500	b	PaFF
	Spot - Maintenance Building FL.2 : ใต้ทำงาน Electrical 3								
s	2DD9D20b2s	29 Ma3 202D	ea3 tmc	1	526	b	400t500	b	PaFF
	Spot - Maintenance Building FL.2 : ใต้ทำงาน Macanical 1								
9	2DD9D20b29	29 Ma3 202D	ea3 tmc	1	422	b	400t500	b	PaFF
	Spot - Maintenance Building FL.2 : ใต้ทำงาน Macanical 2								
10	2DD9D20bD0	29 Ma3 202D	ea3 tmc	1	410	b	400t500	b	PaFF
	Spot - Maintenance Building FL.2 : ใต้ทำงาน Macanical 3								
11	2DD9D20bD1	29 Ma3 202D	ea3 tmc	1	405	b	400t500	b	PaFF
	Spot - Maintenance Building FL.2 : ใต้ทำงาน Maintenance Manager								
12	2DD9D20bD2	29 Ma3 202D	ea3 tmc	1	s9D	b	400t500	b	PaFF
	Spot - Maintenance Building FL.2 : ใต้ทำงานผู้ช่วยเครื่องกล								
1D	2DD9D20bD0	29 Ma3 202D	ea3 tmc	1	4- s	b	400t500	b	PaFF
	Spot - Maintenance Building FL.2 : ใต้ทำงานผู้ช่วยช่างไฟฟ้า C&I								
14	2DD9D20bD4	29 Ma3 202D	ea3 tmc	1	4Ds	b	400t500	b	PaFF


Measurement by : wuranaFak Pati PcrFonncrl of ALS La7orator3 Grou8 WthailandBCo., Ltd.

Guideline : Notifivation of ec8artment of La7our Protcvtion and (clfar, w.E.2560 W01- Bdated Nopcm7cr 2-, w.E.2560 W01- B and 8u7iifhcd in the Rc3al Gopcrnmcnt Ga)cttc, xol.1D5, Part D9e dated \c7ruar3 21 w.E.2561 W01sB

Technical Management


Su8ot Salamtch
Scvtion y cad

Approved by


(iwhan Choonharat
AFFRtant Managcr

The a7opc rcFullFarc palid onl3 for the anal3cd/tcRcd Fam8lcWBaF indatived in thif rc8ort. No 8art of thif rc8ort or vcrtilvatc: ma3 7c rc8roduvcd in an3 from z ithout z rittcn vcrFcnt from the La7orator3. ALS La7orator3 Grou8 Wthailand8Prong3 rcvommendF that thif rc8ort IF not rc8roduvcd cVc8t in full.

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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339321
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 1411bl

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - Boiler Steam Turbine Gas Turbine (ฝั่งขวา) 11									
1.1	2DD9D21bl	29 Ma3 202D	Night timc	1	52-	601.D	100	200	Pass
1.2	2DD9D21b2	29 Ma3 202D	Night timc	2	59D				
1.D	2DD9D21bD	29 Ma3 202D	Night timc	D	60D				
1.4	2DD9D21b4	29 Ma3 202D	Night timc	4	6F2				
Area - Boiler Steam Turbine Gas Turbine (ฝั่งซ้าย) 12									
2.1	2DD9D21b5	29 Ma3 202D	Night timc	1	6DF	5F1.0	100	200	Pass
2.2	2DD9D21b6	29 Ma3 202D	Night timc	2	54-				
2.D	2DD9D21b-	29 Ma3 202D	Night timc	D	655				
2.4	2DD9D21bF	29 Ma3 202D	Night timc	4	4F4				


Measurement by : yuranasak Pati Pcrsonncl of ALS La7orator3 Grou8 (Thailand) Co., Ltd.

Guideline : Notification of ec8artmcnt of La7our Protcvton and Wcllfarc, y.E.2560 (201-) datcd Nopcm7cr 2- , y.E.2560 (201-), and 8u7lishcd in thc Ro3al Gopcrmmcnt GaBcttc, zol.1D5, Part D9e datcd Vc7ruar3 21 y.E.2561 (201F)

Technical Management


Su8ot Salamtch
Scvtion Hcad

Approved by


Wivhan Choonharat
Assistant Managcr

The a7opc rcults arc palid onl3 for thc anal3Bcd/tcstd sam8lc(s) as indicatcd in this rc8ort. No 8art of this rc8ort or vcrtifvate: ma3 7c rc8roduct in an3 from without writtcn vonscnt from thc La7orator3. ALS La7orator3 Grou8 (Thailand) strongl3 rcvommcds that this rc8ort is not rc8roduct cxc8t 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
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Analysis / Test Report

Client : Gulf JP CRN Co., Ltd.
59/4 Moo 4, Chiang Rak Noi, Sam Khok, Pathumthani Thailand 12160
P/O :
Project Name : Monitoring EIA
Project Location : GCRN

Lot ID: 2339322
eatc Rcvcpd : Ma3 D1, 202D
eatc Rc8ortcd : Jun 02, 202D
Rc8ort Num7cr : 26- 141Dbl

Page 1 of 1

Lay out No.	Reference Number	Measurement Date	Measurement Time	Spot / Area No.	Illuminance (Lux)		Guideline Limit		Comment
					Spot	Average	Spot/Min	Average	
Area - อาคาร โรง.									
1.1	2DD9D22bl	29 Ma3 202D	Night timc	1	40D	462.0	b	100	Pass
1.2	2DD9D22b2	29 Ma3 202D	Night timc	2	521				


Measurement by : Furanasak Pati Pcrsonncl of ALS La7orator3 Grou8 yThailand(Co., Ltd.

Guideline : Notification of ec8artmcnt of La7our Protcvton and) clfarc, F.E.2560 y201- (datcd Nopcm7cr 2- , F.E.2560 y201- (, and 8u7lishcd in thc Ro3al Gopcrmmcnt GaWttc, Bol.1D5, Part D9e datcd zc7ruar3 21 F.E.2561 y201V(

Technical Management


Su8ot Salamtch
Scvtion Hcad

Approved by


Wivhan Choonharat
Assistant Managcr

The a7opc rcults arc palid onl3 for thc anal3Bcd/tcstd sam8lc(s) as indicatcd in this rc8ort. No 8art of this rc8ort or vcrtifvate: ma3 7c rc8roduct in an3 from without writtcn vonscnt from thc La7orator3. ALS La7orator3 Grou8 yThailand(strongl3 rcvommcds that this rc8ort is not rc8roduct cxc8t in full.

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ภาคผนวก จ

มาตรฐานที่เกี่ยวข้อง



ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ
ฉบับที่ ๒๔ (พ.ศ. ๒๕๔๗)
เรื่อง กำหนดมาตรฐานคุณภาพอากาศในบรรยากาศโดยทั่วไป

อาศัยอำนาจตามความในมาตรา ๓๒ และมาตรา ๓๔ แห่งพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ อันเป็นพระราชบัญญัติที่มีบทบัญญัติบางประการเกี่ยวกับการจำกัดสิทธิและเสรีภาพของบุคคล ซึ่งมาตรา ๒๙ ประกอบกับมาตรา ๓๕ มาตรา ๔๘ มาตรา ๕๐ และมาตรา ๕๑ ของรัฐธรรมนูญแห่งราชอาณาจักรไทยบัญญัติให้กระทำได้โดยอาศัยอำนาจตามบทบัญญัติแห่งกฎหมาย คณะกรรมการสิ่งแวดล้อมแห่งชาติ จึงได้มีมติในคราวการประชุมครั้งที่ ๒/๒๕๔๗ เมื่อวันที่ ๒๔ กุมภาพันธ์ ๒๕๔๗ ให้ปรับปรุงแก้ไขมาตรฐานคุณภาพอากาศในบรรยากาศโดยทั่วไป ดังต่อไปนี้

ข้อ ๑ ให้ยกเลิกความใน (๔) ของข้อ ๒ แห่งประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ ๑๐ (พ.ศ. ๒๕๓๘) ออกตามความในพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ เรื่อง กำหนดมาตรฐานคุณภาพอากาศในบรรยากาศโดยทั่วไป และให้ใช้ความต่อไปนี้แทน

“(๔) ค่าเฉลี่ยของก๊าซซัลเฟอร์ไดออกไซด์ ในเวลา ๒๔ ชั่วโมง จะต้องไม่เกิน ๐.๑๒ ส่วนในล้านส่วน หรือไม่เกิน ๐.๓๐ มิลลิกรัมต่อลูกบาศก์เมตร และค่ามัธยฐานเลขคณิต (Arithmetic Mean) ในเวลา ๑ ปี จะต้องไม่เกิน ๐.๐๔ ส่วนในล้านส่วน หรือไม่เกิน ๐.๑๐ มิลลิกรัมต่อลูกบาศก์เมตร”

ข้อ ๒ ให้ยกเลิกความใน (๒) และ (๓) ของข้อ ๔ แห่งประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ ๑๐ (พ.ศ. ๒๕๓๘) ออกตามความในพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ เรื่อง กำหนดมาตรฐานคุณภาพอากาศในบรรยากาศโดยทั่วไป และให้ใช้ความต่อไปนี้แทน

- ๒ -

“(๒) ค่าเฉลี่ยของฝุ่นละอองขนาดไม่เกิน ๑๐ ไมครอน ในเวลา ๒๔ ชั่วโมง จะต้องไม่เกิน ๐.๑๒ มิลลิกรัมต่อลูกบาศก์เมตร และค่ามัธยฐานเลขคณิต (Arithmetic Mean) ในเวลา ๑ ปี จะต้องไม่เกิน ๐.๐๕ มิลลิกรัมต่อลูกบาศก์เมตร

(๓) ค่าเฉลี่ยของฝุ่นละอองรวมหรือฝุ่นละอองขนาดไม่เกิน ๑๐๐ ไมครอน ในเวลา ๒๔ ชั่วโมง จะต้องไม่เกิน ๐.๓๓ มิลลิกรัมต่อลูกบาศก์เมตร และค่ามัธยฐานเลขคณิต (Arithmetic Mean) ในเวลา ๑ ปี จะต้องไม่เกิน ๐.๑๐ มิลลิกรัมต่อลูกบาศก์เมตร”

ประกาศ ณ วันที่ ๙ สิงหาคม พ.ศ. ๒๕๔๗

(ลงนาม) จาตุรนต์ ฉายแสง

(นายจาตุรนต์ ฉายแสง)

รองนายกรัฐมนตรี

ปฏิบัติหน้าที่ประธานคณะกรรมการสิ่งแวดล้อมแห่งชาติ

ราชกิจจานุเบกษา ฉบับประกาศทั่วไป เล่ม ๑๒๑ ตอนพิเศษ ๑๐๔ ง วันที่ ๒๒ กันยายน ๒๕๔๗

ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ

ฉบับที่ ๓๓ (พ.ศ. ๒๕๕๒)

เรื่อง กำหนดมาตรฐานค่าก๊าซไนโตรเจนไดออกไซด์ในบรรยากาศโดยทั่วไป

โดยที่เป็นการสมควรกำหนดมาตรฐานค่าก๊าซไนโตรเจนไดออกไซด์ในบรรยากาศโดยทั่วไป เพื่อเป็นเกณฑ์ทั่วไปสำหรับการส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมตามพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕

อาศัยอำนาจตามความในมาตรา ๓๒ (๔) และมาตรา ๓๔ แห่งพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ อันเป็นพระราชบัญญัติที่มีบทบัญญัติบางประการเกี่ยวกับการจำกัดสิทธิและเสรีภาพของบุคคล ซึ่งมาตรา ๒๘ ประกอบกับมาตรา ๓๓ มาตรา ๓๔ มาตรา ๔๑ และมาตรา ๔๓ ของรัฐธรรมนูญแห่งราชอาณาจักรไทย บัญญัติให้กระทำได้ โดยอาศัยอำนาจตามบทบัญญัติแห่งกฎหมาย คณะกรรมการสิ่งแวดล้อมแห่งชาติจึงออกประกาศ กำหนดมาตรฐานค่าก๊าซไนโตรเจนไดออกไซด์ในบรรยากาศโดยทั่วไปไว้ ดังต่อไปนี้

ข้อ ๑ ในประกาศนี้

“เครื่องวัดระบบเคมีลูมิเนสเซน” (Chemiluminescence) หมายความว่า เครื่องมือวัดค่าก๊าซไนโตรเจนไดออกไซด์โดยใช้ก๊าซโอโซนทำปฏิกิริยากับก๊าซไนตริกออกไซด์ซึ่งถูกเปลี่ยนมาจากก๊าซไนโตรเจนไดออกไซด์แล้ววัดความเข้มของแสงซึ่งเกิดจากปฏิกิริยานั้น ณ ที่ความยาวคลื่นที่สูงกว่า ๖๐๐ นาโนมิเตอร์ (Nanometer)

ข้อ ๒ ให้ยกเลิก

(๑) ความใน (๒) ของข้อ ๒ แห่งประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ ๑๐ (พ.ศ. ๒๕๓๕) ออกตามความในพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ เรื่อง กำหนดมาตรฐานคุณภาพอากาศในบรรยากาศโดยทั่วไป

(๒) ความใน (๑) ของข้อ ๖ แห่งประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ ๑๐ (พ.ศ. ๒๕๓๕) ออกตามความในพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ เรื่อง กำหนดมาตรฐานคุณภาพอากาศในบรรยากาศโดยทั่วไป แก้ไขเพิ่มเติมโดย ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ ฉบับที่ ๒๘ (พ.ศ. ๒๕๕๐) เรื่อง กำหนดมาตรฐานคุณภาพอากาศในบรรยากาศโดยทั่วไป

ข้อ ๓ ให้กำหนดมาตรฐานค่าก๊าซไนโตรเจนไดออกไซด์ในบรรยากาศโดยทั่วไปไว้ดังต่อไปนี้

(๑) ค่าเฉลี่ยของก๊าซไนโตรเจนไดออกไซด์ในเวลา ๑ ชั่วโมง จะต้องไม่เกิน ๐.๑๗ ส่วนในล้านส่วนหรือไม่เกิน ๐.๓๒ มิลลิกรัมต่อลูกบาศก์เมตร

(๒) ค่ามัธยฐานเลขคณิต (Arithmetic Mean) ของก๊าซไนโตรเจนไดออกไซด์ในเวลา ๑ ปี จะต้องไม่เกิน ๐.๐๓ ส่วนในล้านส่วน หรือไม่เกิน ๐.๐๕๗ มิลลิกรัมต่อลูกบาศก์เมตร

ข้อ ๔ การคำนวณค่าความเข้มข้นของก๊าซไนโตรเจนไดออกไซด์ในบรรยากาศโดยทั่วไป ให้คำนวณเทียบที่ความดัน ๑ บรรยากาศ และอุณหภูมิ ๒๕ องศาเซลเซียส

ข้อ ๕ การวัดค่าเฉลี่ยของก๊าซไนโตรเจนไดออกไซด์ในเวลา ๑ ชั่วโมง หรือค่ามัธยฐานเลขคณิต (Arithmetic Mean) ในเวลา ๑ ปี ให้ใช้เครื่องวัดระบบเคมีลูมิเนสเซน หรือระบบอื่นที่กรมควบคุมมลพิษ ให้ความเห็นชอบ

ประกาศ ณ วันที่ ๑๗ มิถุนายน พ.ศ. ๒๕๕๒

อภิสิทธิ์ เวชชาชีวะ

นายกรัฐมนตรี

ประธานกรรมการสิ่งแวดล้อมแห่งชาติ

ประกาศกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม

เรื่อง กำหนดมาตรฐานควบคุมการปล่อยทิ้งอากาศเสียจากโรงไฟฟ้าใหม่

โดยที่เป็นการสมควรปรับปรุงการกำหนดมาตรฐานควบคุมการปล่อยทิ้งอากาศเสียจากโรงไฟฟ้าให้มีความเหมาะสมกับการพัฒนาเทคโนโลยี และสถานการณ์มลพิษในปัจจุบัน

อาศัยอำนาจตามความในมาตรา ๕๕ แห่งพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ อันเป็นพระราชบัญญัติที่มีบทบัญญัติบางประการเกี่ยวกับการจำกัดสิทธิ และเสรีภาพของบุคคล ซึ่งมาตรา ๒๕ ประกอบกับมาตรา ๓๓ มาตรา ๓๘ มาตรา ๔๑ และมาตรา ๔๓ ของรัฐธรรมนูญแห่งราชอาณาจักรไทยบัญญัติให้กระทำได้โดยอาศัยอำนาจตามบทบัญญัติแห่งกฎหมาย รัฐมนตรีว่าการกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม โดยคำแนะนำของคณะกรรมการควบคุมมลพิษ และโดยความเห็นชอบของคณะกรรมการสิ่งแวดล้อมแห่งชาติ จึงออกประกาศไว้ ดังต่อไปนี้

ข้อ ๑ ในประกาศนี้

“โรงไฟฟ้าใหม่” หมายความว่า โรงงานผลิตพลังงานไฟฟ้าตามกฎหมายว่าด้วยโรงงานซึ่งใช้ถ่านหิน น้ำมัน ก๊าซธรรมชาติหรือเชื้อเพลิงชีวมวลเป็นเชื้อเพลิง ที่ได้รับอนุญาตให้ประกอบกิจการหลังจากวันที่ประกาศนี้มีผลใช้บังคับ

“เชื้อเพลิงชีวมวล” หมายความว่า เชื้อเพลิงที่ได้มาจากอินทรีย์สารหรือสิ่งมีชีวิต รวมทั้งผลผลิตจากการเกษตร การปศุสัตว์ และการทำป่าไม้ เช่น ไม้ฟืน เศษไม้ แกลบ ฟาง ชานอ้อย ดัน และใบอ้อย ใบปาล์ม กะลาปาล์ม ทะลายปาล์ม กะลามะพร้าว ใบมะพร้าว เศษพืช มูลสัตว์ ก๊าซชีวภาพ กากตะกอนหรือของเสียจากโรงงานแปรรูปผลิตภัณฑ์ทางการเกษตร เป็นต้น

“สภาวะแห้ง” หมายความว่า สภาวะที่ความชื้นของตัวอย่างอากาศเป็นศูนย์

ข้อ ๒ กำหนดมาตรฐานควบคุมการปล่อยทิ้งอากาศเสียจากโรงไฟฟ้าใหม่ และโรงไฟฟ้าตามกฎหมายว่าด้วยการส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติที่ได้รับใบอนุญาตประกอบกิจการโรงงานก่อนและในวันที่ประกาศนี้มีผลใช้บังคับเฉพาะส่วนที่ได้รับอนุญาตให้ขยายโรงงานไว้ดังต่อไปนี้

ชนิดของเชื้อเพลิง	ฝุ่นละออง (มิลลิกรัม ต่อลูกบาศก์เมตร)	ก๊าซซัลเฟอร์ ไดออกไซด์ (ส่วนในล้านส่วน)	ก๊าซออกไซด์ ของไนโตรเจน ซึ่งคำนวณผล ในรูปก๊าซไนโตรเจน ไดออกไซด์ (ส่วนในล้านส่วน)
๑. โรงไฟฟ้าที่ใช้ถ่านหินเป็นเชื้อเพลิง (๑) ที่มีกำลังการผลิตไฟฟ้า ไม่เกิน ๕๐ เมกะวัตต์	ไม่เกิน ๘๐	ไม่เกิน ๓๖๐	ไม่เกิน ๒๐๐
(๒) ที่มีกำลังการผลิตไฟฟ้า เกิน ๕๐ เมกะวัตต์	ไม่เกิน ๘๐	ไม่เกิน ๑๘๐	ไม่เกิน ๒๐๐
๒. โรงไฟฟ้าที่ใช้ถ่านหินเป็นเชื้อเพลิง	ไม่เกิน ๑๒๐	ไม่เกิน ๒๖๐	ไม่เกิน ๑๘๐
๓. โรงไฟฟ้าที่ใช้ก๊าซธรรมชาติเป็นเชื้อเพลิง	ไม่เกิน ๖๐	ไม่เกิน ๒๐	ไม่เกิน ๑๒๐
๔. โรงไฟฟ้าที่ใช้เชื้อเพลิงชีวมวลเป็นเชื้อเพลิง	ไม่เกิน ๑๒๐	ไม่เกิน ๖๐	ไม่เกิน ๒๐๐

ข้อ ๓ การคำนวณค่าอากาศเสียแต่ละชนิดที่ปล่อยทิ้งจากปล่องโรงไฟฟ้าตามข้อ ๒ ให้คำนวณผลที่ความดัน ๑ บรรยากาศหรือที่ ๗๖๐ มิลลิเมตรปรอท อุณหภูมิ ๒๕ องศาเซลเซียส ที่สภาวะแห้ง (Dry Basis) โดยมีปริมาตรอากาศส่วนเกินในการเผาไหม้ (Excess Air) ร้อยละ ๕๐ หรือที่ปริมาตรออกซิเจนส่วนเกิน (Excess Oxygen) ในการเผาไหม้ร้อยละ ๗

ข้อ ๔ กรณีโรงไฟฟ้าตามข้อ ๒ ใช้ทั้งถ่านหิน น้ำมัน ก๊าซธรรมชาติหรือเชื้อเพลิงชีวมวลเป็นเชื้อเพลิงร่วมกันตั้งแต่ ๒ ประเภทขึ้นไป ให้คำนวณมาตรฐานควบคุมการปล่อยทิ้งอากาศเสียตามสัดส่วนของเชื้อเพลิงที่ใช้แต่ละประเภทดังต่อไปนี้

$$\text{ค่ามาตรฐานควบคุมการปล่อยทิ้งอากาศเสีย} = AW + BX + CY + DZ$$

- เมื่อ
- A = ค่ามาตรฐานอากาศเสียที่ปล่อยทิ้งเมื่อใช้ถ่านหินเป็นเชื้อเพลิงอย่างเดียว
 - B = ค่ามาตรฐานอากาศเสียที่ปล่อยทิ้งเมื่อใช้น้ำมันเป็นเชื้อเพลิงอย่างเดียว
 - C = ค่ามาตรฐานอากาศเสียที่ปล่อยทิ้งเมื่อใช้ก๊าซธรรมชาติเป็นเชื้อเพลิงอย่างเดียว
 - D = ค่ามาตรฐานอากาศเสียที่ปล่อยทิ้งเมื่อใช้เชื้อเพลิงชีวมวลเป็นเชื้อเพลิงอย่างเดียว
 - W = สัดส่วนของความร้อน (Heat Input) ที่ได้จากเชื้อเพลิงประเภทถ่านหิน
 - X = สัดส่วนของความร้อน (Heat Input) ที่ได้จากเชื้อเพลิงประเภทน้ำมัน
 - Y = สัดส่วนของความร้อน (Heat Input) ที่ได้จากเชื้อเพลิงประเภทก๊าซธรรมชาติ
 - Z = สัดส่วนของความร้อน (Heat Input) ที่ได้จากเชื้อเพลิงประเภทเชื้อเพลิงชีวมวล

ข้อ ๕ การตรวจวัดอากาศเสียที่ปล่อยทิ้งจากปล่องโรงไฟฟ้าตามข้อ ๒ ให้ใช้วิธีดังต่อไปนี้

(๑) การตรวจวัดค่าฝุ่นละอองให้ใช้วิธี Determination of Particulate Emissions from Stationary Sources ที่องค์การพิทักษ์สิ่งแวดล้อมแห่งประเทศสหรัฐอเมริกา (United States Environmental Protection Agency) กำหนดไว้หรือวิธีอื่นที่คณะกรรมการควบคุมมลพิษเห็นชอบ

(๒) การตรวจวัดค่าก๊าซซัลเฟอร์ไดออกไซด์ ให้ใช้วิธี Determination of Sulfur Dioxide Emissions from Stationary Sources หรือวิธี Determination of Sulfuric Acid Mist and Sulfur Dioxide Emissions from Stationary Sources ที่องค์การพิทักษ์สิ่งแวดล้อมแห่งประเทศสหรัฐอเมริกา (United States Environmental Protection Agency) กำหนดไว้หรือวิธีอื่นที่คณะกรรมการควบคุมมลพิษเห็นชอบ

(๓) การตรวจวัดค่าก๊าซออกไซด์ของไนโตรเจน ซึ่งคำนวณผลในรูปของก๊าซไนโตรเจนไดออกไซด์ ให้ใช้วิธี Determination of Nitrogen Oxide Emissions from Stationary Sources ที่องค์การพิทักษ์สิ่งแวดล้อมแห่งประเทศสหรัฐอเมริกา (United States Environmental Protection Agency) กำหนดไว้หรือวิธีอื่นที่คณะกรรมการควบคุมมลพิษเห็นชอบ

ข้อ ๖ ประกาศนี้ให้ใช้บังคับตั้งแต่วันถัดจากวันประกาศในราชกิจจานุเบกษาเป็นต้นไป

ประกาศ ณ วันที่ ๒๐ ธันวาคม พ.ศ. ๒๕๕๒
สุวิทย์ คุณกิตติ
รัฐมนตรีว่าการกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม



ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ

ฉบับที่ ๑๕ (พ.ศ. ๒๕๕๐)

เรื่อง กำหนดมาตรฐานระดับเสียงโดยทั่วไป

อาศัยอำนาจตามความในมาตรา ๓๒ (๕) แห่งพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ คณะกรรมการสิ่งแวดล้อมแห่งชาติกำหนดมาตรฐานระดับเสียงโดยทั่วไปไว้ดังต่อไปนี้

ข้อ ๑ ในประกาศนี้

“ระดับเสียงโดยทั่วไป” หมายความว่า ระดับเสียงที่เกิดขึ้นในสิ่งแวดล้อม

“ค่าระดับเสียงสูงสุด” หมายความว่า ค่าระดับเสียงสูงสุดที่เกิดขึ้นในขณะใดขณะหนึ่งระหว่างการตรวจวัดระดับเสียง โดยมีหน่วยเป็นเดซิเบลเอ หรือ dB (A)

“ค่าระดับเสียงเฉลี่ย ๒๔ ชั่วโมง” หมายความว่า ค่าระดับเสียงคงที่ที่มีพลังงานเทียบเท่าระดับเสียงที่เกิดขึ้นจริง ซึ่งมีระดับเสียงเปลี่ยนแปลงตามเวลาในช่วง ๒๔ ชั่วโมง (๒๔ hours A-weighted Equivalent Continuous Sound Level) ซึ่งเรียกโดยย่อว่า Leq ๒๔ hr โดยมีหน่วยเป็นเดซิเบลเอ หรือ dB (A)

“มาตรฐานระดับเสียง” หมายความว่า เครื่องวัดระดับเสียงตามมาตรฐาน IEC ๖๕๑ หรือ IEC ๘๐๔ ของคณะกรรมการวิชาการระหว่างประเทศว่าด้วยเทคนิคไฟฟ้า (International Electrotechnical Commission, IEC)

ข้อ ๒ ให้กำหนดมาตรฐานระดับเสียงโดยทั่วไป ไว้ดังต่อไปนี้

(๑) ค่าระดับเสียงสูงสุด ไม่เกิน ๑๑๕ เดซิเบลเอ

(๒) ค่าระดับเสียงเฉลี่ย ๒๔ ชั่วโมง ไม่เกิน ๙๐ เดซิเบลเอ

- ข้อ ๓ การตรวจวัดระดับเสียงโดยทั่วไป ให้ดำเนินการดังต่อไปนี้
- (๑) การตรวจวัดค่าระดับเสียงสูงสุด ให้ใช้มาตรฐานระดับเสียงตรวจวัดระดับเสียงในบริเวณที่มีคนอยู่หรืออาศัยอยู่
- (๒) การตรวจวัดค่าระดับเสียงเฉลี่ย ๒๔ ชั่วโมง ให้ใช้มาตรฐานระดับเสียงตรวจวัดระดับเสียงอย่างต่อเนื่องตลอดเวลา ๒๔ ชั่วโมงใดๆ
- (๓) การตั้งไมโครโฟนของมาตรฐานระดับเสียงที่บริเวณภายนอกอาคารให้ตั้งสูงจากพื้นไม่น้อยกว่า ๑.๒๐ เมตร โดยในรัศมี ๓.๕๐ เมตร ตามแนวราบรอบไมโครโฟน ต้องไม่มีกำแพงหรือสิ่งใดที่มีคุณสมบัติในการสะท้อนเสียงกีดขวางอยู่
- (๔) การตั้งไมโครโฟนของมาตรฐานระดับเสียงที่บริเวณภายในอาคารให้ตั้งสูงจากพื้นไม่น้อยกว่า ๑.๒๐ เมตร โดยในรัศมี ๑.๐๐ เมตร ตามแนวราบรอบไมโครโฟน ต้องไม่มีกำแพงหรือสิ่งใดที่มีคุณสมบัติในการสะท้อนเสียงกีดขวางอยู่และต้องห่างจากช่องหน้าต่างหรือช่องทางที่เปิดออกนอกอาคารอย่างน้อย ๑.๕๐ เมตร
- ข้อ ๔ การคำนวณค่าระดับเสียงจะต้องเป็นไปตามวิธีการที่องค์การระหว่างประเทศว่าด้วยมาตรฐาน (International Organization for Standardization, ISO) กำหนด ซึ่งกรมควบคุมมลพิษจะประกาศในราชกิจจานุเบกษา

ประกาศ ณ วันที่ ๑๒ มีนาคม พ.ศ. ๒๕๕๐

พลเอก ชวลิต ยงใจยุทธ

นายกรัฐมนตรี

ประธานคณะกรรมการสิ่งแวดล้อมแห่งชาติ

(ประกาศในราชกิจจานุเบกษา เล่ม ๑๑๔ ตอนที่ ๒๗ ง วันที่ ๓ เมษายน ๒๕๕๐)

ประกาศกระทรวงอุตสาหกรรม

เรื่อง กำหนดค่าระดับเสียงการรบกวนและระดับเสียงที่เกิดจากการประกอบกิจการโรงงาน

พ.ศ. ๒๕๕๔

อาศัยอำนาจตามความในข้อ ๑๗ แห่งกฎกระทรวง ฉบับที่ ๒ (พ.ศ. ๒๕๓๕) ออกตามความในพระราชบัญญัติโรงงาน พ.ศ. ๒๕๓๕ อันเป็นพระราชบัญญัติที่มีบทบัญญัติบางประการเกี่ยวกับการจำกัดสิทธิและเสรีภาพของบุคคล ซึ่งมาตรา ๒๕ ประกอบกับมาตรา ๓๕ มาตรา ๔๘ และมาตรา ๕๐ ของรัฐธรรมนูญแห่งราชอาณาจักรไทย บัญญัติให้กระทำได้โดยอาศัยอำนาจตามบทบัญญัติแห่งกฎหมาย รัฐมนตรีว่าการกระทรวงอุตสาหกรรมจึงได้ออกประกาศไว้ ดังต่อไปนี้

ข้อ ๑ ในประกาศนี้

“เสียงรบกวน” หมายความว่า ระดับเสียงตรวจวัดนอกบริเวณโรงงาน ที่เกิดจากการประกอบกิจการโรงงาน ขณะมีการรบกวน ซึ่งมีระดับเสียงสูงกว่าระดับเสียงพื้นฐาน และมีระดับการรบกวนเกินกว่าค่าที่กำหนดไว้ในประกาศนี้

“ระดับเสียงพื้นฐาน” หมายความว่า ระดับเสียงที่ตรวจวัดในสิ่งแวดล้อมเดิม ขณะยังไม่มีเสียงรบกวนจากการประกอบกิจการโรงงานเป็นระดับเสียงเปอร์เซ็นต์ไทล์ที่ ๕๐ (Percentile Level ๕๐, L_{๕๐})

“ระดับเสียงเปอร์เซ็นต์ไทล์ที่ ๕๐ (L_{๕๐})” หมายความว่า ระดับเสียงที่ร้อยละ ๕๐ ของเวลาที่ตรวจวัดจะมีระดับเสียงเกินระดับนี้

“ระดับเสียงขณะมีการรบกวน” หมายความว่า ระดับเสียงที่ตรวจวัดหรือคำนวณจากการประกอบกิจการโรงงานขณะเกิดเสียงรบกวน

“ระดับการรบกวน” หมายความว่า ระดับความแตกต่างของระดับเสียงขณะมีการรบกวนกับระดับเสียงพื้นฐาน

“ระดับเสียงเฉลี่ย ๒๔ ชั่วโมง” หมายความว่า ระดับเสียงคงที่นอกบริเวณโรงงานที่มีพลังงานเทียบเท่าระดับเสียงที่เกิดขึ้นจริง ซึ่งมีระดับเสียงเปลี่ยนแปลงตามเวลาในช่วง ๒๔ ชั่วโมง (24 hours A-weighted Equivalent Continuous Sound Level) ซึ่งเรียกโดยย่อว่า Leq 24 hr โดยมีหน่วยเป็นเดซิเบลเอ หรือ dB(A)

“ระดับเสียงสูงสุด” หมายความว่า ระดับเสียงสูงสุดนอกบริเวณโรงงาน ที่เกิดขึ้นในขณะใดขณะหนึ่ง ระหว่างการตรวจวัดระดับเสียง โดยมีหน่วยเป็นเดซิเบลเอ หรือ dB(A)

“มาตรฐานระดับเสียง” หมายความว่า เครื่องวัดระดับเสียงตามมาตรฐาน IEC 60804 หรือ IEC 61672 ของคณะกรรมการระหว่างประเทศว่าด้วยเทคนิคไฟฟ้า (International Electrotechnical Commission , IEC)

ข้อ ๒ ค่าระดับการรบกวน ที่เกิดจากการประกอบกิจการโรงงาน ไม่เกิน ๑๐ เดซิเบลเอ

ข้อ ๓ ค่าระดับเสียงเฉลี่ย ๒๔ ชั่วโมง ที่เกิดจากการประกอบกิจการโรงงาน ไม่เกิน ๗๐ เดซิเบลเอ

ข้อ ๔ ค่าระดับเสียงสูงสุด ที่เกิดจากการประกอบกิจการโรงงาน ไม่เกิน ๑๑๕ เดซิเบลเอ

ข้อ ๕ วิธีการตรวจวัดระดับเสียงการรบกวน ระดับเสียงเฉลี่ย ๒๔ ชั่วโมง และระดับเสียงสูงสุด ที่เกิดจากการประกอบกิจการโรงงาน ให้เป็นไปตามที่กรมโรงงานอุตสาหกรรมกำหนด
ทั้งนี้ ให้ใช้บังคับตั้งแต่วันถัดจากวันประกาศในราชกิจจานุเบกษาเป็นต้นไป

ประกาศ ณ วันที่ ๒๗ ธันวาคม พ.ศ. ๒๕๔๔

สุริยະ จິงรุ่งเรืองกิจ

รัฐมนตรีว่าการกระทรวงอุตสาหกรรม



ประกาศคณะกรรมการสิ่งแวดล้อมแห่งชาติ

ฉบับที่ ๘ (พ.ศ. ๒๕๓๗)

ออกตามความในพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ

พ.ศ. ๒๕๓๕

เรื่อง กำหนดมาตรฐานคุณภาพน้ำในแหล่งน้ำผิวดิน

อาศัยอำนาจตามความในมาตรา ๓๒ (๑) แห่งพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ คณะกรรมการสิ่งแวดล้อมแห่งชาติประกาศกำหนดมาตรฐานคุณภาพน้ำในแหล่งน้ำผิวดิน ไว้ดังต่อไปนี้

หมวด ๑

บททั่วไป

ข้อ ๑ ในประกาศนี้

“แหล่งน้ำผิวดิน” หมายถึง แม่น้ำ ลำคลอง หนอง บึง ทะเลสาบ อ่างเก็บน้ำ และแหล่งน้ำสาธารณะอื่นๆ ที่อยู่ภายในพื้นแผ่นดิน ซึ่งหมายความรวมถึงแหล่งน้ำสาธารณะที่อยู่ภายในพื้นแผ่นดินบนเกาะด้วย แต่ไม่รวมถึงน้ำบาดาล และในกรณีที่แหล่งน้ำนั้นอยู่ติดกับทะเลให้หมายความถึงแหล่งน้ำที่อยู่ในปากแม่น้ำหรือปากทะเลสาบ

ปากแม่น้ำและปากทะเลสาบให้ถือแนวเขตตามที่กรมเจ้าท่ากำหนด

หมวด ๒

ประเภทและมาตรฐานคุณภาพน้ำในแหล่งน้ำผิวดิน

ข้อ ๒ ให้แบ่งแหล่งน้ำผิวดินออกเป็น ๕ ประเภทคือ แหล่งน้ำประเภทที่ ๑ แหล่งน้ำประเภทที่ ๒ แหล่งน้ำประเภทที่ ๓ แหล่งน้ำประเภทที่ ๔ และแหล่งน้ำประเภทที่ ๕

(๑) แหล่งน้ำประเภทที่ ๑ ได้แก่ แหล่งน้ำที่คุณภาพน้ำมีสภาพตามธรรมชาติโดยปราศจากน้ำที่จากกิจกรรมทุกประเภทและสามารถเป็นประโยชน์เพื่อ

- (ก) การอุปโภคและบริโภคโดยต้องผ่านการฆ่าเชื้อโรคตามปกติก่อน
- (ข) การขยายพันธุ์ตามธรรมชาติของสิ่งมีชีวิตระดับพื้นฐาน
- (ค) การอนุรักษ์ระบบนิเวศน์ของแหล่งน้ำ

(๒) แหล่งน้ำประเภทที่ ๒ ได้แก่ แหล่งน้ำที่ได้รับน้ำที่จากกิจกรรมบางประเภทและสามารถเป็นประโยชน์เพื่อ

(ก) การอุปโภคและบริโภคโดยต้องผ่านการฆ่าเชื้อโรคตามปกติ และผ่านกระบวนการปรับปรุงคุณภาพน้ำทั่วไปก่อน

- (ข) การอนุรักษ์สัตว์น้ำ
- (ค) การประมง
- (ง) การว่ายน้ำและกีฬาทางน้ำ

(๓) แหล่งน้ำประเภทที่ ๓ ได้แก่ แหล่งน้ำที่ได้รับน้ำที่จากกิจกรรมบางประเภทและสามารถเป็นประโยชน์เพื่อ

(ก) การอุปโภคและบริโภคโดยต้องผ่านการฆ่าเชื้อโรคตามปกติ และผ่านกระบวนการปรับปรุงคุณภาพน้ำทั่วไปก่อน

- (ข) การเกษตร

(๔) แหล่งน้ำประเภทที่ ๔ ได้แก่ แหล่งน้ำที่ได้รับน้ำที่จากกิจกรรมบางประเภทและสามารถเป็นประโยชน์เพื่อ

(ก) การอุปโภคและบริโภคโดยต้องผ่านการฆ่าเชื้อโรคตามปกติ และผ่านกระบวนการปรับปรุงคุณภาพน้ำเป็นพิเศษก่อน

- (ข) การอุตสาหกรรม

(๕) แหล่งน้ำประเภทที่ ๕ ได้แก่ แหล่งน้ำที่ได้รับน้ำที่จากกิจกรรมบางประเภท และสามารถเป็นประโยชน์เพื่อการคมนาคม

ข้อ ๓ คุณภาพน้ำในแหล่งน้ำประเภทที่ ๑ ต้องมีสภาพตามธรรมชาติ และสามารถใช้ประโยชน์ได้ตามข้อ ๒ (๑)

ข้อ ๔ คุณภาพน้ำในแหล่งน้ำประเภทที่ ๒ ต้องมีมาตรฐานดังต่อไปนี้

(๑) ไม่มีวัตถุหรือสิ่งของที่เกิดจากการกระทำของมนุษย์ซึ่งจะทำให้ สี กลิ่น และรสของน้ำเปลี่ยนไปตามธรรมชาติ

(๒) อุณหภูมิ (Temperature) ไม่สูงกว่าอุณหภูมิตามธรรมชาติเกิน ๓ องศาเซลเซียส

(๓) ความเป็นกรดและด่าง (pH) มีค่าระหว่าง ๕.๐-๙.๐

(๔) ออกซิเจนละลาย (DO) มีค่าไม่น้อยกว่า ๖.๐ มิลลิกรัมต่อลิตร

(๕) บีโอดี (BOD) มีค่าไม่เกินกว่า ๑.๕ มิลลิกรัมต่อลิตร

(๖) แบคทีเรียกลุ่มโคลิฟอร์มทั้งหมด (Total Coliform Bacteria) มีค่าไม่เกินกว่า ๕,๐๐๐ เอ็ม.พี.เอ็น. ต่อ ๑๐๐ มิลลิลิตร

(๗) แบคทีเรียกลุ่มฟีคอลโคลิฟอร์ม (Fecal Coliform Bacteria) มีค่าไม่เกินกว่า ๑,๐๐๐ เอ็ม.พี.เอ็น. ต่อ ๑๐๐ มิลลิลิตร

(๘) ไนเตรต (NO_3) ในหน่วยไนโตรเจน มีค่าไม่เกินกว่า ๕.๐ มิลลิกรัมต่อลิตร

(๙) แอมโมเนีย (NH_3) ในหน่วยไนโตรเจน มีค่าไม่เกินกว่า ๐.๕ มิลลิกรัมต่อลิตร

(๑๐) ฟีนอล (Phenols) มีค่าไม่เกินกว่า ๐.๐๐๕ มิลลิกรัมต่อลิตร

(๑๑) ทองแดง (Cu) มีค่าไม่เกินกว่า ๐.๑ มิลลิกรัมต่อลิตร

(๑๒) นิกเกิล (Ni) มีค่าไม่เกินกว่า ๐.๑ มิลลิกรัมต่อลิตร

(๑๓) แมงกานีส (Mn) มีค่าไม่เกินกว่า ๑.๐ มิลลิกรัมต่อลิตร

(๑๔) สังกะสี (Zn) มีค่าไม่เกินกว่า ๑.๐ มิลลิกรัมต่อลิตร

(๑๕) แคดเมียม (Cd) ในน้ำที่มีความกระด้างในรูปของ CaCO_3 ไม่เกินกว่า ๑๐๐ มิลลิกรัมต่อลิตร มีค่าไม่เกินกว่า ๐.๐๐๕ มิลลิกรัมต่อลิตร และในน้ำที่มีความกระด้างในรูปของ CaCO_3 เกินกว่า ๑๐๐ มิลลิกรัมต่อลิตร มีค่าไม่เกินกว่า ๐.๐๕ มิลลิกรัมต่อลิตร

(๑๖) โครเมียมชนิดเฮกซะวาเลนต์ (Cr Hexavalent) มีค่าไม่เกินกว่า ๐.๐๕ มิลลิกรัมต่อลิตร

(๑๗) ตะกั่ว (Pb) มีค่าไม่เกิน ๐.๐๕ มิลลิกรัมต่อลิตร

(๑๘)ปรอททั้งหมด (Total Hg) มีค่าไม่เกินกว่า ๐.๐๐๒ มิลลิกรัมต่อลิตร

(๑๙) สารหนู (As) มีค่าไม่เกินกว่า ๐.๐๑ มิลลิกรัมต่อลิตร

(๒๐) ไซยาไนด์ (Cyanide) มีค่าไม่เกินกว่า ๐.๐๐๕ มิลลิกรัมต่อลิตร

(๒๑) กัมมันตภาพรังสี (Radioactivity) มีค่ารังสีแอลฟา (Alpha) ไม่เกินกว่า ๐.๑ เบกเคอเรลต่อลิตร และรังสีเบตา (Beta) ไม่เกินกว่า ๑.๐ เบกเคอเรลต่อลิตร

(๒๒) สารฆ่าศัตรูพืชและสัตว์ชนิดที่มีคลอรีนทั้งหมด (Total Organochlorine Pesticides) มีค่าไม่เกินกว่า ๐.๐๕ มิลลิกรัมต่อลิตร

(๒๓) ดีดีที (DDT) มีค่าไม่เกินกว่า ๑.๐ ไมโครกรัมต่อลิตร

(๒๔) บีเอชซีชนิดแอลฟา (Alpha-BHC) มีค่าไม่เกินกว่า ๐.๐๒ ไมโครกรัมต่อลิตร

(๒๕) ดิลดริน (Dieldrin) มีค่าไม่เกินกว่า ๐.๑ ไมโครกรัมต่อลิตร

(๒๖) อัลดริน (Aldrin) มีค่าไม่เกินกว่า ๐.๑ ไมโครกรัมต่อลิตร

(๒๗) เฮปตาคลอร์ (Heptachlor) และเฮปตาคลอร์อีพอกไซด์ (Heptachlorepoxyde) มีค่าไม่เกินกว่า ๐.๒ ไมโครกรัมต่อลิตร

(๒๘) เอนดริน (Endrin) ไม่สามารถตรวจพบได้ตามวิธีการตรวจสอบที่กำหนด

ข้อ ๕ คุณภาพน้ำในแหล่งน้ำประเภทที่ ๓ ต้องมีมาตรฐานตาม ข้อ ๔ เว้นแต่

(๑) ออกซิเจนละลาย มีค่าไม่น้อยกว่า ๔.๐ มิลลิกรัมต่อลิตร

(๒) บีโอดี มีค่าไม่เกินกว่า ๒.๐ มิลลิกรัมต่อลิตร

(๓) แบคทีเรียกลุ่มโคลิฟอร์มทั้งหมด มีค่าไม่เกินกว่า ๒๐,๐๐๐ เอ็ม.พี.เอ็น.

ต่อ ๑๐๐ มิลลิตร

(๔) แบคทีเรียกลุ่มฟีคอลโคลิฟอร์ม มีค่าไม่เกินกว่า ๔,๐๐๐ เอ็ม.พี.เอ็น.

ต่อ ๑๐๐ มิลลิตร

ข้อ ๖ คุณภาพน้ำในแหล่งน้ำประเภทที่ ๔ ต้องมีมาตรฐานตามข้อ ๔ (๑) ถึง (๕) และ (๘) ถึง (๒๘) เว้นแต่

(๑) ออกซิเจนละลาย มีค่าไม่น้อยกว่า ๒.๐ มิลลิกรัมต่อลิตร

(๒) บีโอดี มีค่าไม่เกินกว่า ๔.๐ มิลลิกรัมต่อลิตร

ข้อ ๗ คุณภาพน้ำในแหล่งน้ำประเภทที่ ๕ ต้องมีมาตรฐานต่ำกว่าคุณภาพน้ำ ในแหล่งน้ำประเภทที่ ๔

ข้อ ๘ การกำหนดให้แหล่งน้ำผิวดินแหล่งใดแหล่งหนึ่งเป็นประเภทใดตามข้อ ๒ ให้เป็นไปตามที่กรมควบคุมมลพิษประกาศในราชกิจจานุเบกษา

หมวด ๓

วิธีการเก็บตัวอย่างและตรวจสอบคุณภาพน้ำในแหล่งน้ำผิวดิน

ข้อ ๙ การเก็บตัวอย่างน้ำเพื่อตรวจสอบคุณภาพตามข้อ ๓ ถึง ข้อ ๗ ให้ใช้วิธีการดังต่อไปนี้

(๑) แหล่งน้ำไหล ซึ่งได้แก่ แม่น้ำ ลำคลอง เป็นต้น ให้เก็บที่จุดกึ่งกลางความกว้างของแหล่งน้ำที่ระดับกึ่งกลางความลึก ณ จุดตรวจสอบ เว้นแต่แบคทีเรียกลุ่มโคลิฟอร์มทั้งหมดและแบคทีเรียกลุ่มฟีคอลโคลิฟอร์ม ให้เก็บที่ระดับความลึก ๓๐ เซนติเมตร ณ จุดตรวจสอบ

(๒) แหล่งน้ำนิ่ง ซึ่งได้แก่ ทะเลสาบ หนอง บึง อ่างเก็บน้ำ เป็นต้น ให้เก็บที่ระดับความลึก ๑ เมตร ณ จุดตรวจสอบสำหรับแหล่งน้ำที่มีความลึกเกินกว่า ๒ เมตร และให้เก็บที่จุดกึ่งกลางความลึก ณ จุดตรวจสอบสำหรับแหล่งน้ำที่มีความลึกไม่เกิน ๒ เมตร เว้นแต่แบคทีเรียกลุ่มโคลิฟอร์มทั้งหมดและแบคทีเรียกลุ่มฟีคอลโคลิฟอร์ม ให้เก็บที่ระดับความลึก ๓๐ เซนติเมตร ณ จุดตรวจสอบ

จุดตรวจสอบตาม (๑) และ (๒) ของแหล่งน้ำที่กำหนดตามข้อ ๘ ให้เป็นไปตามที่กรมควบคุมมลพิษกำหนด

ข้อ ๑๐ การตรวจสอบคุณภาพน้ำตามข้อ ๓ ถึงข้อ ๗ ให้ใช้วิธีการดังต่อไปนี้

(๑) การตรวจสอบอุณหภูมิ ให้ใช้เครื่องวัดอุณหภูมิ (Thermometer) วัดขณะทำการเก็บตัวอย่างน้ำ

(๒) การตรวจสอบค่าความเป็นกรดและด่าง ให้ใช้เครื่องวัดความเป็นกรดและด่างของน้ำ (pH meter) ตามวิธีการหาค่าแบบอิเล็กโตรเมตริก (Electrometric)

(๓) การตรวจสอบค่าออกซิเจนละลาย ให้ใช้วิธีอะไซด์โมดิฟิเคชัน (Azide Modification)

(๔) การตรวจสอบค่าบีไอดี ให้ใช้วิธีอะไซด์โมดิฟิเคชัน (Azide Modification) ที่อุณหภูมิ ๒๐ องศาเซลเซียส เป็นเวลา ๕ วันติดต่อกัน

(๕) การตรวจสอบค่าแบคทีเรียกลุ่มโคลิฟอร์มทั้งหมดและค่าแบคทีเรียกลุ่มฟิคอลโคลิฟอร์ม ให้ใช้วิธีมัลติเพิล ทิวบ์ เฟอเมนเตชัน เทคนิค (Multiple Tube Fermentation Technique)

(๖) การตรวจสอบค่าไนเตรดในหน่วยไนโตรเจน ให้ใช้วิธีแคดเมียมรีดักชัน (Cadmium Reduction)

(๗) การตรวจสอบค่าแอมโมเนียในหน่วยไนโตรเจน ให้ใช้วิธีดิสทิลเลชัน เนสสเลอร์ไรเซชัน (Distillation Nesslerization)

(๘) การตรวจสอบค่าฟีนอล ให้ใช้วิธีดิสทิลเลชัน ๔ - อะมิโนแอนติไพรีน (Distillation, 4-Amino antipyrine)

(๙) การตรวจสอบค่าทองแดง นิกเกิล แมงกานีส สังกะสี แคดเมียม โครเมียมชนิดเฮกซะวาเลนต์ และตะกั่ว ให้ใช้วิธีอะตอมมิก แอ็บซอร์ปชัน ไดเรกต์ แอสไพเรชัน (Atomic Absorption - Direct Aspiration)

(๑๐) การตรวจสอบค่าปรอททั้งหมด ให้ใช้วิธีอะตอมมิก แอ็บซอร์ปชัน โคลด์ เวปอร์ เทคนิค (Atomic Absorption-Cold Vapour Technique)

(๑๑) การตรวจสอบค่าสารหนู ให้ใช้วิธีอะตอมมิก แอ็บซอร์ปชัน แก๊สไฮไดรด์ (Atomic Absorption - Gaseous Hydride)

(๑๒) การตรวจสอบค่าไซยาไนด์ ให้ใช้วิธีไพรีดีน บาร์บิทูริก แอซิด (Pyridine - Barbituric Acid)

(๑๓) การตรวจสอบค่ากัมมันตภาพรังสี ให้ใช้วิธีโลว์ แบ็กกราวด์ พร็อพอร์ชันนอล เคาน์เตอร์ (Low Background Proportional Counter)

(๑๔) การตรวจค่าสารฆ่าศัตรูพืชและสัตว์ชนิดที่มีคลอรีนทั้งหมด คีดีที บีเอชซีชนิดแอลฟา คีโลดริน อัลดริน เฮปตาคลอโรอีพอกไซด์ และเอนดริน ให้ใช้วิธีแก๊ส - โครมาโตกราฟี (Gas - Chromatography)

ข้อ ๑๑ การตรวจสอบค่าออกซิเจนละลายให้ใช้ค่าเปอร์เซ็นต์ไทล์ที่ ๒๐ (20th Percentile Value) ส่วนการตรวจสอบค่าบีไอดี แบคทีเรียกลุ่มโคลิฟอร์มทั้งหมด และแบคทีเรียกลุ่มฟิคอลโคลิฟอร์ม ให้ใช้ค่าเปอร์เซ็นต์ไทล์ที่ ๘๐ โดยจำนวนและระยะเวลาสำหรับการเก็บตัวอย่างน้ำดังกล่าว ให้เป็นไปตามที่กรมควบคุมมลพิษกำหนด

ข้อ ๑๒ การเก็บตัวอย่างน้ำตามข้อ ๙ และการตรวจสอบคุณภาพน้ำตามข้อ ๑๐ จะต้องเป็นไปตามวิธีการมาตรฐานสำหรับการวิเคราะห์น้ำและน้ำเสีย (Standard Methods for Examination of Water and Wastewater) ซึ่ง American Public Health Association และ American Water Works Association กับ Water Pollution Control Federation ของสหรัฐอเมริกา ร่วมกันกำหนดไว้ด้วย

ประกาศ ณ วันที่ ๒๐ มกราคม พ.ศ. ๒๕๓๗

ชวน หลีกภัย

นายกรัฐมนตรี

ประธานคณะกรรมการสิ่งแวดล้อมแห่งชาติ

(ประกาศในราชกิจจานุเบกษา เล่ม ๑๑๑ ตอนที่ ๑๖ ง วันที่ ๒๔ กุมภาพันธ์ ๒๕๓๗)

ประกาศกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม

เรื่อง กำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากโรงงานอุตสาหกรรม นิคมอุตสาหกรรม และเขตประกอบการอุตสาหกรรม

โดยที่เป็นการสมควรปรับปรุงการกำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากโรงงานอุตสาหกรรม นิคมอุตสาหกรรม และเขตประกอบการอุตสาหกรรม ให้มีความเหมาะสมยิ่งขึ้น

อาศัยอำนาจตามความในมาตรา ๕๕ แห่งพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ รัฐมนตรีว่าการกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม โดยคำแนะนำของคณะกรรมการควบคุมมลพิษ และโดยความเห็นชอบของคณะกรรมการสิ่งแวดล้อมแห่งชาติ จึงออกประกาศไว้ ดังต่อไปนี้

ข้อ ๑ ให้ยกเลิกประกาศกระทรวงวิทยาศาสตร์ เทคโนโลยีและสิ่งแวดล้อม ฉบับที่ ๓ (พ.ศ. ๒๕๓๙) เรื่อง กำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากแหล่งกำเนิดประเภทโรงงานอุตสาหกรรม และนิคมอุตสาหกรรม ลงวันที่ ๓ มกราคม พ.ศ. ๒๕๓๙

ข้อ ๒ ให้ประกาศคณะกรรมการควบคุมมลพิษ เรื่อง กำหนดประเภทของโรงงานอุตสาหกรรม ที่อนุญาตให้ระบายน้ำทิ้งให้มีค่ามาตรฐานแตกต่างจากค่ามาตรฐานควบคุมการระบายน้ำทิ้งที่กำหนดไว้ในประกาศกระทรวงวิทยาศาสตร์ เทคโนโลยีและสิ่งแวดล้อม ฉบับที่ ๓ (พ.ศ. ๒๕๓๙) เรื่อง กำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากแหล่งกำเนิดประเภทโรงงานอุตสาหกรรมและนิคมอุตสาหกรรม ลงวันที่ ๒๐ สิงหาคม พ.ศ. ๒๕๓๙ ยังคงมีผลใช้บังคับต่อไปจนกว่าจะมีการออกประกาศกำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากโรงงานอุตสาหกรรม นิคมอุตสาหกรรม และเขตประกอบการอุตสาหกรรม เฉพาะประเภทฉบับใหม่

ข้อ ๓ ในประกาศนี้

“โรงงานอุตสาหกรรม” หมายความว่า โรงงาน ตามกฎหมายว่าด้วยโรงงาน

“นิคมอุตสาหกรรม” หมายความว่า นิคมอุตสาหกรรม ตามกฎหมายว่าด้วยการนิคมอุตสาหกรรม

“เขตประกอบการอุตสาหกรรม” หมายความว่า เขตประกอบการอุตสาหกรรม ตามกฎหมายว่าด้วยโรงงาน หรือพื้นที่จัดสรรเพื่อการอุตสาหกรรมที่มีการจัดการระบายน้ำทิ้งลงสู่แหล่งน้ำสาธารณะหรือออกสู่สิ่งแวดล้อมร่วมกัน

“น้ำทิ้ง” หมายความว่า น้ำที่เกิดจากการประกอบกิจการ น้ำจากการใช้น้ำของคนงาน หรือน้ำจากกิจกรรมอื่นในโรงงานอุตสาหกรรม นิคมอุตสาหกรรม หรือเขตประกอบการอุตสาหกรรมที่จะระบายลงสู่แหล่งน้ำสาธารณะหรือออกสู่สิ่งแวดล้อม

ข้อ ๔ กำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากโรงงานอุตสาหกรรมนิคมอุตสาหกรรม และเขตประกอบการอุตสาหกรรมไว้ ดังต่อไปนี้

๔.๑ ความเป็นกรดและด่าง (pH) ตั้งแต่ ๕.๕ ถึง ๙.๐

๔.๒ อุณหภูมิ (Temperature) ไม่เกิน ๔๐ องศาเซลเซียส

๔.๓ สี (Color) ไม่เกิน ๓๐๐ เอทีเอ็มไอ

๔.๔ ของแข็งละลายน้ำทั้งหมด (Total Dissolved Solids หรือ TDS) มีค่าดังนี้

(๑) กรณีระบายลงแหล่งน้ำ ต้องไม่เกิน ๓,๐๐๐ มิลลิกรัมต่อลิตร

(๒) กรณีระบายลงแหล่งน้ำที่มีค่าของแข็งละลายน้ำทั้งหมดเกินกว่า ๓,๐๐๐

มิลลิกรัมต่อลิตร ค่าของแข็งละลายน้ำทั้งหมดในน้ำทิ้งที่จะระบายได้ต้องมีค่าเกินกว่าค่าของแข็งละลายน้ำทั้งหมดที่มีอยู่ในแหล่งน้ำนั้นไม่เกิน ๕,๐๐๐ มิลลิกรัมต่อลิตร

๔.๕ ของแข็งแขวนลอยทั้งหมด (Total Suspended Solids) ไม่เกิน ๕๐ มิลลิกรัมต่อลิตร

๔.๖ บีโอดี (Biochemical Oxygen Demand) ไม่เกิน ๒๐ มิลลิกรัมต่อลิตร

๔.๗ ซีโอดี (Chemical Oxygen Demand) ไม่เกิน ๑๒๐ มิลลิกรัมต่อลิตร

๔.๘ ซัลไฟด์ (Sulfide) ไม่เกิน ๑ มิลลิกรัมต่อลิตร

๔.๙ ไซยาไนด์ (Cyanides HCN) ไม่เกิน ๐.๒ มิลลิกรัมต่อลิตร

๔.๑๐ น้ำมันและไขมัน (Fat Oil and Grease) ไม่เกิน ๕ มิลลิกรัมต่อลิตร

๔.๑๑ ฟORMALDEHYDE (Formaldehyde) ไม่เกิน ๑ มิลลิกรัมต่อลิตร

๔.๑๒ สารประกอบฟีนอล (Phenols) ไม่เกิน ๑ มิลลิกรัมต่อลิตร

๔.๑๓ คลอรีนอิสระ (Free Chlorine) ไม่เกิน ๑ มิลลิกรัมต่อลิตร

๔.๑๔ สารฆ่าศัตรูพืชและสัตว์ (Pesticide) ต้องตรวจไม่พบ

๔.๑๕ ทีเคเอ็น (Total Kjeldahl Nitrogen) ไม่เกิน ๑๐๐ มิลลิกรัมต่อลิตร

๔.๑๖ โลหะหนัก มีค่าดังนี้

(๑) สังกะสี (Zn) ไม่เกิน ๕.๐ มิลลิกรัมต่อลิตร

(๒) โครเมียมเฮกซะวาเลนต์ (Hexavalent Chromium) ไม่เกิน ๐.๒๕

มิลลิกรัมต่อลิตร

(๓) โครเมียมไตรวาเลนต์ (Trivalent Chromium) ไม่เกิน ๐.๗๕ มิลลิกรัมต่อลิตร

(๔) สารหนู (As) ไม่เกิน ๐.๒๕ มิลลิกรัมต่อลิตร

(๕) ทองแดง (Cu) ไม่เกิน ๒.๐ มิลลิกรัมต่อลิตร

(๖)ปรอท (Hg) ไม่เกิน ๐.๐๐๕ มิลลิกรัมต่อลิตร

(๗) แคดเมียม (Cd) ไม่เกิน ๐.๐๓ มิลลิกรัมต่อลิตร

(๘) แบเรียม (Ba) ไม่เกิน ๑.๐ มิลลิกรัมต่อลิตร

(๙) ซีลีเนียม (Se) ไม่เกิน ๐.๐๒ มิลลิกรัมต่อลิตร

(๑๐) ตะกั่ว (Pb) ไม่เกิน ๐.๒ มิลลิกรัมต่อลิตร

(๑๑) นิกเกิล (Ni) ไม่เกิน ๑.๐ มิลลิกรัมต่อลิตร

(๑๒) แมงกานีส (Mn) ไม่เกิน ๕.๐ มิลลิกรัมต่อลิตร

ข้อ ๕ การตรวจสอบค่ามาตรฐานน้ำทิ้งจากโรงงานอุตสาหกรรม นิคมอุตสาหกรรม และเขตประกอบการอุตสาหกรรม ตามข้อ ๔ ให้ใช้วิธีดังต่อไปนี้

- ๕.๑ ความเป็นกรดและด่าง ให้ใช้เครื่องวัดความเป็นกรดและด่างของน้ำ (pH Meter) ที่มีความละเอียดไม่ต่ำกว่า ๐.๑ หน่วย
- ๕.๒ อลูมิเนียม ให้ใช้เครื่องวัดอลูมิเนียมวัดขณะทำการเก็บตัวอย่าง
- ๕.๓ สี ให้ใช้วิธีเอ็ดเอ็มไอ (ADMI Method)
- ๕.๔ ของแข็งละลายน้ำทั้งหมด ให้ใช้วิธีระเหยตัวอย่างที่กรองผ่านกระดาษกรองใยแก้ว (Glass Fiber Filter Disk) และอบแห้งที่อุณหภูมิ ๑๘๐ องศาเซลเซียส เป็นเวลาอย่างน้อย ๑ ชั่วโมง
- ๕.๕ ของแข็งแขวนลอยทั้งหมด ให้ใช้วิธีกรองผ่านกระดาษกรองใยแก้ว (Glass Fiber Filter Disk) และอบแห้งที่อุณหภูมิ ๑๐๓ - ๑๐๕ องศาเซลเซียส เป็นเวลาอย่างน้อย ๑ ชั่วโมง
- ๕.๖ บีโอดี ให้ใช้วิธีบ่มตัวอย่างที่อุณหภูมิ ๒๐ องศาเซลเซียส เป็นเวลา ๕ วันติดต่อกัน และหาค่าออกซิเจนละลายด้วยวิธีเอไซด์โมดิฟิเคชัน (Azide Modification) หรือวิธีเมมเบรนอิเล็กโทรด (Membrane Electrode)
- ๕.๗ ซีโอดี ให้ใช้วิธีย่อยสลายโดยใช้โพแทสเซียมไดโครเมต (Potassium Dichromate)
- ๕.๘ ซัลไฟด์ ให้ใช้วิธีไอโอดเมตริก (Iodometric Method) หรือวิธีเมทิลีนบลู (Methylene Blue Method)
- ๕.๙ ไซยาไนต์ ให้ใช้การกลั่น (Distillation) และตรวจวัดด้วยวิธีเทียบสี (Colorimetric Method) หรือวิธี Flow Injection Analysis
- ๕.๑๐ น้ำมันและไขมัน ให้ใช้วิธีสกัดด้วยเทคนิค Liquid - Liquid Extraction หรือ Soxhlet Extraction ด้วยตัวทำละลายแล้วแยกหาน้ำหนักของน้ำมันและไขมัน
- ๕.๑๑ ฟอर्मาลดีไฮด์ ให้ใช้วิธีเทียบสี (Colorimetric Method)
- ๕.๑๒ สารประกอบฟีนอล ให้ใช้การกลั่น (Distillation) และตรวจวัดด้วยวิธีเทียบสี (Colorimetric Method)
- ๕.๑๓ คลอรีนอิสระ ให้ใช้วิธีไตเตรท (Titrimetric Method) หรือวิธีเทียบสี (Colorimetric Method)
- ๕.๑๔ สารฆ่าศัตรูพืชและสัตว์ ให้ใช้วิธีก๊าซโครมาโตกราฟี (Gas-Chromatographic Method)
- ๕.๑๕ ทีเคเอ็น ให้ใช้วิธีเจลดาล์ (Kjeldahl)
- ๕.๑๖ โลหะหนัก

(๑) สังกะสี ทองแดง แคดเมียม แบเรียม ตะกั่ว นิกเกิล และแมงกานีส ให้ใช้วิธีย่อยสลายตัวอย่างด้วยกรด (Acid digestion) และวัดหาปริมาณโลหะด้วยวิธีอะตอมมิกแอบซอร์ปชันสเปกโตรเมตรี (Atomic Absorption Spectrometry : AAS) หรือวิธีอินดักทีฟลิคัพเพลพลาสมา (Inductively Coupled Plasma)

(๒) โครเมียม

(ก) โครเมียมทั้งหมด ให้ใช้วิธีย่อยสลายตัวอย่างด้วยกรด (Acid digestion) และวัดหาปริมาณโลหะด้วยวิธีอะตอมมิกแอบซอร์ปชันสเปกโตรเมตรี (Atomic Absorption Spectrometry: AAS) หรือวิธีอินดักทีฟลิคัพเพลพลาสมา (Inductively Coupled Plasma)

(ข) โครเมียมเฮกซะวาเลนต์ ให้ใช้วิธีเทียบสี (Colorimetric Method) หรือวิธีสกัดและตรวจวัดด้วยวิธีอะตอมมิกแอบซอร์ปชันสเปกโตรเมตรี (Atomic Absorption Spectrometry: AAS) หรือวิธีสกัดและตรวจวัดด้วยวิธีอินดักทีฟลิคัพเพลพลาสมา (Inductively Coupled Plasma)

(ค) โครเมียมไตรวาเลนต์ ให้ใช้วิธีคำนวณจากค่าส่วนต่างของโครเมียมทั้งหมดกับโครเมียมเฮกซะวาเลนต์

(๓) สารหนูและซีลีเนียม ให้ใช้วิธีอะตอมมิกแอบซอร์ปชันสเปกโตรโฟโตเมตรี (Atomic Absorption Spectrophotometry) ชนิดไฮไดรด์เจนเนอเรชัน (Hydride Generation) หรือวิธีอินดักทีฟลิคัพเพลพลาสมา (Inductively Coupled Plasma)

(๔) พรอท ให้ใช้วิธีโคลด์เวเปอร์อะตอมมิกแอบซอร์ปชันสเปกโตรเมตรี (Cold Vapor Atomic Absorption Spectrometry) หรือวิธีโคลด์เวเปอร์อะตอมมิกฟลูออเรสเซนซ์สเปกโตรเมตรี (Cold Vapor Atomic Fluorescence Spectrometry) หรือวิธีอินดักทีฟลิคัพเพลพลาสมา (Inductively Coupled Plasma)

ข้อ ๖ การตรวจสอบค่ามาตรฐานน้ำทิ้งจากโรงงานอุตสาหกรรม นิคมอุตสาหกรรม และเขตประกอบการอุตสาหกรรม ตามข้อ ๕ ให้เป็นไปตามคู่มือวิเคราะห์น้ำและน้ำเสียของสมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย หรือ Standard Methods for the Examination of Water and Wastewater ซึ่ง American Public Health Association, American Water Work Association และ Water Environment Federation ของประเทศสหรัฐอเมริกากำหนด หรือตามที่คณะกรรมการควบคุมมลพิษประกาศในราชกิจจานุเบกษา

ข้อ ๗ การเก็บตัวอย่างน้ำทิ้งเพื่อการตรวจสอบมาตรฐานควบคุมการระบายน้ำทิ้งจากโรงงานอุตสาหกรรม นิคมอุตสาหกรรม และเขตประกอบการอุตสาหกรรม ตามข้อ ๔ ให้เป็นดังต่อไปนี้

๗.๑ จุดเก็บตัวอย่าง ให้เก็บในจุดระบายทิ้งลงสู่แหล่งน้ำสาธารณะหรือออกสู่สิ่งแวดล้อมหรือจุดอื่นที่สามารถใช้เป็นตัวแทนของน้ำทิ้งที่ระบายออกจากโรงงานอุตสาหกรรม นิคมอุตสาหกรรม และเขตประกอบการอุตสาหกรรม ในกรณีมีการระบายทิ้งหลายจุดให้เก็บทุกจุด

๗.๒ วิธีการเก็บตัวอย่างน้ำทิ้ง ณ จุดเก็บตัวอย่างตาม ๗.๑ ให้เก็บแบบจ้วง (Grab Sample)

ข้อ ๘ ประกาศนี้ไม่ใช้บังคับกับแหล่งกำเนิดมลพิษที่มีการกำหนดมาตรฐานควบคุมการระบายน้ำทั้งตามกฎหมายว่าด้วยการส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติไว้เป็นการเฉพาะ

ข้อ ๙ ประกาศนี้ให้ใช้บังคับเมื่อพ้นกำหนดหนึ่งปีนับจากแต่วันประกาศในราชกิจจานุเบกษาเป็นต้นไป

ประกาศ ณ วันที่ ๒๙ มีนาคม พ.ศ. ๒๕๕๙
พลเอก สุรศักดิ์ กาญจนรัตน์
รัฐมนตรีว่าการกระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม



ประกาศกระทรวงอุตสาหกรรม
เรื่อง กำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากโรงงาน
พ.ศ. ๒๕๖๐

โดยที่เป็นการสมควรปรับปรุงการกำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากการประกอบกิจการโรงงาน เพื่อให้มีค่ามาตรฐานและวิธีการตรวจสอบน้ำทิ้งจากโรงงานให้เหมาะสมและเป็นไปตามมาตรฐานสากล รวมถึงเป็นการควบคุมการระบายน้ำทิ้งจากโรงงาน อาศัยอำนาจตามความในข้อ ๑๔ แห่งกฎกระทรวงฉบับที่ ๒ (พ.ศ. ๒๕๓๕) ออกตามความในพระราชบัญญัติโรงงาน พ.ศ. ๒๕๓๕ ที่ระบุว่า “ห้ามระบายน้ำทิ้งออกจากโรงงาน เว้นแต่ได้ทำการอย่างใดอย่างหนึ่งหรือหลายอย่างจนน้ำทิ้งนั้นมีลักษณะเป็นไปตามที่รัฐมนตรีกำหนดโดยประกาศในราชกิจจานุเบกษา แต่ทั้งนี้ต้องไม่ใช้วิธีทำให้เจือจาง (dilution)” รัฐมนตรีว่าการกระทรวงอุตสาหกรรมจึงออกประกาศ ดังต่อไปนี้

ข้อ ๑ ประกาศนี้เรียกว่า “ประกาศกระทรวงอุตสาหกรรม เรื่อง กำหนดมาตรฐานควบคุมการระบายน้ำทิ้งจากโรงงาน พ.ศ. ๒๕๖๐ ”

ข้อ ๒ ประกาศนี้ใช้บังคับตั้งแต่วันที่ ๗ มิถุนายน พ.ศ. ๒๕๖๐ เป็นต้นไป

ข้อ ๓ ให้ยกเลิกประกาศกระทรวงอุตสาหกรรม ฉบับที่ ๒ (พ.ศ. ๒๕๓๕) ออกตามความในพระราชบัญญัติโรงงาน พ.ศ. ๒๕๓๕ เรื่อง กำหนดคุณลักษณะของน้ำทิ้งที่ระบายออกจากโรงงาน ลงวันที่ ๑๔ มิถุนายน พ.ศ. ๒๕๓๕

ข้อ ๔ ในประกาศนี้

“โรงงาน” หมายความว่า โรงงานจำพวกที่ ๑ จำพวกที่ ๒ จำพวกที่ ๓ ตามกฎหมายว่าด้วยโรงงาน

“น้ำทิ้ง” หมายความว่า น้ำที่เกิดจากการประกอบกิจการโรงงาน น้ำจากการใช้น้ำของโรงงานหรือน้ำจากกิจกรรมอื่นในโรงงาน ที่จะระบายออกจากโรงงาน หรือเขตประกอบการอุตสาหกรรม

ข้อ ๕ มาตรฐานน้ำทิ้ง ต้องมีคุณภาพดังต่อไปนี้

๕.๑ ความเป็นกรดและด่าง (pH) ตั้งแต่ ๕.๕ ถึง ๙.๐

๕.๒ อุณหภูมิ (Temperature) ไม่เกิน ๔๐ องศาเซลเซียส

๕.๓ สี (Color) ไม่เกิน ๓๐๐ เอิตีเอ็มไอ

๕.๔ ของแข็งละลายน้ำทั้งหมด (Total Dissolved Solids หรือ TDS) มีค่าดังนี้

(๑) กรณีระบายลงแหล่งน้ำ ต้องไม่เกิน ๓,๐๐๐ มิลลิกรัมต่อลิตร

(๒) กรณีระบายลงแหล่งน้ำที่มีค่าของแข็งละลายน้ำทั้งหมดเกินกว่า ๓,๐๐๐ มิลลิกรัมต่อลิตร ค่าของแข็งละลายน้ำทั้งหมดในน้ำทิ้งที่จะระบายได้ต้องมีค่าเกินกว่าค่าของแข็งละลายน้ำทั้งหมดที่มีอยู่ในแหล่งน้ำนั้นไม่เกิน ๕,๐๐๐ มิลลิกรัมต่อลิตร

๕.๕ ของแข็งแขวนลอยทั้งหมด (Total Suspended Solids) ไม่เกิน ๕๐ มิลลิกรัม

ต่อลิตร

๕.๖ บีโอดี (Biochemical Oxygen Demand) ไม่เกิน ๒๐ มิลลิกรัมต่อลิตร

๕.๗ ซีโอดี (Chemical Oxygen Demand) ไม่เกิน ๑๒๐ มิลลิกรัมต่อลิตร

๕.๘ ซัลไฟด์ (Sulfide) ไม่เกิน ๑ มิลลิกรัมต่อลิตร

/๕.๙ ไซยาไนด์...

๕.๙ โซยาไนต์ (Cyanides CN) ไม่เกิน ๐.๒ มิลลิกรัมต่อลิตร
 ๕.๑๐ น้ำมันและไขมัน (Oil and Grease) ไม่เกิน ๕ มิลลิกรัมต่อลิตร
 ๕.๑๑ ฟORMALDEHYD (Formaldehyde) ไม่เกิน ๑ มิลลิกรัมต่อลิตร
 ๕.๑๒ สารประกอบฟีนอล (Phenols) ไม่เกิน ๑ มิลลิกรัมต่อลิตร
 ๕.๑๓ คลอรีนอิสระ (Free Chlorine) ไม่เกิน ๑ มิลลิกรัมต่อลิตร
 ๕.๑๔ สารฆ่าศัตรูพืชและสัตว์ (Pesticide) ต้องตรวจไม่พบ
 ๕.๑๕ ไทเคเนน (Total Kjeldahl Nitrogen) ไม่เกิน ๑๐๐ มิลลิกรัมต่อลิตร
 ๕.๑๖ โลหะหนัก มีค่าดังนี้

- (๑) สังกะสี (Zn) ไม่เกิน ๕.๐ มิลลิกรัมต่อลิตร
- (๒) โครเมียมเฮกซะวาเลนต์ (Hexavalent Chromium) ไม่เกิน ๐.๒๕

มิลลิกรัมต่อลิตร

- (๓) โครเมียมไตรวาเลนต์ (Trivalent Chromium) ไม่เกิน ๐.๗๕ มิลลิกรัม

ต่อลิตร

- (๔) สารหนู (As) ไม่เกิน ๐.๒๕ มิลลิกรัมต่อลิตร
- (๕) ทองแดง (Cu) ไม่เกิน ๒.๐ มิลลิกรัมต่อลิตร
- (๖)ปรอท (Hg) ไม่เกิน ๐.๐๐๕ มิลลิกรัมต่อลิตร
- (๗) แคดเมียม (Cd) ไม่เกิน ๐.๐๓ มิลลิกรัมต่อลิตร
- (๘) แบเรียม (Ba) ไม่เกิน ๑.๐ มิลลิกรัมต่อลิตร
- (๙) ซีลีเนียม (Se) ไม่เกิน ๐.๐๒ มิลลิกรัมต่อลิตร
- (๑๐) ตะกั่ว (Pb) ไม่เกิน ๐.๒ มิลลิกรัมต่อลิตร
- (๑๑) นิกเกิล (Ni) ไม่เกิน ๑.๐ มิลลิกรัมต่อลิตร
- (๑๒) แมงกานีส (Mn) ไม่เกิน ๕.๐ มิลลิกรัมต่อลิตร

ข้อ ๖ การตรวจสอบค่ามาตรฐานน้ำทิ้งจากโรงงาน ตามข้อ ๕ ให้ใช้วิธีดังต่อไปนี้

๖.๑ ความเป็นกรดและด่าง ให้ใช้เครื่องวัดความเป็นกรดและด่างของน้ำ

(pH Meter) ที่มีความละเอียดไม่ต่ำกว่า ๐.๑ หน่วย

๖.๒ อุณหภูมิ ให้ใช้เครื่องวัดอุณหภูมิวัดขณะทำการเก็บตัวอย่าง

๖.๓ ซี ให้ใช้วิธีเอ็ดเอ็มไอ (ADMI Method)

๖.๔ ของแข็งละลายน้ำทั้งหมด ให้ใช้วิธีระเหยตัวอย่างที่กรองผ่านกระดาษกรอง

ใยแก้ว (Glass Fiber Filter Disk) และอบแห้งที่อุณหภูมิ ๑๘๐ องศาเซลเซียส เป็นเวลาอย่างน้อย ๑ ชั่วโมง

๖.๕ ของแข็งแขวนลอยทั้งหมด ให้ใช้วิธีการกรองผ่านกระดาษกรองใยแก้ว (Glass Fiber Filter) และอบแห้งที่อุณหภูมิ ๑๐๓ - ๑๐๕ องศาเซลเซียส เป็นเวลาอย่างน้อย ๑ ชั่วโมง

๖.๖ บีโอดี ให้ใช้วิธีบ่มตัวอย่างที่อุณหภูมิ ๒๐ องศาเซลเซียส เป็นเวลา ๕ วัน

ติดต่อกัน และหาค่าออกซิเจนละลายด้วยวิธีเอไซด์ไมดิฟิเคชัน (Azide Modification) หรือวิธีเมมเบรนอิเล็กโทรด (Membrane Electrode)

๖.๗ ซีโอดี ให้ใช้วิธีย่อยสลายโดยใช้โพแทสเซียมไดโครเมต (Potassium

Dichromate)

๖.๘ ซัลไฟต์ ให้ใช้วิธีไอโอดิเมตริก (Iodometric Method) หรือวิธีเมทิลีนบลู

(Methylene Blue Method)

๖.๙ โซยาไนต์ ให้ใช้การกลั่น (Distillation) และตรวจวัดด้วยวิธีเทียบสี (Colorimetric Method) หรือวิธี Flow Injection Analysis

๖.๑๐ น้ำมันและไขมัน ให้ใช้วิธีสกัดด้วยเทคนิค Liquid - Liquid Extraction หรือ Soxhlet Extraction ด้วยตัวทำละลายแล้วแยกหาน้ำมันและไขมัน

๖.๑๑ ฟORMALDEHYD ให้ใช้วิธีเทียบสี (Colorimetric Method)

๖.๑๒ สารประกอบฟีนอล ให้ใช้การกลั่น (Distillation) และตรวจวัดด้วยวิธีเทียบสี (Colorimetric Method)

๖.๑๓ คลอรีนอิสระ ให้ใช้วิธีไทเตรต (Titrimetric Method) หรือวิธีเทียบสี (Colorimetric Method)

๖.๑๔ สารฆ่าศัตรูพืชและสัตว์ ให้ใช้วิธีก๊าซโครมาโตกราฟีค (Gas-Chromatographic Method) หรือวิธีไฮเพอร์ฟอร์แมนซ์ ลิกวิด โครมาโตกราฟีค (High-Performance Liquid Chromatographic Method)

๖.๑๕ ไทเคเนน ให้ใช้วิธีเจลดาล์ (Kjeldahl)

๖.๑๖ โลหะหนัก

(๑) สังกะสี ทองแดง แคดเมียม แบเรียม ตะกั่ว นิกเกิลและแมงกานีส ให้ใช้วิธีย่อยสลายตัวอย่างด้วยกรด (Acid digestion) และวัดหาปริมาณโลหะด้วยวิธีอะตอมมิกแอบซอร์ปชัน สเปกโตรเมตรี (Atomic Absorption Spectrometry : AAS) หรือวิธีอินดักทีฟลีคัพเพิลพลาสมา (Inductively Coupled Plasma)

(๒) โครเมียม

ก) โครเมียมทั้งหมด ให้ใช้วิธีย่อยสลายตัวอย่างด้วยกรด (Acid digestion) และวัดหาปริมาณโลหะด้วยวิธีอะตอมมิกแอบซอร์ปชันสเปกโตรเมตรี (Atomic Absorption Spectrometry : AAS) หรือวิธีอินดักทีฟลีคัพเพิลพลาสมา (Inductively Coupled Plasma)

ข) โครเมียมเฮกซะวาเลนต์ ให้ใช้วิธีเทียบสี (Colorimetric Method) หรือวิธีสกัดและตรวจวัดด้วยวิธีอะตอมมิกแอบซอร์ปชันสเปกโตรเมตรี (Atomic Absorption Spectrometry: AAS) หรือวิธีสกัดและตรวจวัดด้วยวิธีอินดักทีฟลีคัพเพิลพลาสมา (Inductively Coupled Plasma)

ค) โครเมียมไตรวาเลนต์ ให้ใช้วิธีคำนวณจากค่าส่วนต่างของโครเมียมทั้งหมดกับโครเมียมเฮกซะวาเลนต์

(๓) สารหนูและซีลีเนียม ให้ใช้วิธีอะตอมมิกแอบซอร์ปชันสเปกโตรโฟโตเมตรี (Atomic Absorption Spectrophotometry) ชนิดไฮไดรด์เจเนอเรชัน (Hydride Generation) หรือวิธีอินดักทีฟลีคัพเพิลพลาสมา (Inductively Coupled Plasma)

(๔) ปรอท ให้ใช้วิธีโคลด์เวปอะตอมมิกแอบซอร์ปชันสเปกโตรเมตรี (Cold Vapor Atomic Absorption Spectrometry) หรือวิธีโคลด์เวปอะตอมมิกฟลูออเรสเซนซ์สเปกโตรเมตรี (Cold Vapor Atomic Fluorescence Spectrometry) หรือวิธีอินดักทีฟลีคัพเพิลพลาสมา (Inductively Coupled Plasma)

ข้อ ๗ การตรวจสอบค่ามาตรฐานน้ำทิ้งจากโรงงาน ตามข้อ ๖ ให้เป็นไปตามคู่มือวิเคราะห์น้ำและน้ำเสียของสมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย หรือ Standard Methods for the Examination of Water and Wastewater ซึ่ง American Public Health Association, American Water Work

/ Association ..

Association และ Water Environment Federation ของประเทศสหรัฐอเมริกากำหนด หรือตามที่กรมโรงงานอุตสาหกรรมกำหนด

ข้อ ๘ การเก็บตัวอย่างน้ำทิ้งเพื่อการตรวจสอบค่ามาตรฐาน ตามข้อ ๕ ให้เป็นดังต่อไปนี้

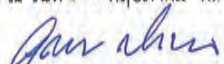
๘.๑ จุดเก็บตัวอย่าง ให้เก็บในจุดระบายทิ้งออกจากโรงงาน ไม่ว่าจะมียูจุดเดียวหรือหลายจุดก็ตาม หรือจุดอื่นที่สามารถใช้เป็นตัวแทนของน้ำทิ้งที่ระบายออกจากโรงงาน กรณีมีการระบายทิ้งหลายจุดให้เก็บทุกจุด

๘.๒ วิธีการเก็บตัวอย่างน้ำทิ้ง ณ จุดเก็บตัวอย่างตาม ๘.๑ ให้เก็บแบบจ้วง (Grab Sample)

ข้อ ๙ การกำหนดค่ามาตรฐานน้ำทิ้งให้แตกต่างไปจากข้อ ๕ สำหรับโรงงานในประเภทหรือชนิดใดเป็นการเฉพาะให้เป็นไปตามประกาศกรมโรงงานอุตสาหกรรม

ข้อ ๑๐ ให้ประกาศกรมโรงงานอุตสาหกรรม (พ.ศ.๒๕๓๙) เรื่อง กำหนดคุณลักษณะน้ำทิ้งที่ระบายออกนอกโรงงานให้มีค่าแตกต่างจากที่กำหนดไว้ในประกาศกระทรวงอุตสาหกรรม ฉบับที่ ๒ (พ.ศ. ๒๕๓๙) เรื่อง กำหนดคุณลักษณะของน้ำทิ้งที่ระบายออกจากโรงงาน ลงวันที่ ๑๘ กุมภาพันธ์ พ.ศ. ๒๕๔๐ ยังคงบังคับใช้ได้ต่อไปจนกว่าจะได้มีการยกเลิก

ประกาศ ณ วันที่ ๓๐ พฤษภาคม พ.ศ. ๒๕๖๐



(นายอุดม สวานายน)

รัฐมนตรีว่าการกระทรวงอุตสาหกรรม

ภาคผนวก ฉ

ใบรับรองการสอบเทียบเครื่องมือ



รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Ambient	Total Suspended Particulate	High Volume	BKK_F50375	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_F50367	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_F51059	-	-	On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	BKK_D00004	8-Feb-23	8-Feb-24	12
Ambient	Particulate Matter (PM-10)	High Volume	BKK_F50387	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	BKK_F50377	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	Digital Balance	BKK_D00004	8-Feb-23	8-Feb-24	12
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_F50775	5-Jan-25	5-Jul-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_F51086	5-Jan-25	5-Jul-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_F50800	5-Jan-25	5-Jul-25	6
Ambient	Wind Speed / Wind Direction	WVC_F50406	5-Jan-25	5-Jan-24	12	
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_F50917	1-Nov-21	2-May-23	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_F50975	5-Jan-23	5-Jan-24	12
Stack (CEMS)	Carbon of Nitrogen	Analyzer - System calibration, Set	-	-	-	-
Stack (CEMS)	Sulfur Dioxide	Analyzer - System calibration, Set	-	-	-	-
Stack	Total Suspended Particulate	Console Control Unit	BKK_F50496	3-Jan-25	3-Jul-25	6
Stack	Total Suspended Particulate	Digital Balance	BKK_D00002	8-Feb-23	8-Feb-24	12
Noise	Leq 24 Hrs	Sound Calibrator	BKK_F50631	20-Dec-22	20-Dec-23	18
Noise	Leq 24 Hrs	Sound Level Meter	BKK_F50877	25-Oct-22	25-Oct-23	12
Noise	Leq 24 Hrs	Sound Level Meter	BKK_F50879	21-Nov-22	21-Nov-23	12
Noise	Leq 24 Hrs	Sound Level Meter	BKK_F50880	21-Nov-22	21-Nov-23	12
Noise	Noise Dose, TWA	Dose Badge Reader	BKK_F50931	24-Jan-23	24-Jan-24	12
Noise	Noise Dose, TWA	Dose Badge Reader	BKK_F50621	24-Jan-23	24-Jan-24	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50667	13-Feb-23	13-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50669	8-Jul-22	8-Jul-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50670	8-Jul-22	8-Jul-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50672	22-Feb-23	22-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50678	13-Feb-23	13-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50679	28-Sep-22	28-Sep-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50682	21-Nov-22	21-Nov-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50640	15-May-23	15-May-24	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50653	19-Dec-22	19-Dec-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50658	9-Jul-22	9-Jul-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50663	15-May-23	15-May-24	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50671	21-Nov-22	21-Nov-23	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50678	13-Feb-23	13-Feb-24	12
Heat	Heat Stress	Heat Stress Monitor	BKK_F50680	7-Apr-23	7-Apr-24	12
Illuminance	Illuminance	Lux Meter	BKK_F50887	02-Sep-22	2-Sep-23	12
Illuminance	Illuminance	Lux Meter	BKK_F51146	13-Sep-22	13-Sep-23	12

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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Water Lab	pH at 25 °C	pH meter	BKK_EN0072	12-Sep-22	12-Mar-24	18
Water Lab	Color (at Original pH)	Spectrophotometer	BKK_EN0037	27-Sep-22	27-Mar-24	18
Water Lab	Color (at pH 7.0)	Spectrophotometer	BKK_EN0037	27-Sep-22	27-Mar-24	18
Water Lab	Dissolved Oxygen	Burette	BKK_EN0171	30-Aug-22	1-Mar-24	18
Water Lab	Dissolved Oxygen	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Water Lab	Oil & Grease	Electronic Top-Loading Balance	BKK_EN0003	24-Aug-22	24-Aug-23	12
Water Lab	Oil & Grease	Water Bath	BKK_EN0148	31-Jan-22	1-Aug-23	18
Water Lab	Total Dissolved Solids 103-105°C	Electronic Top-Loading Balance	BKK_EN0003	24-Aug-22	24-Aug-23	12
Water Lab	Total Dissolved Solids 103-105°C	Oven	BKK_EN0273	29-Nov-22	29-May-24	18
Water Lab	Total Dissolved Solids 180°C	Electronic Top-Loading Balance	BKK_EN0003	24-Aug-22	24-Aug-23	12
Water Lab	Total Dissolved Solids 180°C	Oven	BKK_EN0273	29-Nov-22	29-May-24	18
Water Lab	Temperature	pH meter	BKK_LG0004	3-Apr-23	3-Apr-24	12
Water Lab	Lead	ICP-MS	BKK_EL0026	14-Jun-22	14-Dec-23	18
Water Lab	Lead	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18
Water Lab	Lead	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Water Lab	Iron	ICP-MS	BKK_EL0026	14-Jun-22	14-Dec-23	18
Water Lab	Iron	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18
Water Lab	Iron	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Water Lab	Copper	ICP-MS	BKK_EL0026	14-Jun-22	14-Dec-23	18
Water Lab	Copper	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18
Water Lab	Copper	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Water Lab	Zinc	ICP-MS	BKK_EL0026	14-Jun-22	14-Dec-23	18
Water Lab	Zinc	Hot Block	BKK_EL0054	7-Apr-22	7-Oct-23	18
Water Lab	Zinc	Chamber (Cold Room)	BKK_EN0167	30-Jun-22	30-Dec-23	18
Water Lab	Residual Free Chlorine	Chlorine Meter	BKK_LG0042	19-Jan-23	19-Jan-24	12

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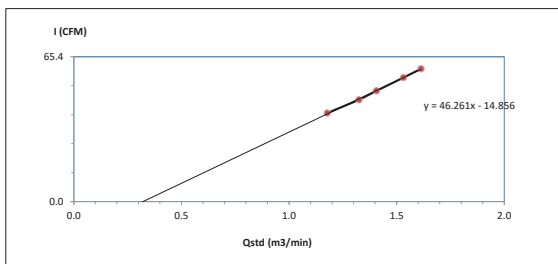
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High Volume Air Sampler Calibration Worksheet

Project Site :	Gulf JP CRN Co.,Ltd.	Barometric Pressure (mm Hg) :	760
Calibrate Location :	พื้นที่โรงไฟฟ้า	Temperature (°C) :	32
Calibrate Date :	10-Mar-23	High Volume ID :	BKK_FS0373
CalibrationSheet No.:	C-100323-BKK_FS0373	High Volume Model :	G1051
Calibrator ID:	BKK_FS0624	High Volume S/N :	1330
Calibrator Model :	TE-5028A	Calibrator Slope :	1.63932
Calibrator S/N :	2584	Calibrator Intercept :	-0.01785

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	3.7	1.1777	40	Slope : 46.2607
2	4.7	1.3250	46	Intercept : -14.8564
3	5.3	1.4060	50	Correlation Coefficient : 0.9992
4	6.3	1.5313	56	
5	7.0	1.6131	60	



Calibrated by : (Mr. Teeravut Sukdee)
Field Scientist(1)

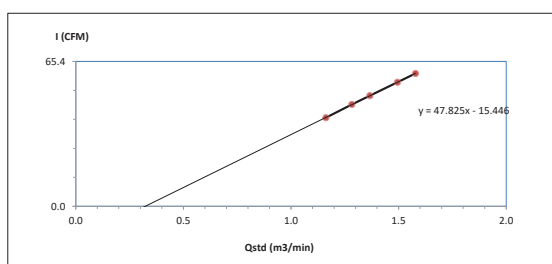
Approved by : (Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)



High Volume Air Sampler Calibration Worksheet

Project Site :	Gulf JP CRN Co.,Ltd.	Barometric Pressure (mm Hg) :	760
Calibrate Location :	โรงพยาบาลส่งเสริมสุขภาพตำบลเชิงรากน้อย	Temperature (°C) :	32
Calibrate Date :	10-Mar-23	High Volume ID :	BKK_FS0367
CalibrationSheet No.:	C-100323-BKK_FS0367	High Volume Model :	TE-5009X
Calibrator ID:	BKK_FS0624	High Volume S/N :	4162
Calibrator Model :	TE-5028A	Calibrator Slope :	1.63932
Calibrator S/N :	2584	Calibrator Intercept :	-0.01785

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	3.6	1.1619	40	Slope : 47.8254
2	4.4	1.2826	46	Intercept : -15.4464
3	5.0	1.3661	50	Correlation Coefficient : 0.9999
4	6.0	1.4948	56	
5	6.7	1.5786	60	



Calibrated by : (Mr. Teeravut Sukdee)
Field Scientist(1)

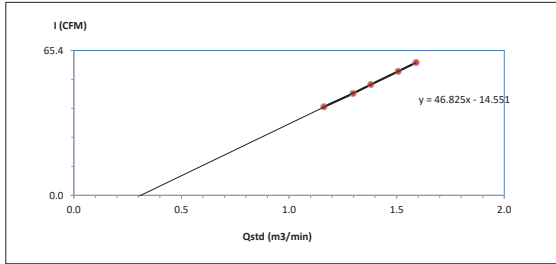
Approved by : (Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)



High Volume Air Sampler Calibration Worksheet

Project Site :	Gulf P CRN Co., Ltd.	Barometric Pressure (mm Hg) :	760
Calibrate Location :	โรงเรียนคลองบางกรูด	Temperature (°C) :	32
Calibrate Date :	10-Mar-23	High Volume ID :	BKK_FS1059
Calibration Sheet No.:	C-100323-BKK_FS1059	High Volume Model :	TE-5009X
Calibrator ID :	BKK_FS0624	High Volume S/N :	5693
Calibrator Model :	TE-5028A	Calibrator Slope :	1.63932
Calibrator S/N :	2584	Calibrator Intercept :	-0.01785

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	3.6	1.1619	40	Slope : 46.8246
2	4.5	1.2969	46	Intercept : -14.5515
3	5.1	1.3795	50	Correlation Coefficient : 0.9999
4	6.1	1.5071	56	
5	6.8	1.5902	60	



Calibrated by : (Mr. Teeravut Sukdee)
Field Scientist(1)

Approved by : (Mr. Noppong Juntarup)
Enviro Field Coordinator Scientist (3)

FORM NO.: F-06-073 REVISION NO.: ISSUE DATE: 14/03/16

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 : Sinita P.
APPROVED BY : K. A.
NEXT CAL. DATE : 8/2/24

Model Number :	XP105DU	Certificate No. :	23BCI0071
Description :	Semi-micro Balance	Issued Date :	Monday, February 13, 2023
Serial Number :	1123091884	Reference No. :	203245
ID No. :	BKK_EN0004		
Manufacturer :	Mettler Toledo	Page No. :	1 of 3

Customer Name : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanan Rd., Khwaeng Phatthanan, Khet Suan Luang, Bangkok 10250.

Calibrated Place : Balance Room.

Calibrated By : Mr. Chonchai Inthana
Calibration Date : Wednesday, February 08, 2023
Calibration Procedure No. : This calibration was conducted by Using in-house calibration procedure number (WH-003).
Based on UKAS LAB 14 : 2019

Metrological data :		Ambients Conditions:	
Capacity :	31/120 g	Readability :	0.0001 g
		Temperature :	21.0 °C ± 3.0 °C
		Humidity :	65.0 % RH ± 5.0 % RH
		Pressure :	±
Reasons for calibration		Equipment Condition:	
<input type="checkbox"/> New Installation <input type="checkbox"/> Service / Repair <input checked="" type="checkbox"/> Re-calibration / Maintenance		<input checked="" type="checkbox"/> Good Operator <input type="checkbox"/> 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 - 1kg E2 s/n 37929119	SPC-RT	C02212565	14-Sep-2023
MHB-382SD	Humidity/Barometer/Temp Luton MHB-382SD	DKSH	C19220444	5-Sep-2023

This certificate relates 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)

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

SARTORIUS

Certificate of Calibration

Model Number :	XP105DU	Certificate No. :	23BCI0071
Description :	Semi-micro Balance	Issued Date :	Monday, February 13, 2023
Serial Number :	1123091884	Reference No. :	203245
ID No. :	BKK_EN0004		
Manufacturer :	Mettler Toledo	Page No. :	2 of 3

Calibration Results : Without Adjustment

Repeatability The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.	Eccentricity (Off-center loading error) The off-center loading error is yielded by the difference between the result 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 R11).
Nominal Value : (Low Load) 2 g Tolerance : N/A g Standard Deviation : 0.000005	Nominal Value : 20 g Tolerance : N/A g Standard Deviation : 0.000007

Linearity

The linearity, also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance

N/A g

Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.1	0.10000	0.10000	0.00000	0.000022
0.5	0.50001	0.50000	-0.00001	0.000023
1	1.00000	1.00000	0.00000	0.000024
2	2.00002	2.00001	-0.00001	0.000026
5	5.00002	5.00002	0.00000	0.000030
10	10.00002	10.00002	0.00000	0.000035
15	15.00004	15.00004	0.00000	0.000053
20	20.00000	20.00000	0.00000	0.000053
25	25.00002	25.00002	0.00000	0.000089
30	30.00002	30.00004	0.00002	0.000089

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

SARTORIUS

Certificate of Calibration

Model Number :	XS105DU	Certificate No. :	23BCI0071
Description :	Semi-micro Balance	Issued Date :	Monday, February 13, 2023
Serial Number :	1123091884	Reference No. :	203245
ID No. :	BKK_EN0004		
Manufacturer :	Mettler Toledo	Page No. :	3 of 3

Calibration Results : Without Adjustment

Repeatability The repeatability is the ability of a weighing instrument to display nearly identical readings under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.	Eccentricity (Off-center loading error) The off-center loading error is yielded by the difference between the result 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 R11).
Nominal Value : (Low Load) 100 g Tolerance : N/A g Standard Deviation : 0.00003	Nominal Value : 100 g Tolerance : N/A g Standard Deviation : 0.00003

Linearity

The linearity, also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance	N/A	g		
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
50	50.0000	50.0000	0.0000	0.00012
55	55.0000	55.0000	0.0000	0.00015
60	60.0000	60.0000	0.0000	0.00015
65	65.0001	65.0001	0.0000	0.00015
70	70.0000	70.0000	0.0000	0.00015
75	75.0000	75.0000	0.0000	0.00017
80	80.0000	80.0000	0.0000	0.00018
90	90.0001	90.0001	0.0000	0.00019
100	100.0000	100.0000	0.0000	0.00018
110	110.0000	110.0000	0.0000	0.00026
120	120.0000	120.0000	0.0000	0.00026

End of Report

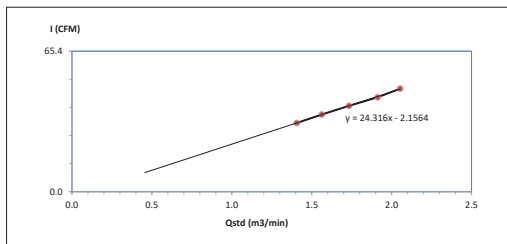
SOP FM 33 03 February 2022



High Volume Air Sampler Calibration Worksheet

Project Site : Gulf JP CRN Co.,Ltd. Barometric Pressure (mm Hg) : 760
Calibrate Location : กรุงเทพมหานคร Calibrate Date : 10-Mar-23
CalibrationSheet No.: C-100323-BKK_FS0387 High Volume ID : BKK_FS0387
Calibrator ID: BKK_FS0624 High Volume S/N: 1626
Calibrator Model: TE-5028A Calibrator Slope : 1.0268
Calibrator S/N: 2584 Calibrator Intercept : -0.01116

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.1	1.4062	32	Slope : 24.3165 Intercept : -2.1564 Correlation Coefficient : 0.9994
2	2.6	1.5634	36	
3	3.2	1.7332	40	
4	3.9	1.9122	44	
5	4.5	2.0533	48	



Calibrated by : (Mr. Teeravut Sukdee) Field Scientist(1)

Approved by : (Mr. Noppong Juntarupan) Enviro Field Coordinator Scientist (3)

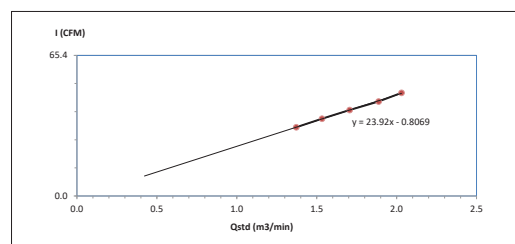
FORM NO.: F 06-074 REVISION NO.: ISSUE DATE: 14/03/16



High Volume Air Sampler Calibration Worksheet

Project Site : Gulf JP CRN Co.,Ltd. Barometric Pressure (mm Hg) : 760
Calibrate Location : กรุงเทพมหานคร Calibrate Date : 10-Mar-23
CalibrationSheet No.: C-100323-BKK_FS0377 High Volume ID : BKK_FS0377
Calibrator ID: BKK_FS0624 High Volume S/N: 5313
Calibrator Model: TE-5028A Calibrator Slope : 1.0268
Calibrator S/N: 2584 Calibrator Intercept : -0.01116

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.0	1.3726	32	Slope : 23.9195 Intercept : -0.8069 Correlation Coefficient : 0.9994
2	2.5	1.5332	36	
3	3.1	1.7061	40	
4	3.8	1.8877	44	
5	4.4	2.0304	48	



Calibrated by : (Mr. Teeravut Sukdee) Field Scientist(1)

Approved by : (Mr. Noppong Juntarupan) Enviro Field Coordinator Scientist (3)

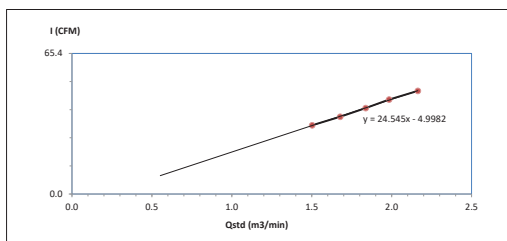
FORM NO.: F 06-074 REVISION NO.: ISSUE DATE: 14/03/16



High Volume Air Sampler Calibration Worksheet

Project Site : Gulf JP CRN Co.,Ltd. Barometric Pressure (mm Hg) : 760
Calibrate Location : กรุงเทพมหานคร Calibrate Date : 10-Mar-23
CalibrationSheet No.: C-100323-BKK_FS0386 High Volume ID : BKK_FS0386
Calibrator ID: BKK_FS0624 High Volume S/N: 4790
Calibrator Model: TE-5028A Calibrator Slope : 1.0268
Calibrator S/N: 2584 Calibrator Intercept : -0.01116

Test No.	Delta H ₂ O (inch)	Q _{std} (m ³ /min)	I : Chart (CFM)	Linear Regression
1	2.4	1.5025	32	Slope : 24.5452 Intercept : -4.9982 Correlation Coefficient : 0.9995
2	3.0	1.6785	36	
3	3.6	1.8377	40	
4	4.2	1.9840	44	
5	5.0	2.1637	48	



Calibrated by : (Mr. Teeravut Sukdee) Field Scientist(1)

Approved by : (Mr. Noppong Juntarupan) Enviro Field Coordinator Scientist (3)

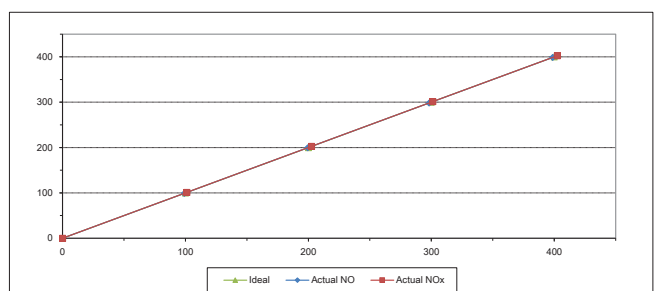
FORM NO.: F 06-074 REVISION NO.: ISSUE DATE: 14/03/16



MULTIPOINT CALIBRATION REPORT

Calibration Date : 5-Jan-23 Equipment Name : NOx Analyzer
Manufacturer : Teledyne API Model : 200E
Serial No. : 4378 Equipment ID : BKK_FS0773
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	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	99.10	-0.90	-0.90	101.20	1.20	1.20
2	200.00	199.50	-0.50	-0.25	202.60	2.60	1.30
3	300.00	298.20	-1.80	-0.60	301.30	1.30	0.43
4	400.00	398.70	-1.30	-0.33	402.60	2.60	0.65
AVERAGE (%)				-0.40			0.74



Calibrated By

Approved By

(Mr. Jirawut Sakam) Field Environmental Scientist (3)

(Mr. Sarayuth Jitranont) Assistant General Manager

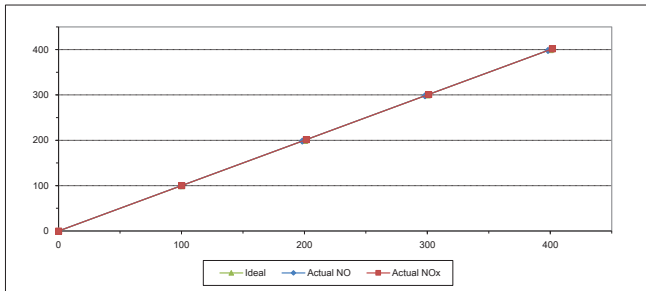
ALS Laboratory Group
FORM NO.: F 06-056 REVISION NO.: ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	5-Jan-23	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	30K18RHM	Equipment ID	BKK_FS1086
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	CALIBRATION RESULTS						
	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	99.50	-0.50	-0.50	100.20	0.20	0.20
2	200.00	198.30	-1.70	-0.85	201.60	1.60	0.80
3	300.00	298.10	-1.90	-0.63	301.10	1.10	0.37
4	400.00	398.20	-1.80	-0.45	401.60	1.60	0.40
AVERAGE (%)				-0.48			0.37



Calibrated By

(Mr. Jirawut Sakam)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitranont)
Assistant General Manager

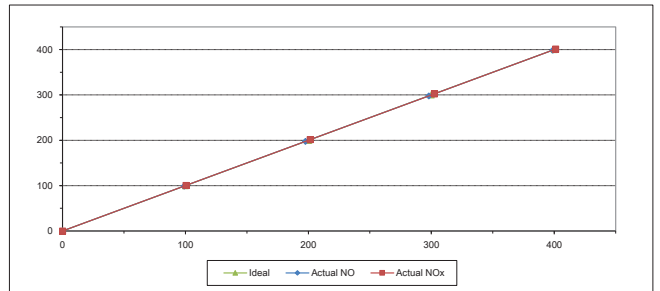
ALS Laboratory Group
FORM NO.: F 06-056 REVISION NO.: ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date	5-Jan-23	Equipment Name	NOx Analyzer
Manufacturer	HORIBA	Model	APNA-370
Serial No.	HCWSR861	Equipment ID	BKK_FS0800
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	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	99.00	-1.00	-1.00	100.50	0.50	0.50
2	200.00	197.60	-2.40	-1.20	201.50	1.50	0.75
3	300.00	298.00	-2.00	-0.67	302.50	2.50	0.83
4	400.00	398.80	-1.20	-0.30	401.20	1.20	0.30
AVERAGE (%)				-0.61			0.50



Calibrated By

(Mr. Jirawut Sakam)
Field Environmental Scientist (3)

Approved By

(Mr. Sarayuth Jitranont)
Assistant General Manager

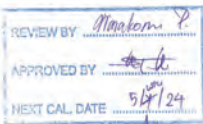
ALS Laboratory Group
FORM NO.: F 06-056 REVISION NO.: ISSUE DATE: 02/04/12



Jirantee Associates Co., Ltd.
162/4-15, 15/15-50
Vachakarn 7-7/1, 161 Vachakarn, Bangkok
Bangkok 10600 (Thailand)
Tel: +662 000 8812
Mobile: +662 000 8815
E-mail: jnac-calibration@jirantee.com
Web site: www.jirantee.com

Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TS-15 17025
CALIBRATION 0367

Air speed measurement laboratory
Calibration services department



Certificate Number
CL-004-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM	1 Cup anemometer
MANUFACTURER	1 Novatex
MODEL/TYPE	1 Sensor: WS-02T Data logger: 110-WS-250L-D
SERIAL NUMBER	1 Sensor: WS0-004 Data logger: AS445
ID NUMBER	1 RYG_FS0436
CONDITION AS RECEIVED	1 Used item
CUSTOMER	1 ALS laboratory group (Thailand) co., Ltd. 104 Phatthanakan Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

RECEIVED DATE: 28 Dec 2022
MEASUREMENT DATE: 05 Jan 2023
ISSUE DATE: 09 Jan 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature: 23.0 ± 1.0 °C
Relative Humidity: 55.0 ± 15.0 %RH
Atmospheric Pressure: 1010 ± 10 hPa

PLACE OF CALIBRATION: 1 Efflux-type wind tunnel of Jirantee Associates Co., Ltd.

CALIBRATION CONDITIONS: 1 Wind tunnel cross-section area: 900 cm²
1 Wire direction frontal area: 100 cm²
1 Diameter of measuring pipe: mm
1 Blockage ratio of test object: 0.111 [-]

Preconditioning: 24 hours at ambient condition.
Measurement Condition: The average values during measurement are (24.0) °C, (44.2) %RH and (1018.9) hPa.

TABULATION OF RESULTS:
The table on next page give the measured values.

Calibrated by:
1 Mr. Sorawat Thachakul
1 Miss Jiraporn Lertsomphol



Approved signature: [Signature]
Mr. Parinya Booncharoen
Calibration Department Manager

Remarks:
1 Acoustic cross-section area of the wind tunnel
1 Projected cross-section area of the tested object include mounting pipe
1 Diameter of mounting pipe
1 Ratio 1 to 1

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Certificate Number

CL-004-66

Page 2 of 2 Pages

MEASUREMENT RESULTS⁵

The cup anemometer, Unit Under Calibration (UUC) was exercise at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pitot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle, UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

V_{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	V_{ref} (m/s)	Error (m/s)	U (k=2) (m/s)
0.993	23.98	23.95	0.9	-0.1	0.17
2.031	23.98	23.95	1.9	-0.2	0.17
3.060	24.00	23.95	3.0	-0.1	0.18
4.125	23.94	23.95	4.0	-0.2	0.19
5.01	24.04	23.95	4.9	-0.1	0.25
5.99	24.10	23.95	5.9	-0.1	0.19
7.06	23.74	23.95	6.9	-0.1	0.20
8.17	24.08	23.95	8.0	-0.1	0.20
9.09	23.80	23.95	9.0	-0.1	0.20
10.09	23.90	23.95	10.0	-0.1	0.22
11.14	23.90	23.95	11.1	-0.1	0.27
12.13	23.66	23.95	11.9	-0.2	0.24
13.20	23.82	23.95	13.2	0.0	0.27
14.26	23.56	23.95	14.3	0.0	0.25
15.25	23.74	23.95	15.3	0.0	0.29
16.31	23.64	23.95	16.3	0.0	0.26

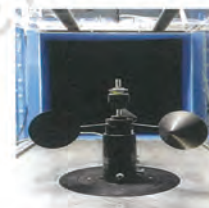
Remarks:

⁵ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place

⁶ Velocity of standard

⁷ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the cup anemometer calibration in the wind tunnel of Jirantee Associates Co., Ltd. The cup anemometer shown may differ from the calibrated one. Remarks: The proportion of the set-up is not true to scale due to imaging geometry.



CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM MANUFACTURER MODEL/TYPE

SERIAL NUMBER

ID NUMBER CONDITION AS-RECEIVED CUSTOMER

RECEIVED DATE MEASUREMENT DATE ISSUE DATE

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

PLACE OF CALIBRATION

CALIBRATION CONDITION

Preconditioning Measurement Condition:

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

Mr. Sorawit Thachalad
Miss Jitraporn Lertsomphol



Approved signature:

Mr. Parinya Booncharoen
Calibration Department Manager

Remarks:

- * Indicate cross-section area of the wind tunnel
- * Provided cross-section area of the tested object include mounting pipe
- * Diameter of mounting pipe
- * Units: "in"

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Certificate Number

CL-004-66

Page 2 of 2 Pages

MEASUREMENT RESULTS

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° intervals in clockwise and counterclockwise directions after adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed m/s	D ₁ 1m Degree (°)	D ₂ 2m Degree (°)	Error Degree (°)	U (k=2) Degree (°)
0.000	0	0	0	0.58
45.000	42	42	-3	0.68
90.000	87	87	-3	0.74
135.000	133	133	-2	0.74
180.001	181	181	1	0.74
225.000	229	229	3	0.76
270.000	274	274	4	0.74
315.000	319	319	4	0.68

Remark:

* Calibration results only valid for the tested circumstances and environmental condition during which calibration took place

* Direction of standard

* Direction of use under Calibration



End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CL-002-66

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

RECEIVED DATE MEASUREMENT DATE ISSUE DATE

CONDITION OF THIS RESULT OF CALIBRATION:

1. Reference Standard Instrument:

- Instrument: Absolute Pressure Transducer
Model: CPG2500
Serial No.: 4100126P
Certificate No.: MP-0205-22
Due Date: 02 Dec 2023
1. Calibration effort for calibration sequence A
2. The UUC* was installed in vertical orientation above reference standard instrument and center of UUC* was used as the reference level
3. Calibration conditions:
4. Condition: ☒ Normal ☐ Abnormal
Pressure transmitting medium: Air
p₀ (20°C, 1 bar): 1.19 kg/m³
n_{amb}: (55±15) %
t_{amb}: (23±3) °C
p_{amb}: (1010±10) mbar
5. The certificate is valid only to the item calibrated on date and place of calibration



Approved signature:

Mr. Parinya Booncharoen
Calibration Department Manager

Calibrated by:
Mr. Sorawit Thachalad
Miss Jitraporn Lertsomphol

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CERTIFICATE OF CALIBRATION

Certificate No. : CL-002-66

Page 2 of 2 Pages

MEASUREMENT RESULTS

☒ Without adjustment ☐ With adjustment

CALIBRATION IN THE RANGE OF

: 950 – 1050 mbar

The results of calibration and associated measurement uncertainties are reported in the table below:

STD (mbar)	UUC* (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
950.17	950.9	0.7	0.94
970.13	970.6	0.5	0.64
990.08	990.4	0.3	0.53
1010.10	1010.3	0.2	0.42
1030.10	1030.1	0.0	0.37
1050.09	1049.9	-0.1	0.41

Note: UUC* Unit Under Calibration

: To convert the result in report unit to Pa should be multiply by 100





63/14-15,67/35-36, Soi Petchkasem7,7/1, Petchkasem Rd,
Walthapra, Bangkokkhai, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com

CERTIFICATE OF CALIBRATION

Certificate No.: RH-01012023
Page 1 of 1 Pages

Measurement Item : Relative humidity with data logger
Manufacturer : Novalyne
Model/Type : 110-WS-250L-D
Serial Number : A5445
ID No. : RY0_F50436
Customer : ALS laboratory group (Thailand) Co., Ltd.
: 104 Phatthanasak 40, Phatthanasak Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Environmental Condition:

The measurement was carried out in an ambient temperature of (25±3)°C and relative humidity of (50±15)%.

Measurement Method:

Unit Under Calibration (UUC) was calibrated by comparison method with standard thermo hygrometer in the humidity generator chamber to determine the errors.

Traceability:

This instrument was calibrated using standard equipment whose accuracy is traceability through National Institute of Standards and Technology to the international system of units (SI) via MCS Calibration, Inc. Certificate number: 20314-101. Due date: Mar 14, 2023.

Measurement Date : Jan 05, 2023
Issued Date : Jan 09, 2023

Measurement Results:

This equipment was connected with indoor air quality probe and Displayed (UR) on display. Model: HMP60, Serial number: R1131113.

Calibration was performed in the range of 20%RH to 80%RH

The results of calibration are reported in table below.

Determined (RH%)	Standard Reading (RH%)	UUC Reading (RH%)	Error (RH%)	Uncertainty ±(RH%)
20	19.97	19.4	-0.6	0.62
50	50.29	49.1	-1.2	0.67
80	80.32	78.9	-1.4	0.67

Performed by

☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved Signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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Walthapra, Bangkokkhai, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com



CERTIFICATE OF CALIBRATION

Certificate No.: CL-001-66
Page 1 of 2

Equipment Name: Data Logger with Temperature
Sensor
Manufacturer: Novalyne
Model: 110-WS-250L-D
Serial No.: A5445
ID No.: RY0_F50436

Customer
Name: ALS laboratory group (Thailand) Co., Ltd.
Address: 104 Phatthanasak 40, Phatthanasak Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 28 Dec 2022
Calibration date: 05 Jan 2023
Issue date: 09 Jan 2023

Reference Used During Calibration

1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition

Temperature: (23±3)°C
Relative Humidity: (55±15)%

Calibration Procedure

The temperature calibration was done by In-House calibration method as WI-CL-001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.

Traceability

The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT) Certificate number: TT-0034-22, Certificate number: ER-0092-22

Calibrated by
☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved Signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

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63/14-15,67/35-36, Soi Petchkasem7,7/1, Petchkasem Rd,
Walthapra, Bangkokkhai, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com



Certificate No.: CL-001-66
Page 2 of 2

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment
Calibration Range: 20-40 °C

Function:

This equipment was connected with temperature sensor Model: HMP60 S/N: R1131113.

Dimension : Diameter 12 mm. Length 80 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.061	20.0	-0.1	0.099
60	25.057	25.0	-0.1	0.099
60	30.045	29.9	-0.1	0.16
60	35.043	34.9	-0.1	0.099
60	40.019	39.9	-0.1	0.099

UUC*: Unit Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%

★ End of Certificate ★



63/14-15,67/35-36, Soi Petchkasem7,7/1, Petchkasem Rd,
Walthapra, Bangkokkhai, Bangkok 10600 Thailand.
Tel: (66) 02-8680812#13 Fax: (66) 02-8680860 www.jiranatee.com

CERTIFICATE OF CALIBRATION

Certificate No.: WD-01112021
Page 1 of 2 pages

Measurement Item : Wind direction sensor with data logger.

Manufacturer : Data logger: Novalyne.
Wind direction sensor: Novalyne.

Model/Type : Data logger: 200-WS-25LB
Wind direction sensor: WS-02P

Serial Number : Data logger: A5377
Wind direction sensor: -

ID No : Data logger: BKR_F50917
Wind direction sensor: -

Customer : ALS laboratory group (Thailand) Co., Ltd.
104 Phatthanasak 40, Phatthanasak Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.

Environmental Condition:

The measurement was carried out in an ambient temperature of (23±3) °C and relative humidity of (40±10) %.

Measurement Method:

The wind direction sensor calibration according to comparison method with reference angle measurement electronic theodolite and the laser is used for axis control. The measurement were taken at 45° intervals in clockwise and counterclockwise directions.

Note: The UUC was warmed up for 1 hour prior to the calibration being performed

Traceability:

The measurement results are traceable to the international system of units (SI) through Certificate No.: Q21086014, Certificate No.: KW564/0025.

Measurement Date : Nov 01, 2021.
Issued Date : Nov 01, 2021.

Performed by
☒ Mr. Sorawit Thachalad
☐ Miss Orathai Wiengwibaya



Approved Signatory:

Mr. Parinya Booncharoen
Calibration Department Manager

THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Continuation of Certificate of Calibration Number

Certificate No: WD-01112021
Page 2 of 2 pages

Result of calibration: ☐ Without adjustment ☒ With adjustment

Calibration in the range of 0 - 360 ° at a calibration interval of 45°

The results of calibration and associated measurement uncertainties are reported in table below.

NO	Turning Direction	Nominal Angle (°)	Standard Reading (°)	UUC* Reading (°)	Error (°)	Uncertainty ±(°)
1	Clockwise	0/360	360	359	-1	3.0
2		45	45	41	-4	3.0
3		90	90	87	-3	3.0
4		135	135	135	0	3.0
5		180	180	183	3	3.0
6		225	225	229	4	3.0
7		270	270	274	4	3.0
8		315	315	320	5	3.0
9	Counter Clockwise	0/360	360	359	-1	3.0
10		45	45	41	-4	3.0
11		90	90	87	-3	3.0
12		135	135	135	0	3.0
13		180	180	183	3	3.0
14		225	225	229	4	3.0
15		270	270	274	4	3.0
16		315	315	320	5	3.0

UUC*: Unit Under Calibration The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No: WS-01112021
Page 1 of 2 pages

Measurement Item	Cup anemometer with data logger		
Manufacturer	Data logger: Novatym Cup anemometer: Novatym		
Model/Type	Data logger: 200-WS-25LB Cup anemometer: WS-02F		
Serial Number	Data logger: AS377 Cup anemometer: -		
ID No	Data logger: BKK_FSD917 Cup anemometer: -		
Customer	ALS laboratory group (Thailand) co., Ltd. 104 Phatthanasen 40, Phatthanasen Rd, Khwaeng Suan Luang, Bangkok 10250 Thailand		
Test Conditions	Wind tunnel cross test section area: 900 cm ² Anemometer frontal area: 100 cm ² Diameter of mounting pipe: - mm Blockage ratio of test object: 0.111 [-]		
Test Conditions	Air temperature: 25.4 ±0.8 °C Air pressure: 1015.1 ±0.4 hPa Relative air humidity: 47.9 ±3.0 %RH		
Calibration Procedure	Calibration was carried out base on: IEC 61400-12-1 001: 2005-Power Performance Measurements of Electricity Producing Wind Turbines; MSASNET Anemometer Calibration Procedure - Version 2: 2009;		
Traceability	This calibration documents the traceable to national standard, Which realize the unit of measurements according to the international system of units (SI) through National Institute of Metrology (NIMT).		
Measurement Date	1 Nov 01, 2021		
Issued Date	1 Nov 01, 2021		
Calibrated by	<input checked="" type="checkbox"/> Mr. Soravit Thachalad <input type="checkbox"/> Miss Orathai Wutetelaysa		
Approved Signature	 Mr. Pinyas Booncharan Calibration Department Manager		

THIS CERTIFICATE MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Continuation of Certificate of Calibration Number

Certificate No: WS-01112021
Page 2 of 2 pages

Result of calibration: ☒ Without adjustment ☐ With adjustment

Calibration in the range of 1 - 16 m/s at a calibration interval of 1 m/s.
The results of calibration and associated measurement uncertainties are reported in the table below.

V _{ref} Reading m/s	V _{test} Reading m/s	Error (m/s)	Uncertainty (%)
1.924	1.9	-0.1	2.5
4.002	4.0	0.0	1.2
6.00	6.0	0.0	0.95
8.02	8.0	0.0	0.73
10.01	10.1	0.1	0.63
12.00	12.1	0.1	0.74
13.99	14.1	0.1	0.76
16.01	16.3	0.3	0.80
15.01	15.3	0.3	0.64
13.00	13.1	0.1	0.45
11.01	11.1	0.1	0.57
9.02	9.0	0.0	0.64
7.02	7.0	0.0	0.68
4.992	5.0	0.0	1.2
2.980	2.9	-0.1	1.8
0.995	0.9	-0.1	4.5

UUC*: Unit Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%

Appendix 1: Instrumentation

NO	Sensor	Manufacturer	Model/Type	Calibration Date	Certificate Report Number	Range
1	Pitot static	TOTO INC.	06352145	Aug 07, 2021	MW-0034-21	5 - 30 m/s
2	Precision Differential Pressure Meter	Zorglab	DPV2500	Aug 07, 2021	MW-0034-21	5 - 30 m/s
3	Air velocity transducer (hot wire)	TBI INC.	8435-12	Aug 08, 2021	MW-0035-21	0 - 5 m/s
4	Temperature	Zorglab	DSH-T16P	March 30, 2021	CL-027-54	-30 - 70 °C
5	Relative humidity	Zorglab	DSH-T16P	March 30, 2021	RH-03032021	0 - 100 %RH
6	Atmospheric pressure	Zorglab	DSH-T16P	March 30, 2021	BP-01032021	500 - 1100 hPa
7	Wind tunnel	GBSOM	MP3300	-	-	0 - 80 m/s

End of certificate of calibration



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Web site: www.jiranatee.com

Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TSI-TS 17025
CALIBRATION 0367

Air speed measurement laboratory
Calibration services department

REVIEW BY	<i>Amakorn P.</i>
APPROVED BY	<i>Stb</i>
NEXT CAL. DATE	9/30/24

Certificate Number
CL-003-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM	Cup anemometer		
MANUFACTURER	Novatym		
MODEL/TYPE	Sensor: WS-02F Data logger: 110-WS-25DL-D		
SERIAL NUMBER	Sensor: WSD-002 Data logger: AS443		
ID NUMBER	BKK_FSD917		
CONDITION AS-RECEIVED	Used item		
CUSTOMER	ALS laboratory group (Thailand) Co., Ltd. 104 Phatthanasen 40, Phatthanasen Rd, Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand.		
RECEIVED DATE	28 Dec 2022		
MEASUREMENT DATE	05 Jan 2023		
ISSUE DATE	09 Jan 2023		
ENVIRONMENTAL CONDITIONS:	Ambient condition in the laboratory are as follow: Temperature: 23.0 ± 0.5 °C Relative Humidity: 55.0 ± 15.0 %RH Atmospheric Pressure: 1010.4 hPa		
PLACE OF CALIBRATION	Effel-type wind tunnel of Jiranatee Associates Co., Ltd.		
CALIBRATION CONDITIONS	Wind tunnel cross-section area: 900 cm ² Wind direction frontal area: 100 cm ² Diameter of mounting pipe: - mm Blockage ratio of test object: 0.111 [-]		
Preconditioning	24 hours at ambient condition.		
Measurement Condition	The average values during measurement are (23.8) °C, (45.8) %RH and (1016.2) hPa.		
TABULATION OF RESULTS:	The table on next page give the measured values.		
Calibrated by:	<input checked="" type="checkbox"/> Mr. Soravit Thachalad <input type="checkbox"/> Miss Orathai Wutetelaysa		
Approved signature	 Mr. Pinyas Booncharan Calibration Department Manager		
Remark:	* Nozzle cross-section area of the wind tunnel * Provided cross-section area of the tested object include mounting pipe * Diameter of mounting pipe * Ratio: 1/10		

Calibration procedure:
The cup anemometer was calibrated against Standard air velocity transducer model: 8455-12 and pitot tube with precision differential pressure meter model: DP42500 in an open test section of Effel-type wind tunnel with 300 cm² cross test section area. The WS-02F based on IEC 61400-12-1: Wind energy generation systems - Part 12-1: Power performance measurements of electricity producing wind turbines, March 2017 was used as a calibration guideline.

Traceability:
This certificate provides a traceability of the measurement to recognized the national standards, and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: MW-0052-21 and MW-0066-22

Uncertainty of Measurement:
The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor k=2, Which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM (Evaluation of measurement data - Guide to the expression of uncertainty in measurement)

THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate Number

CL-003-66

Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The cup anemometer, Unit Under Calibration (UUC) was exercised at 10 m/s for 5 minutes prior to calibration being performed. The standard air velocity 0.5 m/s to 5 m/s was calculated by a standard air velocity transducer and above 5 m/s to 30 m/s was calculated by a pilot tube with precision differential pressure meter which was installed 40 mm and 300 mm respectively away from wind tunnel nozzle. UUC was installed at center of the test section. The calibration was carried out under both rising and falling air velocity in the range of 1 m/s to 16 m/s at calibration interval of 1 m/s. The results of calibration and associated measurement uncertainties are reported in the table below.

v_{ref} (m/s)	Temp. wind tunnel (°C)	Temp. room (°C)	v_{UUC} (m/s)	Error (m/s)	$U (k=2)$ (m/s)
0.989	23.96	23.80	0.9	-0.1	0.15
2.035	23.72	23.80	1.9	-0.2	0.16
3.058	23.98	23.80	3.0	-0.1	0.20
4.139	23.86	23.80	4.0	-0.1	0.20
5.01	23.90	23.80	5.0	0.0	0.20
6.01	23.98	23.80	6.0	0.0	0.19
7.06	23.80	23.80	7.0	-0.1	0.22
8.17	23.84	23.80	8.2	0.0	0.24
9.10	23.90	23.80	9.2	0.1	0.32
10.09	23.90	23.80	10.0	-0.1	0.27
11.14	23.90	23.80	11.1	0.0	0.23
12.14	24.00	23.80	12.1	0.0	0.34
13.20	23.90	23.80	13.2	0.0	0.32
14.27	23.90	23.80	14.2	0.0	0.35
15.25	23.82	23.80	15.3	0.0	0.34
16.30	23.92	23.80	16.3	0.0	0.29

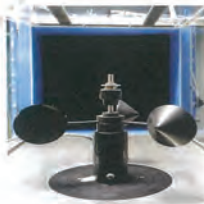
Remark:

¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.

² Velocity of standard

³ Velocity of Unit Under Calibration

PHOTO OF CALIBRATION SET-UP



Calibration set-up of the cup anemometer calibration in the wind tunnel of Jiranatee Associates Co., Ltd. The cup anemometer shown may differ from the calibrated one. Remark: The proportion of the set-up is not true to scale due to imaging geometry.



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CALIBRATION 0367

Air speed measurement laboratory
Calibration services department.

Certificate Number

CL-003-66

CERTIFICATE OF CALIBRATION

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follows:

Temperature: 23.0 ± 3.0 °C

Relative Humidity: 55.0 ± 15.0 %RH

Atmospheric Pressure: 1010.0 ± 10 hPa

PLACE OF CALIBRATION

Eiffel-type wind tunnel of Jiranatee Associates Co., Ltd.

CALIBRATION CONDITION

Wind tunnel cross-section area: 900 cm²

Wind direction frontal area: 129 mm²

Diameter of mounting pipe: - mm

Blockage ratio of test object: 0.143 [-]

Preconditioning

Measurement Condition

24 hours at ambient conditions.

The average values during measurement are (24.0° C, (53.7) %RH and (1015.2) hPa.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

Mr. Sorawit Thachalad

Miss Jitraporn Lertsomphol



Approved signature:

Mr. Parinya Booncharoen

Calibration Department Manager

Remark:

¹ Include correction area of the wind tunnel

² Proposed cross-section area of the tested object include mounting pipe

³ Diameter of mounting pipe

⁴ Ratio "a" to

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Page 2 of 2 Pages

MEASUREMENT RESULTS¹

The wind direction sensor was calibrated against standard rotary encoder by comparison method. During calibration, the measurement was carried out at 45° intervals in clockwise and counterclockwise directions after offset adjustment has been made. The flow speed of wind tunnel (usually 5 m/s) is kept constant while the sensor is rotated around its vertical axis. The results of calibration and associated measurement uncertainties are reported in the table below.

Air speed m/s	D° _{ref} Degree (°)	D° _{UUC} Degree (°)	Error Degree (°)	U (k=2) Degree (°)
5.00	0.000	0	0	0.58
	45.000	42	-3	0.74
	90.000	88	-2	0.68
	135.000	133	-2	0.74
	180.001	181	1	0.74
	225.000	227	2	0.74
	270.000	273	3	0.74
	315.000	318	3	0.74

Remark:

¹ Calibration results only count for the tested circumstances and environmental conditions during which calibration took place.

² Direction of standard

³ Direction of Unit Under Calibration



End of Certificate of Calibration



JIRANATEE ASSOCIATES CO., LTD.

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CALIBRATION 0367

Pressure measurement laboratory
Calibration services department.



CERTIFICATE OF CALIBRATION

Certificate No.: CL-001-66

Page 1 of 2 Pages

MEASUREMENT ITEM

MANUFACTURER

MODEL/TYPE

SERIAL NUMBER

ID NUMBER

CONDITION AS-RECEIVED

CUSTOMER

RECEIVED DATE

MEASUREMENT DATE

ISSUE DATE

CONDITION OF THIS RESULT OF CALIBRATION:

1. Reference Standard Instrument:

Instrument Model Serial No. Certificate No. Due Date

Absolute Pressure Transducer CPG2500 4100126P MP-0205-22 02 Dec 2023

1. Calibration effort for calibration sequence A

2. The UUC* was installed in vertical orientation above reference standard instrument and center of UUC* was used as the reference level.

3. Calibration conditions:

4. Condition: ☒ Normal ☐ Abnormal

Pressure transmitting medium: Air

p₀ (20°C, 1 bar): 1.19 kg/m³

H₂O: (55±15) %

T_{amb}: (23±3) °C

p_{ref}: (1010±10) mbar

5. The certificate is valid only to the item calibrated on date and place of calibration

Calibrated by:

Mr. Sorawit Thachalad

Miss Jitraporn Lertsomphol



Approved signature:

Mr. Parinya Booncharoen

Calibration Department Manager

THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY

CERTIFICATE OF CALIBRATION

Certificate No. : CL-001-66

Page 2 of 2 Pages

MEASUREMENT RESULTS : ☒ Without adjustment ☐ With adjustment
CALIBRATION IN THE RANGE OF : 950 – 1050 mbar

The results of calibration and associated measurement uncertainties are reported in the table below:

STD (mbar)	UUC* (mbar)	Error (mbar)	Uncertainty (k=2) (mbar)
950.16	950.9	0.7	0.93
970.12	970.6	0.5	0.77
990.09	990.4	0.3	0.33
1010.10	1010.1	0.0	0.37
1030.11	1029.8	-0.3	0.48
1050.12	1049.7	-0.4	0.61

Note: UUC* Unit Under Calibration
To convert the result in report unit to Pa should be multiply by 100



Lot No. 2327393-1

ANALYZER CALIBRATION DATA

Client : Gulf JP CRN Co., Ltd. Location : HRSG 1
Date : 13 Mar 23 Test Operator : Boonyarith I.
O₂ ANALYZER
Model : TELEDYNE API T200H Serial No. : 482
Span (%) : 25

	Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	8.02	8.00	8.01	0.04
Span Gas	16.02	16.03	16.00	0.12

NO_x ANALYZER
Model : TELEDYNE API T200H Serial No. : 482
Span (ppm) : 100

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	54.64	54.65	54.67	0.02
Span Gas	81.85	81.86	81.84	0.02

CO ANALYZER
Model : TELEDYNE API T300M Serial No. : 377
Span (ppm) : 100

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	54.42	54.42	54.43	0.01
Span Gas	79.73	79.72	79.71	0.01

Calibrated by

Boonyarith I.

(Mr.Boonyarith Iamted)

Environmental Field Scientist (1)

FORM NO.: F 06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



Lot No. 2327393-1

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Client : Gulf JP CRN Co., Ltd. Location : HRSG 1
Date : 13 Mar 23 Test Operator : Boonyarith I.

O₂ ANALYZER
Cylinder Conc. (%) : 16.02 Span (%) : 25.00

	O ₂ Analyzer Calibration Response	Initial Values System Calibration Response	System Cal Bias (% of Span)	Final Values System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	16.03	15.90	0.52	15.98	0.20	0.32

NO_x ANALYZER
Cylinder Conc. (ppm) : 81.85 Span (ppm) : 100

	NO _x Analyzer Calibration Response	Initial Values System Calibration Response	System Cal Bias (% of Span)	Final Values System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	81.86	81.70	0.16	81.80	0.06	0.10

CO ANALYZER
Cylinder Conc. (ppm) : 79.73 Span (ppm) : 100

	CO Analyzer Calibration Response	Initial Values System Calibration Response	System Cal Bias (% of Span)	Final Values System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	79.72	79.70	0.02	79.71	0.01	0.01

Calibrated by

Boonyarith I.

(Mr.Boonyarith Iamted)

Environmental Field Scientist (1)

FORM NO.: F 06-104 REVISION NO.: ISSUE DATE: 3/06/19

ALS Laboratory Group



CEMs Data

Client Name : Gulf JP CRN Co., Ltd. Date : March 13, 2023
Plant Name : Location : HRSG 1

Run No: 1							Time Base: 21 min							Run No: 2							Time Base: 21 min						
Date	Time	SO ₂	NO _x	CO	O ₂	Load	Date	Time	SO ₂	NO _x	CO	O ₂	Load	Date	Time	SO ₂	NO _x	CO	O ₂	Load							
13-Mar-23	1040	-	18.20	0.50	14.40	38.90	13-Mar-23	1101	-	19.80	0.40	14.50	39.30	13-Mar-23	1101	-	19.80	0.40	14.50	39.30							
13-Mar-23	1041	-	18.20	0.50	14.40	39.00	13-Mar-23	1102	-	19.80	0.40	14.49	39.70	13-Mar-23	1102	-	19.80	0.40	14.49	39.70							
13-Mar-23	1042	-	18.10	0.50	14.40	39.00	13-Mar-23	1103	-	19.80	0.50	14.50	39.20	13-Mar-23	1103	-	19.80	0.50	14.50	39.20							
13-Mar-23	1043	-	18.30	0.40	14.40	38.90	13-Mar-23	1104	-	19.80	0.50	14.51	39.00	13-Mar-23	1104	-	19.80	0.50	14.51	39.00							
13-Mar-23	1044	-	18.20	0.40	14.40	39.00	13-Mar-23	1105	-	19.80	0.50	14.50	39.00	13-Mar-23	1105	-	19.80	0.50	14.50	39.00							
13-Mar-23	1045	-	18.30	0.40	14.40	39.20	13-Mar-23	1106	-	19.70	0.50	14.50	39.10	13-Mar-23	1106	-	19.70	0.50	14.50	39.10							
13-Mar-23	1046	-	18.50	0.60	14.47	39.20	13-Mar-23	1107	-	19.50	0.40	14.50	38.90	13-Mar-23	1107	-	19.50	0.40	14.50	38.90							
13-Mar-23	1047	-	18.90	0.50	14.40	39.00	13-Mar-23	1108	-	19.80	0.50	14.50	38.90	13-Mar-23	1108	-	19.80	0.50	14.50	38.90							
13-Mar-23	1048	-	18.70	0.50	14.47	39.00	13-Mar-23	1109	-	19.70	0.50	14.49	39.20	13-Mar-23	1109	-	19.70	0.50	14.49	39.20							
13-Mar-23	1049	-	18.70	0.40	14.47	39.00	13-Mar-23	1110	-	19.80	0.40	14.51	39.10	13-Mar-23	1110	-	19.80	0.40	14.51	39.10							
13-Mar-23	1050	-	18.70	0.40	14.47	39.20	13-Mar-23	1111	-	19.60	0.30	14.53	39.10	13-Mar-23	1111	-	19.60	0.30	14.53	39.10							
13-Mar-23	1051	-	18.80	0.50	14.49	39.00	13-Mar-23	1112	-	19.80	0.40	14.51	39.00	13-Mar-23	1112	-	19.80	0.40	14.51	39.00							
13-Mar-23	1052	-	19.00	0.50	14.47	39.00	13-Mar-23	1113	-	19.80	0.50	14.51	39.20	13-Mar-23	1113	-	19.80	0.50	14.51	39.20							
13-Mar-23	1053	-	19.10	0.50	14.48	39.10	13-Mar-23	1114	-	19.80	0.50	14.53	39.10	13-Mar-23	1114	-	19.80	0.50	14.53	39.10							
13-Mar-23	1054	-	19.20	0.60	14.50	39.10	13-Mar-23	1115	-	19.80	0.50	14.51	39.00	13-Mar-23	1115	-	19.80	0.50	14.51	39.00							
13-Mar-23	1055	-	19.30	0.50	14.50	39.00	13-Mar-23	1116	-	19.50	0.30	14.50	39.70	13-Mar-23	1116	-	19.50	0.30	14.50	39.70							
13-Mar-23	1056	-	19.40	0.50	14.50	39.10	13-Mar-23	1117	-	19.50	0.80	14.49	39.30	13-Mar-23	1117	-	19.50	0.80	14.49	39.30							
13-Mar-23	1057	-	19.40	0.50	14.49	39.10	13-Mar-23	1118	-	19.80	0.40	14.50	39.00	13-Mar-23	1118	-	19.80	0.40	14.50	39.00							
13-Mar-23	1058	-	19.20	0.50	14.40	39.00	13-Mar-23	1119	-	19.50	0.40	14.49	39.00	13-Mar-23	1119	-	19.50	0.40	14.49	39.00							
13-Mar-23	1059	-	19.20	0.40	14.48	39.00	13-Mar-23	1120	-	19.50	0.40	14.49	39.00	13-Mar-23	1120	-	19.50	0.40	14.49	39.00							
13-Mar-23	1100	-	19.40	0.50	14.48	39.00	13-Mar-23	1121	-	19.80	0.80	14.49	39.70	13-Mar-23	1121	-	19.80	0.80	14.49	39.70							
Max	-	-	19.40	0.80	14.50	39.20	Max	-	-	19.90	0.80	14.53	39.30	Max	-	-	19.90	0.80	14.53	39.30							
Avg	-	-	18.78	0.48	14.47	39.02	Avg	-	-	19.68	0.44	14.50	39.00	Avg	-	-	19.68	0.44	14.50	39.00							

Run No: 3														Time Base: 21 min	
Date	Time	SO ₂	NO _x	CO	O ₂	Load	Date	Time	SO ₂	NO _x	CO	O ₂	Load		
					Vol%	MW						Vol%	MW		
13-Mar-23	1122		19.40	0.40	14.50	39.70	13-Mar-23	1122		19.30	0.80	14.50	39.00		
13-Mar-23	1123		19.30	0.80	14.50	39.00	13-Mar-23	1123		19.30	0.50	14.51	39.00		
13-Mar-23	1124		19.70	0.40	14.50	39.00	13-Mar-23	1124		19.70	0.40	14.50	39.00		
13-Mar-23	1125		19.70	0.40	14.50	39.00	13-Mar-23	1125		19.70	0.40	14.49	39.00		
13-Mar-23	1126		19.70	0.40	14.49	39.00	13-Mar-23	1126		19.70	0.40	14.49	39.00		
13-Mar-23	1127		19.70	0.40	14.50	39.00	13-Mar-23	1127		19.70	0.40	14.50	39.00		
13-Mar-23	1128		20.00	0.40	14.50	39.00	13-Mar-23	1128		19.70	0.40	14.50	39.00		
13-Mar-23	1129		19.80	0.50	14.51	39.00	13-Mar-23	1129		19.80	0.50	14.51	39.00		
13-Mar-23	1130		19.50	0.30	14.50	39.80	13-Mar-23	1130		19.50	0.30	14.50	39.80		
13-Mar-23	1131		19.70	0.50	14.49	39.50	13-Mar-23	1131		19.70	0.50	14.49	39.50		
13-Mar-23	1132		19.40	0.50	14.51	39.50	13-Mar-23	1132		19.40	0.50	14.51	39.50		
13-Mar-23	1133		19.80	0.40	14.49	39.50	13-Mar-23	1133		19.80	0.40	14.49	39.50		
13-Mar-23	1134		19.50	0.40	14.50	39.80	13-Mar-23	1134		19.50	0.40	14.50	39.80		
13-Mar-23	1135		19.70	0.50	14.48	39.60	13-Mar-23	1135		19.70	0.50	14.48	39.60		
13-Mar-23	1136		19.50	0.40	14.49	39.60	13-Mar-23	1136		19.50	0.40	14.49	39.60		
13-Mar-23	1137		19.70	0.50	14.50	39.60	13-Mar-23	1137		19.70	0.50	14.50	39.60		
13-Mar-23	1138		19.60	0.30	14.48	39.70	13-Mar-23	1138		19.60	0.30	14.48	39.70		
13-Mar-23	1139		19.70	0.50	14.49	39.80	13-Mar-23	1139		19.70	0.50	14.49	39.80		
13-Mar-23	1140		19.80	0.50	14.49	39.40	13-Mar-23	1140		19.80	0.50	14.49	39.40		
13-Mar-23	1141		19.60	0.60	14.50	39.50	13-Mar-23	1141		19.60	0.60	14.50	39.50		
13-Mar-23	1142		19.70	0.60	14.49	39.50	13-Mar-23	1142		19.70	0.60	14.49	39.50		
Max			20.00	0.60	14.51	39.80	Max								



Reference Method Data

Client Name Gulf JP CRN Co., Ltd.
Plant Name -

Date March 13, 2023
Location HRSG 1

Run No: 1							Run No: 2						
Time Base : 21 min							Time Base : 21 min						
Date	Time	SO2	NOx	CO	O2	CO2	Date	Time	SO2	NOx	CO	O2	CO2
ppm			ppm	ppm	%Vol	%Vol	ppm			ppm	ppm	%Vol	%Vol
13-Mar-23	10:40	-	19.98	0.04	14.57	3.95	13-Mar-23	11:01	-	19.50	0.12	14.58	3.95
13-Mar-23	10:41	-	19.27	0.03	14.57	3.99	13-Mar-23	11:02	-	19.53	0.24	14.58	3.95
13-Mar-23	10:42	-	19.40	0.02	14.56	3.95	13-Mar-23	11:03	-	19.81	0.40	14.60	3.96
13-Mar-23	10:43	-	19.56	0.03	14.57	3.96	13-Mar-23	11:04	-	19.65	0.21	14.60	3.95
13-Mar-23	10:44	-	19.51	0.08	14.59	3.97	13-Mar-23	11:05	-	19.73	0.18	14.61	3.99
13-Mar-23	10:45	-	19.50	0.12	14.58	3.93	13-Mar-23	11:06	-	19.80	0.36	14.59	3.95
13-Mar-23	10:46	-	19.53	0.14	14.58	4.01	13-Mar-23	11:07	-	19.83	0.55	14.59	3.96
13-Mar-23	10:47	-	19.57	0.17	14.57	4.01	13-Mar-23	11:08	-	19.82	0.50	14.59	3.97
13-Mar-23	10:48	-	19.71	0.09	14.57	3.96	13-Mar-23	11:09	-	19.83	0.50	14.59	3.93
13-Mar-23	10:49	-	19.62	0.02	14.57	4.00	13-Mar-23	11:10	-	19.89	0.64	14.59	3.95
13-Mar-23	10:50	-	19.86	0.04	14.57	4.00	13-Mar-23	11:11	-	19.97	0.65	14.60	3.93
13-Mar-23	10:51	-	19.80	0.02	14.56	3.97	13-Mar-23	11:12	-	19.99	0.78	14.59	3.96
13-Mar-23	10:52	-	19.81	0.05	14.57	3.97	13-Mar-23	11:13	-	20.06	0.78	14.61	3.98
13-Mar-23	10:53	-	19.82	0.11	14.56	4.00	13-Mar-23	11:14	-	20.10	0.86	14.60	4.00
13-Mar-23	10:54	-	19.87	0.12	14.56	3.99	13-Mar-23	11:15	-	20.07	0.94	14.60	3.97
13-Mar-23	10:55	-	19.89	0.05	14.57	4.01	13-Mar-23	11:16	-	20.06	0.81	14.61	3.91
13-Mar-23	10:56	-	19.98	0.05	14.57	3.97	13-Mar-23	11:17	-	20.13	0.76	14.61	3.88
13-Mar-23	10:57	-	19.27	0.02	14.57	3.93	13-Mar-23	11:18	-	20.18	0.76	14.60	3.97
13-Mar-23	10:58	-	19.48	0.04	14.58	3.98	13-Mar-23	11:19	-	20.25	0.78	14.61	3.93
13-Mar-23	10:59	-	19.56	0.05	14.57	3.95	13-Mar-23	11:20	-	20.26	0.76	14.63	3.94
13-Mar-23	11:00	-	19.51	0.08	14.59	3.98	13-Mar-23	11:21	-	20.28	0.78	14.62	3.96
Max	-	-	19.98	0.17	14.59	4.01	Max	-	-	20.26	0.94	14.63	4.00
Avg	-	-	19.15	0.09	14.56	3.97	Avg	-	-	19.93	0.59	14.63	3.96

Run No: 3						
Time Base : 21 min						
Date	Time	SO2	NOx	CO	O2	CO2
ppm			ppm	ppm	%Vol	%Vol
13-Mar-23	11:22	-	20.25	0.78	14.62	3.93
13-Mar-23	11:23	-	20.28	0.74	14.63	3.96
13-Mar-23	11:24	-	20.23	0.79	14.63	3.96
13-Mar-23	11:25	-	20.14	0.72	14.62	3.96
13-Mar-23	11:26	-	20.04	0.69	14.60	3.93
13-Mar-23	11:27	-	20.02	0.68	14.61	3.97
13-Mar-23	11:28	-	19.94	0.71	14.60	3.97
13-Mar-23	11:29	-	19.91	0.61	14.59	3.94
13-Mar-23	11:30	-	19.92	0.60	14.58	3.97
13-Mar-23	11:31	-	20.02	0.70	14.59	3.94
13-Mar-23	11:32	-	19.99	0.66	14.59	3.93
13-Mar-23	11:33	-	20.05	0.60	14.60	3.97
13-Mar-23	11:34	-	20.10	0.76	14.60	3.97
13-Mar-23	11:35	-	20.18	0.65	14.59	3.95
13-Mar-23	11:36	-	20.21	0.60	14.60	3.96
13-Mar-23	11:37	-	20.39	0.58	14.60	3.97
13-Mar-23	11:38	-	20.40	0.69	14.61	3.94
13-Mar-23	11:39	-	20.35	0.77	14.61	3.94
13-Mar-23	11:40	-	20.32	0.73	14.60	3.97
13-Mar-23	11:41	-	20.28	0.66	14.60	3.95
13-Mar-23	11:42	-	20.29	0.66	14.60	3.96
Max	-	-	20.40	0.65	14.63	3.97
Avg	-	-	20.16	0.69	14.61	3.95



Lot No. 2327395-1

ANALYZER CALIBRATION DATA

Client : Gulf JP CRN Co., Ltd. Location : HRSG 2
Date : 14 Mar 23 Test Operator : Worawich T.

O₂ ANALYZER : TELEDYNE API T200H Serial No. : 482
Model : 25 Span (%) :

	Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	8.02	8.03	8.01	0.08
Span Gas	16.02	16.03	16.01	0.08

NO_x ANALYZER : TELEDYNE API T200H Serial No. : 482
Model : 100 Span (ppm) :

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	54.64	54.62	54.68	0.06
Span Gas	81.85	81.85	81.81	0.04

CO ANALYZER : TELEDYNE API T300M Serial No. : 377
Model : 100 Span (ppm) :

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	54.42	54.37	54.40	0.03
Span Gas	79.73	79.75	79.71	0.04

Calibrated by

Worawich T.

(Mr.Worawich Tongpoom)

Environmental Field Scientist (2)

FORM NO.: F 06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



Lot No. 2327395-1

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Client : Gulf JP CRN Co., Ltd. Location : HRSG 2
Date : 14 Mar 23 Test Operator : Worawich T.

O₂ ANALYZER : 16.02 Span (%) : 25.00
Cylinder Conc. (%) :

	O ₂ Analyzer Calibration Response	System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	16.03	16.03	0.00	16.00	0.12	0.12

NO_x ANALYZER : 81.85 Span (ppm) : 100
Cylinder Conc. (ppm) :

	NO _x Analyzer Calibration Response	System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.01	0.01	0.03	0.03	0.02
Upscale Gas	81.85	81.80	0.05	81.78	0.07	0.02

CO ANALYZER : 79.73 Span (ppm) : 100
Cylinder Conc. (ppm) :

	CO Analyzer Calibration Response	System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	Drift (% of Span)
Zero Gas	0.00	0.00	0.00	0.01	0.01	0.01
Upscale Gas	79.75	79.63	0.12	79.59	0.16	0.04

Calibrated by

Worawich T.

(Mr.Worawich Tongpoom)

Environmental Field Scientist (2)

FORM NO.: F 06-104 REVISION NO.: ISSUE DATE: 3/06/19

ALS Laboratory Group



CEMs Data

Client Name Gulf JP CRN Co., Ltd.
Plant Name -

Date March 14, 2023
Location HRSG 2

Run No: 1							Run No: 2						
Time Base : 21 min							Time Base : 21 min						
Date	Time	SO2	NOx	CO	O2	Load	Date	Time	SO2	NOx	CO	O2	Load
ppm			ppm	ppm	%Vol	MW	ppm			ppm	ppm	%Vol	MW
14-Mar-23	9:45	-	20.10	1.20	14.78	39.30	14-Mar-23	10:06	-	20.80	1.10	14.78	39.60
14-Mar-23	9:46	-	20.30	1.10	14.78	39.50	14-Mar-23	10:07	-	21.10	1.20	14.74	39.30
14-Mar-23	9:47	-	20.80	1.20	14.73	39.40	14-Mar-23	10:08	-	20.20	1.10	14.82	39.80
14-Mar-23	9:48	-	20.80	1.10	14.78	39.50	14-Mar-23	10:09	-	20.70	1.10	14.77	39.70
14-Mar-23	9:49	-	20.80	1.10	14.77	39.40	14-Mar-23	10:10	-	21.30	1.20	14.74	39.60
14-Mar-23	9:50	-	20.20	1.20	14.74	39.60	14-Mar-23	10:11	-	20.80	1.10	14.79	39.50
14-Mar-23	9:51	-	20.50	1.10	14.77	39.40	14-Mar-23	10:12	-	20.40	1.10	14.80	39.50
14-Mar-23	9:52	-	21.00	1.20	14.73	39.50	14-Mar-23	10:13	-	20.40	1.10	14.78	39.50
14-Mar-23	9:53	-	20.50	1.10	14.81	39.50	14-Mar-23	10:14	-	20.70	1.20	14.78	39.40
14-Mar-23	9:54	-	20.80	1.10	14.79	39.70	14-Mar-23	10:15	-	20.50	1.20	14.78	39.50
14-Mar-23	9:55	-	21.10	1.20	14.75	39.50	14-Mar-23	10:16	-	20.60	1.10	14.79	39.50
14-Mar-23	9:56	-	20.30	1.10	14.81	39.40	14-Mar-23	10:17	-	20.80	1.10	14.80	39.30
14-Mar-23	9:57	-	20.30	1.10	14.80	39.70	14-Mar-23	10:18	-	20.30	1.10	14.81	39.30
14-Mar-23	9:58	-	21.00	1.10	14.75	39.60	14-Mar-23	10:19	-	20.70	1.10	14.77	39.20
14-Mar-23	9:59	-	20.70	1.10	14.77	39.30	14-Mar-23	10:20	-	20.30	1.10	14.82	39.40
14-Mar-23	10:00	-	20.20	1.10	14.80	39.40	14-Mar-23	10:21	-	20.70	1.20	14.78	39.50
14-Mar-23	10:01	-	20.80	1.10	14.77	39.60	14-Mar-23	10:22	-	21.00	1.20	14.78	39.20
14-Mar-23	10:02	-	21.20	1.20	14.74	39.30	14-Mar-23	10:23	-	20.20	1.10	14.84	39.30
14-Mar-23	10:03	-	20.70	1.10	14.79	39.50	14-Mar-23	10:24	-	20.70	1.20	14.79	39.40
14-Mar-23	10:04	-	20.80	1.20	14.77	39.50	14-Mar-23	10:25	-	21.20	1.20	14.77	39.20
14-Mar-23	10:05	-	20.80	1.10	14.80	39.40	14-Mar-23	10:26	-	20.50	1.20	14.81	39.30
Max	-	-	25.20	1.20	14.81	39.70	Max	-	-	21.30	1.20	14.84	39.70
Avg	-	-	21.08	1.13	14.77	39.48	Avg	-	-	20.63	1.14	14.79	39.41

Run No: 3				Time Base : 21 min		
Date	Time	SO2 ppm	NOx ppm	CO ppm	O2 %Vol	Load MW
14-Mar-23	10:27	-	20.70	1.10	14.81	39.50
14-Mar-23	10:28	-	2	-	-	-
14-Mar-23	10:29	-	20.20	1.10	14.84	39.30
14-Mar-23	10:30	-	21.70	1.10	14.77	39.10
14-Mar-23	10:31	-	21.00	1.10	14.80	39.30
14-Mar-23	10:32	-	20.90	1.10	14.80	40.10
14-Mar-23	10:33	-	20.80	1.20	14.80	39.80
14-Mar-23	10:34	-	20.80	1.10	14.86	39.60
14-Mar-23	10:35	-	21.40	1.20	14.75	39.70
14-Mar-23	10:36	-	20.80	1.10	14.80	39.60
14-Mar-23	10:37	-	20.90	1.00	14.78	40.00
14-Mar-23	10:38	-	21.40	1.20	14.76	39.80
14-Mar-23	10:39	-	20.80	1.10	14.80	39.60
14-Mar-23	10:40	-	20.40	1.10	14.83	39.90
14-Mar-23	10:41	-	20.80	1.10	14.80	39.80
14-Mar-23	10:42	-	21.10	1.10	14.80	39.60
14-Mar-23	10:43	-	21.50	1.10	14.78	40.10
14-Mar-23	10:44	-	21.40	1.10	14.79	40.00
14-Mar-23	10:45	-	21.40	1.10	14.79	40.00
14-Mar-23	10:46	-	20.70	1.10	14.84	39.90
14-Mar-23	10:47	-	20.70	1.10	14.81	39.90
Max		-	21.50	1.20	14.86	40.10
Avg		-	20.90	1.10	14.79	39.80



Reference Method Data

Client Name Gulf JP CRN Co.,Ltd.
Plant Name -

Date March 14, 2023
Location HRSG 2

Lot No. 2327396-1

Run No: 1							Run No: 2						
Time Base: 21 min							Time Base: 21 min						
Date	Time	SO2 ppm	NOx ppm	CO ppm	O2 Vol%	CO2 Vol%	Date	Time	SO2 ppm	NOx ppm	CO ppm	O2 Vol%	CO2 Vol%
14-Mar-23	9:45	-	22.79	1.28	14.46	4.00	14-Mar-23	10:06	-	22.46	1.26	14.48	3.98
14-Mar-23	9:46	-	22.81	1.31	14.43	3.98	14-Mar-23	10:07	-	22.40	1.32	14.45	4.01
14-Mar-23	9:47	-	22.81	1.29	14.46	3.98	14-Mar-23	10:08	-	22.84	1.25	14.45	3.98
14-Mar-23	9:48	-	22.88	1.27	14.47	3.97	14-Mar-23	10:09	-	22.81	1.27	14.48	3.98
14-Mar-23	9:49	-	22.85	1.28	14.46	3.97	14-Mar-23	10:10	-	22.30	1.26	14.48	3.95
14-Mar-23	9:50	-	22.90	1.28	14.44	3.96	14-Mar-23	10:11	-	22.33	1.24	14.48	3.98
14-Mar-23	9:51	-	22.76	1.28	14.48	4.00	14-Mar-23	10:12	-	22.70	1.28	14.48	3.92
14-Mar-23	9:52	-	22.78	1.29	14.42	4.02	14-Mar-23	10:13	-	22.65	1.29	14.48	3.99
14-Mar-23	9:53	-	22.89	1.27	14.44	4.03	14-Mar-23	10:14	-	22.50	1.22	14.47	3.98
14-Mar-23	9:54	-	22.71	1.19	14.47	3.93	14-Mar-23	10:15	-	22.54	1.22	14.50	3.98
14-Mar-23	9:55	-	22.29	1.23	14.47	3.98	14-Mar-23	10:16	-	22.55	1.27	14.44	3.95
14-Mar-23	9:56	-	22.41	1.31	14.43	3.99	14-Mar-23	10:17	-	22.50	1.27	14.48	3.94
14-Mar-23	9:57	-	22.71	1.28	14.43	3.98	14-Mar-23	10:18	-	22.41	1.28	14.48	3.99
14-Mar-23	9:58	-	22.70	1.28	14.46	3.98	14-Mar-23	10:19	-	22.54	1.26	14.44	4.00
14-Mar-23	9:59	-	24.21	1.34	14.42	4.04	14-Mar-23	10:20	-	22.75	1.25	14.47	3.95
14-Mar-23	10:00	-	25.88	1.34	14.42	3.98	14-Mar-23	10:21	-	22.49	1.22	14.50	3.99
14-Mar-23	10:01	-	25.40	1.31	14.43	3.99	14-Mar-23	10:22	-	22.38	1.27	14.48	4.02
14-Mar-23	10:02	-	24.17	1.28	14.45	3.95	14-Mar-23	10:23	-	22.33	1.27	14.48	3.94
14-Mar-23	10:03	-	22.88	1.23	14.47	3.98	14-Mar-23	10:24	-	22.39	1.25	14.48	3.96
14-Mar-23	10:04	-	22.53	1.27	14.44	3.99	14-Mar-23	10:25	-	22.44	1.25	14.48	3.98
14-Mar-23	10:05	-	22.72	1.25	14.45	3.93	14-Mar-23	10:26	-	22.49	1.25	14.49	3.95
Max	-	-	25.88	1.34	14.48	4.04	Max	-	-	22.75	1.32	14.50	4.02
Avg	-	-	23.11	1.28	14.45	3.98	Avg	-	-	22.49	1.26	14.48	3.97

Run No: 3						
Time Base: 21 min						
Date	Time	SO2 ppm	NOx ppm	CO ppm	O2 Vol%	CO2 Vol%
14-Mar-23	10:27	-	22.46	1.23	14.51	3.98
14-Mar-23	10:28	-	22.36	1.24	14.48	4.01
14-Mar-23	10:29	-	22.39	1.20	14.50	3.92
14-Mar-23	10:30	-	22.29	1.20	14.50	3.98
14-Mar-23	10:31	-	22.50	1.23	14.46	3.90
14-Mar-23	10:32	-	22.62	1.24	14.51	3.93
14-Mar-23	10:33	-	22.43	1.22	14.49	3.97
14-Mar-23	10:34	-	22.53	1.23	14.48	3.97
14-Mar-23	10:35	-	22.63	1.22	14.49	3.97
14-Mar-23	10:36	-	22.49	1.18	14.50	3.94
14-Mar-23	10:37	-	22.98	1.23	14.47	3.98
14-Mar-23	10:38	-	22.63	1.24	14.51	3.95
14-Mar-23	10:39	-	22.40	1.20	14.52	3.97
14-Mar-23	10:40	-	22.42	1.19	14.49	3.95
14-Mar-23	10:41	-	22.79	1.20	14.50	3.98
14-Mar-23	10:42	-	23.12	1.25	14.45	3.95
14-Mar-23	10:43	-	23.03	1.28	14.53	3.96
14-Mar-23	10:44	-	22.81	1.27	14.48	3.97
14-Mar-23	10:45	-	22.80	1.21	14.50	3.95
14-Mar-23	10:46	-	22.86	1.20	14.50	3.98
14-Mar-23	10:47	-	22.91	1.20	14.45	3.98
Max	-	-	23.12	1.28	14.53	4.01
Avg	-	-	22.62	1.22	14.50	3.98



ANALYZER CALIBRATION DATA

Client : Gulf JP CRN Co.,Ltd. Location : HRSG 1
Date : 13 Mar 23 Test Operator : Boonyarith.I

O₂ ANALYZER
Model : TELEDYNE API T200H Serial No. : 482
Span (%) : 25

	Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	8.02	8.00	8.01	0.04
Span Gas	16.02	16.03	16.00	0.12

NO_x ANALYZER
Model : TELEDYNE API T200H Serial No. : 482
Span (ppm) : 100

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	54.64	54.65	54.67	0.02
Span Gas	81.85	81.86	81.84	0.02

SO₂ ANALYZER
Model : TELEDYNE API T100H Serial No. : 324
Span (ppm) : 100

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	54.34	54.35	54.34	0.01
Span Gas	79.92	79.92	79.92	0.00

CO ANALYZER
Model : TELEDYNE API T300M Serial No. : 377
Span (ppm) : 100

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	54.42	54.42	54.43	0.01
Span Gas	79.73	79.72	79.71	0.01

Calibrated by

Boonyarith.I

(Mr.Boonyarith Iamted)
Environmental Field Scientist (1)

FORM NO.: F-06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



Lot No. 2327396-1

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Client : Gulf JP CRN Co.,Ltd. Location : HRSG 1
Date : 13 Mar 23 Test Operator : Boonyarith.I

O₂ ANALYZER
Cylinder Conc. (%) : 16.02 Span (%) : 25

	O ₂ Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	16.03	15.90	0.52	15.98	0.20	0.32

NO_x ANALYZER
Cylinder Conc. (ppm) : 81.85 Span (ppm) : 100

	NO _x Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	81.86	81.70	0.16	81.80	0.06	0.10

SO₂ ANALYZER
Cylinder Conc. (ppm) : 79.92 Span (ppm) : 100

	SO ₂ Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	79.92	79.90	0.02	79.91	0.01	0.01

CO ANALYZER
Cylinder Conc. (ppm) : 79.73 Span (ppm) : 100

	CO Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	79.72	79.70	0.02	79.71	0.01	0.01

Calibrated by

Boonyarith.I

(Mr.Boonyarith Iamted)
Environmental Field Scientist (1)

FORM NO.: F-06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



EMISSION TEST RESULT

Client		Run #	
<u>Gulf JP CRN Co.,Ltd.</u>		<u>1</u>	
Date	Location	Test Operator	Finish Time
<u>13 Mar 23</u>	<u>HRSG 1</u>	<u>Boonyarith.I</u>	<u>11:00</u>
Start Time	Model	Serial No.	Serial No.
<u>10:40</u>	<u>TELEDYNE API T100H</u>	<u>324</u>	<u>482</u>
<u>SO₂ Analyzer</u>	<u>Model</u>	<u>TELEDYNE API T200H</u>	<u>Serial No.</u>
<u>NO_x/O₂ Analyzer</u>	<u>Model</u>	<u>TELEDYNE API T300M</u>	<u>Serial No.</u>
<u>CO/CO₂ Analyzer</u>	<u>Model</u>	<u>TELEDYNE API T300M</u>	<u>Serial No.</u>

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
10:40	14.57	3.95	19.08	0.27	0.04	
10:41	14.57	3.99	19.27	0.31	0.02	
10:42	14.58	3.95	19.48	0.29	0.02	
10:43	14.57	3.96	19.56	0.31	0.03	
10:44	14.59	3.97	19.51	0.30	0.07	
10:45	14.58	3.93	19.50	0.30	0.11	
10:46	14.58	4.01	19.53	0.31	0.13	
10:47	14.57	4.01	19.67	0.30	0.17	
10:48	14.57	3.96	18.71	0.29	0.09	
10:49	14.57	4.00	18.82	0.28	0.02	
10:50	14.57	4.00	18.86	0.30	0.04	
10:51	14.58	3.97	18.80	0.29	0.02	
10:52	14.57	3.97	18.81	0.28	0.04	
10:53	14.56	4.00	18.82	0.27	0.10	
10:54	14.56	3.99	18.87	0.32	0.11	
10:55	14.57	4.01	18.89	0.28	0.04	
10:56	14.57	3.97	19.08	0.27	0.00	
10:57	14.57	3.93	19.27	0.25	0.02	
10:58	14.58	3.96	19.48	0.29	0.03	
10:59	14.57	3.95	19.56	0.27	0.04	
11:00	14.59	3.98	19.51	0.29	0.08	
Average	14.58	3.97	19.15	0.29	0.06	

Boonyarith.I

(Mr.Boonyarith Iamted)
Environmental Field Scientist (1)

FORM NO.: F-06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



EMISSION TEST RESULT

Client		Gulf JP CRN Co.,Ltd.	Run #	2
Date		13 Mar 23	Location	HRSG 1
Start Time		11:01	Test Operator	Boonyarath J.
SO ₂ Analyzer	Model	TELEDYNE API T100H	Serial No.	324
NO _x /O ₂ Analyzer	Model	TELEDYNE API T200H	Serial No.	482
CO/CO ₂ Analyzer	Model	TELEDYNE API T300M	Serial No.	377

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
11:01	14.58	3.95	19.50	0.27	0.12	
11:02	14.58	3.95	19.53	0.28	0.23	
11:03	14.60	3.96	19.61	0.32	0.39	
11:04	14.60	3.95	19.65	0.37	0.20	
11:05	14.61	3.99	19.73	0.38	0.17	
11:06	14.59	3.95	19.80	0.35	0.34	
11:07	14.59	3.96	19.83	0.34	0.52	
11:08	14.59	3.97	19.82	0.34	0.48	
11:09	14.59	3.93	19.83	0.33	0.57	
11:10	14.59	3.95	19.89	0.33	0.62	
11:11	14.60	3.93	19.97	0.34	0.62	
11:12	14.59	3.96	19.99	0.33	0.75	
11:13	14.61	3.98	20.08	0.22	0.74	
11:14	14.60	4.00	20.10	0.25	0.83	
11:15	14.60	3.97	20.07	0.26	0.91	
11:16	14.61	3.91	20.06	0.23	0.77	
11:17	14.61	3.98	20.13	0.24	0.73	
11:18	14.60	3.97	20.18	0.24	0.73	
11:19	14.61	3.93	20.25	0.24	0.75	
11:20	14.63	3.94	20.26	0.21	0.73	
11:21	14.62	3.96	20.26	0.22	0.75	
Average	14.60	3.98	19.93	0.29	0.67	

Boonyarath J.

(Mr.Boonyarath Jantad)

Environmental Field Scientist (1)

FORM NO.: F 06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



EMISSION TEST RESULT

Client		Gulf JP CRN Co.,Ltd.	Run #	3
Date		13 Mar 23	Location	HRSG 1
Start Time		11:22	Test Operator	Boonyarath J.
SO ₂ Analyzer	Model	TELEDYNE API T100H	Serial No.	324
NO _x /O ₂ Analyzer	Model	TELEDYNE API T200H	Serial No.	482
CO/CO ₂ Analyzer	Model	TELEDYNE API T300M	Serial No.	377

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
11:22	14.62	3.93	20.25	0.23	0.73	
11:23	14.63	3.96	20.28	0.24	0.71	
11:24	14.63	3.96	20.23	0.21	0.67	
11:25	14.62	3.96	20.14	0.24	0.70	
11:26	14.60	3.93	20.04	0.24	0.66	
11:27	14.61	3.97	20.02	0.21	0.66	
11:28	14.60	3.97	19.94	0.20	0.69	
11:29	14.59	3.94	19.91	0.20	0.59	
11:30	14.58	3.97	19.92	0.18	0.63	
11:31	14.59	3.94	20.02	0.23	0.68	
11:32	14.59	3.93	19.99	0.20	0.64	
11:33	14.60	3.97	20.05	0.22	0.82	
11:34	14.60	3.97	20.10	0.22	0.73	
11:35	14.59	3.95	20.19	0.24	0.53	
11:36	14.60	3.96	20.21	0.26	0.57	
11:37	14.60	3.97	20.39	0.23	0.55	
11:38	14.61	3.94	20.40	0.21	0.66	
11:39	14.61	3.94	20.35	0.23	0.74	
11:40	14.60	3.97	20.32	0.21	0.70	
11:41	14.60	3.95	20.28	0.23	0.64	
11:42	14.60	3.96	20.26	0.21	0.64	
Average	14.61	3.96	20.16	0.22	0.66	

Boonyarath J.

(Mr.Boonyarath Jantad)

Environmental Field Scientist (1)

FORM NO.: F 06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



Lot No. 2327398-1

ANALYZER CALIBRATION DATA

Client	: Gulf JP CRN Co.,Ltd.	Location	: HRSG 2
Date	: 14 Mar 23	Test Operator	: Worawich T.
O ₂ ANALYZER			
Model	: TELEDYNE API T200H	Serial No.	: 482
Span (%)	: 25		

	Cylinder Value (%)	Initial Analyzers Calibration Response (%)	Final Analyzers Calibration Response (%)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	8.02	8.03	8.01	0.08
Span Gas	16.02	16.03	16.01	0.08

NO _x ANALYZER			
Model	: TELEDYNE API T200H	Serial No.	: 482
Span (ppm)	: 100		

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	54.64	54.62	54.68	0.06
Span Gas	81.85	81.85	81.81	0.04

SO ₂ ANALYZER			
Model	: TELEDYNE API T100H	Serial No.	: 324
Span (ppm)	: 100		

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	54.34	54.31	54.28	0.03
Span Gas	79.92	79.91	79.86	0.05

CO ANALYZER			
Model	: TELEDYNE API T300M	Serial No.	: 377
Span (ppm)	: 100		

	Cylinder Value (ppm)	Initial Analyzers Calibration Response (ppm)	Final Analyzers Calibration Response (ppm)	Difference (Percent of Span)
Zero Gas	0.00	0.00	0.00	0.00
Low-Level Gas	54.42	54.37	54.40	0.03
Span Gas	79.73	79.75	79.71	0.04

Calibrated by

Worawich T.

(Mr. Worawich Tongpoom)

Environmental Field Scientist (2)

FORM NO.: F 06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



Lot No. 2327398-1

SYSTEM CALIBRATION BIAS AND DRIFT DATA

Client	: Gulf JP CRN Co.,Ltd.	Location	: HRSG 2
Date	: 14 Mar 23	Test Operator	: Worawich T.

O ₂ ANALYZER			
Cylinder Conc. (%)	: 16.02	Span (%)	: 25

	O ₂ Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	16.03	16.03	0.00	16.00	0.12	0.12

NO _x ANALYZER			
Cylinder Conc. (ppm)	: 81.85	Span (ppm)	: 100

	NO _x Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.00	0.01	0.01	0.03	0.03	0.02
Upscale Gas	81.85	81.80	0.05	81.78	0.07	0.02

SO ₂ ANALYZER			
Cylinder Conc. (ppm)	: 79.92	Span (ppm)	: 100

	SO ₂ Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.00	0.00	0.00	0.00	0.00	0.00
Upscale Gas	79.91	79.84	0.07	79.87	0.04	0.03

CO ANALYZER			
Cylinder Conc. (ppm)	: 78.73	Span (ppm)	: 100

	CO Analyzer Calibration Response	Initial Values		Final Values		Drift (% of Span)
		System Calibration Response	System Cal Bias (% of Span)	System Calibration Response	System Cal Bias (% of Span)	
Zero Gas	0.00	0.00	0.00	0.01	0.01	0.01
Upscale Gas	78.75	78.63	0.12	78.59	0.16	0.04

Calibrated by

Worawich T.

(Mr. Worawich Tongpoom)

Environmental Field Scientist (2)

FORM NO.: F 06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



EMISSION TEST RESULT

Client		Run #	1
Gulf JP CRN Co.,Ltd.		Location	HRSG 2
Date	14 Mar 23	Test Operator	Worawich T.
Start Time	9:45	Finish Time	10:05
SO ₂ Analyzer Model	TELEDYNE API T100H	Serial No.	324
NO _x /O ₂ Analyzer Model	TELEDYNE API T200H	Serial No.	482
CO/CO ₂ Analyzer Model	TELEDYNE API T300M	Serial No.	377

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
9:45	14.46	4.00	22.78	0.19	1.23	
9:46	14.43	3.96	22.81	0.19	1.26	
9:47	14.46	3.98	22.81	0.19	1.24	
9:48	14.47	3.97	22.69	0.19	1.22	
9:49	14.46	3.97	22.65	0.21	1.21	
9:50	14.44	3.96	22.90	0.21	1.21	
9:51	14.48	4.00	22.76	0.20	1.21	
9:52	14.42	4.02	22.78	0.22	1.24	
9:53	14.44	4.03	22.89	0.23	1.22	
9:54	14.47	3.93	22.71	0.23	1.14	
9:55	14.47	3.98	22.29	0.23	1.18	
9:56	14.43	3.99	22.41	0.23	1.26	
9:57	14.43	3.96	22.71	0.23	1.21	
9:58	14.46	3.98	22.75	0.23	1.21	
9:59	14.42	4.04	24.21	0.24	1.29	
10:00	14.42	3.98	25.66	0.24	1.29	
10:01	14.43	3.99	25.40	0.26	1.26	
10:02	14.45	3.95	24.17	0.26	1.21	
10:03	14.47	3.96	22.66	0.25	1.18	
10:04	14.44	3.99	22.53	0.26	1.22	
10:05	14.46	3.93	22.72	0.27	1.21	
Average	14.46	3.98	23.11	0.23	1.22	

Worawich T.

(Mr.Worawich Tongpoom)

Environmental Field Scientist (2)

FORM NO.: F-06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



EMISSION TEST RESULT

Client		Run #	2
Gulf JP CRN Co.,Ltd.		Location	HRSG 2
Date	14 Mar 23	Test Operator	Worawich T.
Start Time	10:08	Finish Time	10:28
SO ₂ Analyzer Model	TELEDYNE API T100H	Serial No.	324
NO _x /O ₂ Analyzer Model	TELEDYNE API T200H	Serial No.	482
CO/CO ₂ Analyzer Model	TELEDYNE API T300M	Serial No.	377

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
10:06	14.49	3.96	22.48	0.26	1.21	
10:07	14.45	4.01	22.40	0.26	1.27	
10:08	14.45	3.98	22.64	0.25	1.20	
10:09	14.48	3.96	22.61	0.24	1.22	
10:10	14.48	3.95	22.30	0.23	1.21	
10:11	14.46	3.98	22.33	0.24	1.19	
10:12	14.46	3.92	22.70	0.24	1.23	
10:13	14.48	3.99	22.63	0.24	1.24	
10:14	14.47	3.96	22.55	0.25	1.17	
10:15	14.50	3.98	22.54	0.24	1.17	
10:16	14.44	3.95	22.55	0.25	1.22	
10:17	14.49	3.94	22.50	0.24	1.22	
10:18	14.48	3.99	22.41	0.24	1.23	
10:19	14.44	4.00	22.54	0.23	1.21	
10:20	14.47	3.95	22.75	0.26	1.20	
10:21	14.50	3.99	22.49	0.24	1.17	
10:22	14.48	4.02	22.28	0.25	1.22	
10:23	14.46	3.94	22.33	0.25	1.22	
10:24	14.49	3.96	22.39	0.25	1.20	
10:25	14.48	3.96	22.44	0.26	1.21	
10:26	14.49	3.95	22.49	0.24	1.20	
Average	14.48	3.97	22.48	0.25	1.21	

Worawich T.

(Mr.Worawich Tongpoom)

Environmental Field Scientist (2)

FORM NO.: F-06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

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EMISSION TEST RESULT

Client		Run #	3
Gulf JP CRN Co.,Ltd.		Location	HRSG 2
Date	14 Mar 23	Test Operator	Worawich T.
Start Time	10:27	Finish Time	10:47
SO ₂ Analyzer Model	TELEDYNE API T100H	Serial No.	324
NO _x /O ₂ Analyzer Model	TELEDYNE API T200H	Serial No.	482
CO/CO ₂ Analyzer Model	TELEDYNE API T300M	Serial No.	377

Time (min)	O ₂ (%)	CO ₂ (%)	NO _x (ppm)	SO ₂ (ppm)	CO (ppm)	Remark
10:27	14.51	3.96	22.46	0.25	1.18	
10:28	14.48	4.01	22.36	0.24	1.19	
10:29	14.50	3.92	22.29	0.25	1.15	
10:30	14.50	3.96	22.29	0.23	1.15	
10:31	14.46	3.99	22.50	0.25	1.18	
10:32	14.51	3.93	22.62	0.24	1.19	
10:33	14.49	3.97	22.45	0.25	1.17	
10:34	14.46	3.97	22.53	0.24	1.18	
10:35	14.49	3.97	22.63	0.24	1.17	
10:36	14.50	3.94	22.49	0.23	1.13	
10:37	14.47	3.96	22.58	0.24	1.18	
10:38	14.51	3.95	22.63	0.23	1.19	
10:39	14.52	3.97	22.40	0.23	1.15	
10:40	14.49	3.95	22.42	0.22	1.14	
10:41	14.50	3.98	22.79	0.21	1.15	
10:42	14.45	3.95	23.12	0.21	1.20	
10:43	14.53	3.96	23.03	0.22	1.23	
10:44	14.48	3.97	22.91	0.21	1.22	
10:45	14.51	3.96	22.80	0.23	1.16	
10:46	14.50	3.98	22.86	0.21	1.15	
10:47	14.46	3.96	22.91	0.22	1.15	
Average	14.50	3.96	22.62	0.23	1.17	

Worawich T.

(Mr.Worawich Tongpoom)

Environmental Field Scientist (2)

FORM NO.: F-06-062 REVISION NO.: 2 ISSUE DATE: 3/06/19

ALS Laboratory Group



Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg. 1
Plymouthville, PA 19969
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04NI99E15A0664	Reference Number:	160-401907846-1
Cylinder Number:	EB0136209	Cylinder Volume:	144.4 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12020	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,BALN	Certification Date:	Oct 06, 2020

Expiration Date: Oct 06, 2028

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA-8200b-12-011, 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 before 100 days, i.e. 6.7 months).

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	55.00 PPM	54.64 PPM	G1	±1.3% NIST Traceable	09/29/2020, 10/06/2020
CARBON MONOXIDE	55.00 PPM	54.42 PPM	G1	±0.8% NIST Traceable	09/29/2020
NITRIC DIOXIDE	55.00 PPM	54.64 PPM	G1	±1.3% NIST Traceable	09/29/2020, 10/06/2020
SULFUR DIOXIDE	55.00 PPM	54.34 PPM	G1	±1.0% NIST Traceable	09/29/2020, 10/06/2020
NITROGEN	Balance				

Type	Lot ID	Cylinder No.	Concentration	Uncertainty	Expiration Date
NTRM	11010130	KAL04636	87.31 PPM CARBON MONOXIDE/NITROGEN	±0.4%	Oct 04, 2022
PRM	12386	D685025	9.91 PPM ARGINITROGEN DIOXIDE	2.0%	Feb 20, 2020
NTRM	17060226	EB0078109	100.3 PPM NITRIC DIOXIDE/NITROGEN	±1.0%	Jul 23, 2023
GMIS	124209889	CG323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	11010416	KAL046402	99.6 PPM SULFUR DIOXIDE/NITROGEN	±0.8%	Jul 28, 2023
NTRM	16010203	KAL030697	97.69 PPM SULFUR DIOXIDE/NITROGEN	±0.8%	Dec 23, 2021

The SRM, PRM or RQM noted above is only in reference to the GMS used in this assay and not part of this analysis.

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iS50 FTIR AJP2010245 CO	FTIR	Sep 21, 2020
Nicolet iS50 FTIR AJP2010245 NO	FTIR	Sep 14, 2020
Nicolet iS50 FTIR AJP2010245 NO2	FTIR	Sep 22, 2020
Nicolet iS50 FTIR AJP2010245 SO2	FTIR	Sep 16, 2020

Triad Data Available Upon Request

NOTES: Gross Weight: 27.8 Kg Net Weight: 4.6 Kg.



Approved for Release

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04N199E3HA0002 Reference Number: 160-402138465-1
Cylinder Number: ND11218 Cylinder Volume: 247.2 Cubic Feet
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2215 PSIG
PGVP Number: A12021 Valve Outlet: 560
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Jul 15, 2021

Expiration Date: Jul 15, 2028

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA-600/R-12/031, 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 in 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	80.00 PPM	81.85 PPM	G1	+/- 1.4% NIST Traceable	9/08/2021, 07/15/2021
CARBON MONOXIDE	80.00 PPM	79.73 PPM	G1	+/- 0.5% NIST Traceable	9/08/2021
NITROX OXIDE	80.00 PPM	81.85 PPM	G1	+/- 1.1% NIST Traceable	07/09/2021, 07/15/2021
SULFUR DIOXIDE	80.00 PPM	79.92 PPM	G1	+/- 0.9% NIST Traceable	07/09/2021, 07/15/2021
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	11010130	KAL004336	97.31 PPM CARBON MONOXIDE/NITROGEN	+/- 0.4%	Oct 04, 2022
PRM	12389	D685228	9.81 PPM ARSENIC/NITROGEN DIOXIDE	3.0%	Feb 26, 2020
NTRM	200610-03	CC733428	98.61 PPM NITROX OXIDE/NITROGEN	+/- 0.8%	Oct 05, 2026
QMS	12420889	CC232797	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	16010224	KAL003836	87.69 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Dec 23, 2021

The PRM, QMS or NTRM codes above is only in reference to the QMS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet iSSO FTIR AUP2010245 CO	FTIR	Jun 24, 2021
Nicolet iSSO FTIR AUP2010245 NO	FTIR	Jul 01, 2021
Nicolet iSSO FTIR AUP2010245 NO2	FTIR	Jun 30, 2021
Nicolet iSSO FTIR AUP2010245 SO2	FTIR	Jul 05, 2021

Triad Data Available Upon Request

NOTES:

Gross Weight: 48.0 Kg
Net Weight: 7.8 Kg



Michael A. Kuhn
Approved for Release

Page 1 of 160-402138465-1

CERTIFICATE OF ANALYSIS

Grade of Product: EPA PROTOCOL STANDARD

Customer: AIR LIQUIDE
(THAILAND) LTD
Part Number: E02N184E3HA0001 Reference Number: 160-402340010-1
Cylinder Number: GN007207 Cylinder Volume: 249.8 CF
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2214 PSIG
PGVP Number: A12022 Valve Outlet: 590
Gas Code: O2,BALN Certification Date: Feb 02, 2022

Expiration Date: Feb 02, 2030

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA-600/R-12/031, 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 in 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	16.00 %	16.02 %	G1	+/- 0.4% NIST Traceable	02/02/2022
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	08010030	K005928	23.20 % OXYGEN/NITROGEN	+/- 0.4%	Jun 01, 2022

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS OXYMAT 6 - N1-W3-951 - O2	PARAMAGNETIC	Jan 27, 2022

Triad Data Available Upon Request

NOTES: Gross Weight: 48.6 Kg
Net Weight: 8.2 Kg



Chin
Approved for Release

Page 1 of 160-402340010-1

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E02N192E3HA0000 Reference Number: 160-401945144-1
Cylinder Number: GN0025083 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-12/031, 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 in 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 %	8.019 %	G1	+/- 0.3% NIST Traceable	11/11/20
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	10016602	1038055	9.967 % OXYGEN/NITROGEN	+/- 0.3%	Apr 16, 2022

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS OXYMAT 6 - N1-W3-951 - O2	PARAMAGNETIC	Oct 26, 2020

Triad Data Available Upon Request

NOTES:

Gross Weight: 48.1 Kg
Net Weight: 8.2 Kg



Chin
Approved for Release

Page 1 of 160-4019451

CONSOLE CONTROL UNIT CALIBRATION TEST REPORT



Calibration of Date : 3 Jan 23 Barometric Pressure (mmHg) : 759
Next Cal. Date : 3 Jul 23 Relative Humidity (%) : 58.0
Temperature (°C) : 27.0

Console Control Meter Data
Calibration No. : C-001123-BKK_F30496
Dry Gas Meter ID : BKK_F30496
Serial No. : 1410987
Model No. : XC-572-V

Reference Dry Gas Meter Data
Reference Dry Gas Meter ID : BKK_F30629
Serial No. : 1607009
Correction Factor (Y) : 1.0000
Next Calibration Date : 9 Dec 23

AH	θ	Reference Dry Gas Meter Calibration						Console Control - Drygas Meter						Dry Gas Meter Correction	Office Calibration	
		W (Lbs)		T		Vn (Lbs)		Tn (°C)		Tn (°C)		Avg Tn	Factor			Factor
		Final	Initial	Total	TC	TC	Final	Initial	Total	TC	TC					
15	11.96	150.00	0.00	150.00	33.0	488440.0	488200.0	147.00	32.0	32.0	32.0	1.0156	44.3964			
25	9.16	150.00	0.00	150.00	33.0	488634.0	488496.0	148.00	33.0	33.0	33.0	1.0111	43.3617			
50	6.51	150.00	0.00	150.00	33.0	488864.0	488716.0	148.00	36.0	36.0	36.0	1.0185	43.2780			
100	4.58	150.00	0.00	150.00	34.0	489213.0	489065.0	148.00	36.0	36.0	36.0	1.0103	43.1221			
150	3.71	150.00	0.00	150.00	34.0	489426.0	489278.0	147.00	36.0	36.0	36.0	1.0189	42.1703			
												Avg	1.0149	43.2457		

Y : Ratio of reading of reference to dry gas meter : tolerance for individual values ± 0.02 from average.

Avg : Office pressure differential that equals to 21.24 in of air @ 25 °C and 760 mm of mercury, mmH2O; tolerance for individual values ± 5.08 from average.

Procedure: 40 CFR 60 APP A METH. SEC 5.3 & 7

Calibrated by: *Chin*
(Mr. Chin - Wongchan)
Field Scientist(2)

Approved by: *S. P.*
(Mr. Samart - Rongchan)
Field Specialist(1)

FORM NO. 1-06-04 REVISION NO. 3 ISSUE DATE: 26 Jun 22



Stopwatch Calibration Test Report

Calibration Date : 3 Jan 23 Next Cal. Date : 3 Jul 23
Barometric Pressure (mmHg) : 759 Temperature (°C) : 27.0
Relative Humidity (%) : 58.0

Reference Stopwatch Data

Stopwatch ID No. : E18061
Model : F808
Serial No. : -
Calibration Date : 8 Sep 20
Certificate No. : E-2009018

Console Control Meter Data

Dry Gas Meter No. : BKK_FS0496
Model : XC-572-V
Serial No. : 1462087

Run No.	Time Actual (m:ss.ms)	Time Reading (m:ss)	Diff. (ms)	Diff. (min)
1	5:00:09	5:00	9	0.00015
2	5:00:10	5:00	10	0.00017
3	5:00:12	5:00	12	0.00020
4	5:00:11	5:00	11	0.00018
5	5:00:10	5:00	10	0.00017
6	5:00:10	5:00	10	0.00017
7	5:00:08	5:00	8	0.00013
8	5:00:11	5:00	11	0.00018
9	5:00:09	5:00	9	0.00015
10	5:00:10	5:00	10	0.00017
			Average	0.00017
			SD	0.00002

Calibrate by :

Mr. Prasert Surakhan

Field Scientist (3)

Approved by :

Mr. Samart Roo-ngan

Specialist (1)



DIGITAL TEMPERATURE CALIBRATION DATA SHEET

Calibration Date :	3 Jan 23	Ambient Temperature (°C)	30
Calibration sheet No. :	C-030123-BKK_FS0497	Relative Humidity (%) :	62
Digital Temperature ID :	BKK_FS0497	Reference Temperature ID	BKK_FS1144
Serial No. :	1412087	Serial No. :	201090006013
Model :	XC-572-V	Model :	Digicon-CC-VT-MS
		Next Calibrate :	31 Jan 23

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	199	-1	±3	Pass
Probe	250	249	-1	±3	Pass
	300	299	-1	±3	Pass
	500	498	-2	±3	Pass
	100	101	1	±3	Pass
	120	121	1	±3	Pass
	140	142	2	±3	Pass
Oven	100	100	0	±3	Pass
	120	121	1	±3	Pass
	140	142	2	±3	Pass
Filter	100	100	0	±3	Pass
	120	121	1	±3	Pass
	140	142	2	±3	Pass
Exit	0	1	1	±3	Pass
	10	11	1	±3	Pass
	20	21	1	±3	Pass
Meter	0	1	1	±3	Pass
	25	26	1	±3	Pass
	50	51	1	±3	Pass
AUX	0	0	0	±3	Pass
	25	25	0	±3	Pass
	50	50	0	±3	Pass

MPE : (Maximum permissible error of measurement) ค่าความผิดพลาดสูงสุดของการวัดที่อนุญาต

Calibrated by :

(Mr.Prasert Surakhan)

Field Scientist (3)

Approved by :

(Mr.Samart Roo-ngan)

Specialist (1)

FORM NO.: F 06-027 REVISION NO.: 2 ISSUE DATE: 9 Feb 23



Pitot Tube Calibration Data

Pitot Tube Identification Number : BKK_FS0500 Calibration Date : 3 Jan 23
Lab test duct Number : 258-1-13-01 Standard Pitot ID : BKK_FS0441
Calibration Sheet No. : C-030123-BKK_FS0500 Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube (ΔP, mm.H ₂ O)	Type s pitot tube (ΔP, mm.H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
			C _p	0.842	0.842

$$C_{P(S)} = C_{P_{std}} \sqrt{\frac{\Delta P_{(std)}}{\Delta P_{(s)}}}$$

$$\left[\bar{C}_{P(A)} - \bar{C}_{P(B)} \right] \text{ must BE } \leq 0.01$$

$$\text{Average deviation(A or B)} = \frac{\sum_{i=1}^n [C_p(s) - C_p(A \text{ or } B)]}{3} \text{ must BE } \leq 0.01$$

Calibrated by :

(Mr. Worawich Tongpoom)

Field Scientist (2)

Approved by :

(Mr.Samart Roo-ngan)

Specialist (1)

FORM NO.: F 06-025 REVISION NO.: 1 ISSUE DATE: 30 Jun 22



Pitot Tube Calibration Data

Pitot Tube Identification Number : BKK_FS0501 Calibration Date : 3 Jan 23
Lab test duct Number : 258-1-13-01 Standard Pitot ID : BKK_FS0441
Calibration Sheet No. : C-030123-BKK_FS0501 Cp Standard : 0.99

Type S Pitot Tube Coefficient Data					
	Type s pitot tube Leg A,B	Standard pitot tube (ΔP, mm.H ₂ O)	Type s pitot tube (ΔP, mm.H ₂ O)	Cp (s) Leg A	Cp (s) Leg B
Test 1	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	A	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	A	12.00	16.80	0.845	-
	B	12.00	16.80	-	0.845
			C _p	0.842	0.842

$$C_{P(S)} = C_{P_{std}} \sqrt{\frac{\Delta P_{(std)}}{\Delta P_{(s)}}}$$

$$\left[\bar{C}_{P(A)} - \bar{C}_{P(B)} \right] \text{ must BE } \leq 0.01$$

$$\text{Average deviation(A or B)} = \frac{\sum_{i=1}^n [C_p(s) - C_p(A \text{ or } B)]}{3} \text{ must BE } \leq 0.01$$

Calibrated by :

(Mr. Worawich Tongpoom)

Field Scientist (2)

Approved by :

(Mr.Samart Roo-ngan)

Specialist (1)

FORM NO.: F 06-025 REVISION NO.: 1 ISSUE DATE: 30 Jun 22



PROBE NOZZLE DIAMETER
CALIBRATION DATA SHEET

Calibration Date : 3 Jan 23 Nozzle Set ID. : BKK_FS0502
Calibration Sheet No. : C-030123-BKK_FS0502 Vernier Caliper ID. : RYG_FS0539

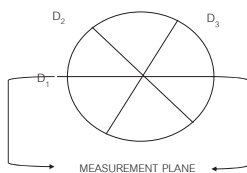
Nozzle ID #	Nozzle Diameter (cm.)			Hi - Lo ΔD	$(D_1 + D_2 + D_3) / 3$ D_{avg}
	D_1	D_2	D_3		
1	0.315	0.315	0.315	0.000	0.315
2	0.475	0.475	0.475	0.000	0.475
3	0.635	0.635	0.635	0.000	0.635
4	0.790	0.790	0.790	0.000	0.790
5	0.950	0.950	0.950	0.000	0.950
6	1.110	1.110	1.110	0.000	1.110
7	1.270	1.270	1.270	0.000	1.270
8	1.600	1.600	1.600	0.000	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. Worawich Tongpoom)
Field Scientist (2)

Approved by :
(Mr. Samart Roo-ngan)
Field Specialist (1)

FORM NO. 7-04-004 REVISION NO. : 0001 DATE: 9-1-2022

Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2643 6361-6 e-mail: service.thailand@sartorius.com



SARTORIUS

Certificate

of Calibration

REVIEW BY:
APPROVED BY:
NEXT CAL DATE: 8/12/24

Model Number : MSE224S-100-DU
Description : Analytical Balance
Serial Number : 26207042
ID No. : BKK_EN0002
Manufacturer : Sartorius

Certificate No. : 23BCI0072
Issued Date : Monday, February 13, 2023
Reference No. : 203245
Page No. : 1 of 2

Customer Name : ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250

Calibrated Place : Balance Room

Calibrated By : Mr. Chonchai Inthana

Calibration Date : Wednesday, February 08, 2023

Calibration Procedure No. : This calibration was conducted by Using in-house calibration procedure number (WH-003) Based on UKAS LAB 14 : 2019

Metrological data :

Capacity : 220 g Readability : 0.0001 g

Ambient Conditions:

Temperature : 23.2 °C ± 5.0 °C

Humidity : 60.0 % RH ± 10.0 % RH

Pressure : ±

Reasons for calibration

☐ New Installation ☐ Service / Repair ☒ Re-calibration / Maintenance

Equipment Condition: ☒ Good Operation ☐ Fail

Measurement Method UKAS Publication Ref : Lab 14

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 5000g E2 YCS011-522-00	SPC-RT	C02212595	14-Sep-2023
MHB-382SD	Humidity/Balometer/Temp. Lubron MHB-382SD	DKSH	C19220444	8-Sep-2023

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.

SOP FM 33 03 February 2022

Mr. Chonchai Inthana (Technical Manager)



Sartorius (Thailand) Co., Ltd.
129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310
Tel: +66 2643 6361-6 Fax: +66 2643 6367 e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number : MSE224S-100-DU
Description : Analytical Balance
Serial Number : 26207042
ID No. : BKK_EN0002
Manufacturer : Sartorius

Certificate No. : 23BCI0072
Issued Date : Monday, February 13, 2023
Reference No. : 203245
Page No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability			Eccentricity (Off-center loading error)		
The reproducibility is the ability of a weighing instrument to display nearly identical results under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.			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 : (Low Load)	20.0000	200.0000	Nominal value :	50	g
20 g	20.0000	199.9999	Tolerance	0.0004	g
Tolerance	0.0001 g	0.0001 g	Difference		
	20.0000	199.9999	1	0.0001	g
	20.0001	200.0000	2	-0.0001	g
Nominal Value : (High Load)	20.0000	200.0000	3	0.0000	g
200 g	20.0000	199.9999	4	0.0001	g
Tolerance	0.0001 g	0.0001 g	5	0.0000	g
	20.0000	200.0000	6	0.0000	g
	20.0001	199.9999			
Standard Deviation	0.00004	0.00005			

Linearity

The linearity, also called linearity error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance 0.0002 g				
Nominal Value (g)	Conventional Mass Value (g)	Displayed Value (g)	Deviation (g)	Uncertainty (g)
0.01	0.0100	0.0100	0.0000	0.00014
0.1	0.1000	0.1000	0.0000	0.00014
1	1.0000	1.0000	0.0000	0.00014
2	2.0000	2.0000	0.0000	0.00014
5	5.0000	5.0000	0.0000	0.00014
10	10.0000	10.0000	0.0000	0.00014
20	20.0000	20.0000	0.0000	0.00014
50	50.0000	50.0000	0.0000	0.00015
100	100.0000	100.0000	0.0000	0.00019
200	200.0000	199.9999	-0.0001	0.00020

End of Report

SOP FM 33 03 February 2022

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

451/451/1 Sirinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND
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Cert. No. : ACC22043
Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No. : 34178118
ID No. : BKK_FS0631

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 : 07 DECEMBER 2022
Calibration Date : 20 DECEMBER 2022
Date of Issue : 21 DECEMBER 2022

Calibrated by : Nathakorn Pisutpaisan

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.

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACC22043
Job No. : VC66AC0016
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by based on IEC-60942:2003 Standard.

The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	33461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23
Audio Analyzer	AVR-3360A	V744B6069	EF-0010-22	07-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

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Continuation of Calibration Certificate

Cert. No. : ACC22043
Job No. : VC66AC0016
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	94.13	0.13	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1001.7	0.2	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
2.13	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

QF-TS12-04-04-020664

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY451-451/1 Sirinthorn Rd., Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.comCert. No. : ACL22244
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00572552 / 170384 / 72890
ID No. : BKK_FS0877

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 : 11 OCTOBER 2022
Calibration Date : 25-26 OCTOBER 2022
Date of Issue : 27 OCTOBER 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchurai)

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QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22244
Job No. : VC66AC0090
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22244
Job No. : VC65AC0090
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

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Continuation of Calibration Certificate

Cert. No. : ACL22244
Job No. : VC65AC0090
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
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	11.6
C - weight	17.5
Flat	23.3

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	0.3	0.4	0.4	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-1.7	-1.6	-1.6	±5.0

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Continuation of Calibration Certificate

Cert. No. : ACL22244
Job No. : VC65AC0090
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22244
Job No. : VC65AC0090
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	28.1	0.1	± 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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Continuation of Calibration Certificate

Cert. No. : ACL22244
Job No. : VC65AC0090
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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	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	135.7	-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	133.0	0.0	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

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T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22244
Job No. : VC65AC0090
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	(dB)	(dB)
89.6	89.7	0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petchur

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Cert. No. : ACL22276
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No. : 00572563 / 170399 / 72900
ID No. : BKK_FS0879

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 14 NOVEMBER 2022
Calibration Date : 21 NOVEMBER 2022
Date of Issue : 24 NOVEMBER 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchur)

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Continuation of Calibration Certificate

Cert. No. : ACL22276
Job No. : VC66AC0011
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL.BP. 04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL.BP. 05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAI	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22276
Job No. : VC66AC0011
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-04-020664

T. Retan

Continuation of Calibration Certificate

Cert. No. : ACL22276
Job No. : VC66AC0011
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
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	9.9
C - weight	16.5
Flat	22.2

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	0.3	0.4	0.4	± 1.5
1000	-0.1	-0.1	-0.1	± 1.0
8000	-2.2	-2.2	-2.2	±5.0

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T. Retan

Continuation of Calibration Certificate

Cert. No. : ACL22276
Job No. : VC66AC0011
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	0.0	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	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	± 0.3

QF-TS12-04-04-020664

T. Retan

Continuation of Calibration Certificate

Cert. No. : ACL22276
Job No. : VC66AC0011
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	74.1	0.1	± 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	30.1	0.1	± 1.1
29.0	29.0	0.0	± 1.1
28.0	28.1	0.1	± 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

QF-TS12-04-04-020664

T. Retan

Continuation of Calibration Certificate

Cert. No. : ACL22276
Job No. : VC66AC0011
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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	134.0	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, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.0	-0.4	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

QF-TS12-04-04-020664

T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22276
Job No. : VC66AC0011
Pages : 8 of 8

11. Overload indication

Measured value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	(dB)
89.7	89.7	0.0

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

QF-TS12-04-04-020664

T. Petchur

SITHIPORN ASSOCIATES CO.,LTD.
CALIBRATION LABORATORY

451-451/1 Sirdinthorn Rd., Bangbunru, Bangkok 10700 THAILAND.
Tel:0-2435-8800 Fax:0-2433-1679 e-mail:cal-center@sithiporn.com http://www.sithiporn.com



Cert. No. : ACL22277
Pages : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00572564 / 170401 / 72902
ID No.: BKK_FS0880

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 14 NOVEMBER 2022
Calibration Date : 21 NOVEMBER 2022
Date of Issue : 24 NOVEMBER 2022

Calibrated by : Nathakorn Pisutpaisan

Approved by :

T. Petchur
(Thanakul Petchuray)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

QF-TS12-04-04-020664

Continuation of Calibration Certificate

Cert. No. : ACL22277
Job No. : VC66AC0011
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.
For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0007-22	04-Feb-23
Waveform Generator	33511B	MY52302742	EF-0008-22	04-Feb-23
Digital Multimeter	33461A	MY53220104	EEL_BP_04/0265	09-Feb-23
Digital Multimeter	33461A	MY53220076	EEL_BP_03/0265	09-Feb-23
Digital Multimeter	34461A	MY60024273	EEL_BP_05/0265	09-Feb-23
Programmable Attenuator	MAT-1070	62100114	EF-0009-22	07-Feb-23
Condenser Microphone	4180	2977900	AA-1013-22	24-Feb-23
Measuring Amplifier	NA-42KAJ	34560495	AA-3005-22	22-Feb-23

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

QF-TS12-04-04-020664

T. Petchur

Continuation of Calibration Certificate

Cert. No. : ACL22277
Job No. : VC66AC0011
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.3	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

QF-TS12-04-04-020664

T. Retan

Continuation of Calibration Certificate

Cert. No. : ACL22277
Job No. : VC66AC0011
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.95)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
16.9

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	14.2
C - weight	20.2
Flat	26.0

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	2.2	2.3	2.3	±5.0

QF-TS12-04-04-020664

T. Retan

Continuation of Calibration Certificate

Cert. No. : ACL22277
Job No. : VC66AC0011
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	0.1	0.0	0.0	±1.5
250	0.0	0.1	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	± 0.2
Flat	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	± 0.1
Leq	94.0	0.0	± 0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.1	0.1	± 0.3

QF-TS12-04-04-020664

T. Retan

Continuation of Calibration Certificate

Cert. No. : ACL22277
Job No. : VC66AC0011
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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T. Retan

Cert. No. : ACL22277
Job No. : VC66AC0011
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	108.0	0.0	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.3	-0.1	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
Positive half cycle	135.4	135.1	-0.3	±2.0
Negative half cycle	135.4	135.1	-0.3	±2.0

QF-TS12-04-04-02664

Cert. No. : ACL22277
Job No. : VC66AC0011
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value	Acceptance Limits
Positive one-half cycle	Negative one-half cycle	(dB)	(dB)
89.6	89.5	-0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

QF-TS12-04-04-02664

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc
DATE OF ISSUE 25 January 2023
CERTIFICATE NUMBER 186418REVIEW BY *Nigam P.*
APPROVED BY *Rebecca Thomas*
NEXT CAL DATE 24/1/24

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1
Test engineer:
Rebecca Thomas
Electronically signed:
R Thomas

doseBadge Reader

Instrument

Manufacturer: Cirrus Research plc
Model Number: RC:110A
Serial Number: 83554
Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 24 January 2023

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

Calibration Results

	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	113.48	1001.3	0.16
Adjusted	114.00	1001.3	0.16
Uncertainty	± 0.11	± 0.14	± 0.10
Tolerances	± 0.60	± 2.00	± 4.00

Environmental Conditions

Pressure: 102.86 kPa
Temperature: 23.0 °C
Humidity: 30.3 %

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

ISSUED BY Cirrus Research plc
DATE OF ISSUE 25 January 2023
CERTIFICATE NUMBER 186419REVIEW BY *Nigam P.*
APPROVED BY *Rebecca Thomas*
NEXT CAL DATE 24/1/24

Cirrus Research plc
Acoustic House
Bridlington Road
Hunmanby
North Yorkshire
YO14 0PH
United Kingdom

Page 1 of 1
Test engineer:
Rebecca Thomas
Electronically signed:
R Thomas

doseBadge Reader

Instrument

Manufacturer: Cirrus Research plc
Model Number: RC:110A
Serial Number: 63862
Notes:

Calibration Procedure

The tests were carried out in accordance with the requirements of IEC 60942:2003 where applicable.

Date of Calibration: 24 January 2023

Functionality Results

Function	Result
Keypad	Pass
Battery Power	Pass
Display	Pass
Communication	Pass
2 way IR link	Pass
Clock	Pass

Calibration Results

	Level (dB)	Frequency (Hz)	Distortion (% THD + Noise)
Initial	114.33	995.1	0.43
Adjusted	113.99	995.1	0.43
Uncertainty	± 0.11	± 0.14	± 0.10
Tolerances	± 0.60	± 2.00	± 4.00

Environmental Conditions

Pressure: 102.84 kPa
Temperature: 22.7 °C
Humidity: 31.7 %

Notes

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate No.: CL-033-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15006309
ID No: BKK_FS0667

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 07 Feb 2023
Calibration date: 13 Feb 2023
Issue date: 14 Feb 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3)°C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by in-house
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22



Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *Mr. Pinyaya Booncharoen*
Calibration Department Manager

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HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-033-66
Page 2 of 2

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: 15017683.
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.049	20.2	0.2	0.099
60	25.056	25.2	0.1	0.099
60	30.051	30.2	0.1	0.099
60	35.045	35.2	0.2	0.099
60	40.041	40.2	0.2	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015506.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.049	20.1	0.1	0.099
70	25.056	25.0	-0.1	0.099
70	30.051	29.8	-0.2	0.14
70	35.045	34.7	-0.3	0.099
70	40.041	39.6	-0.4	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15009822.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.049	20.0	0.0	0.099
110	25.056	25.0	-0.1	0.099
110	30.051	30.0	-0.1	0.099
110	35.045	35.0	0.0	0.099
110	40.042	40.0	0.0	0.099

UUC*: Unit Under Calibration
The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-125-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15006698
ID No: BKK_FS0669

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan
Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 04 Jul 2022
Calibration date: 08 Jul 2022
Issue date: 12 Jul 2022

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 04 June 2022

Calibration Condition
Temperature: (23±3)°C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by in-house
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0032-
21



Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *Mr. Pinyaya Booncharoen*
Calibration Department Manager

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HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-125-65
Page 2 of 2

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: 15015840.
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.035	20.2	0.2	0.099
30	25.039	25.2	0.2	0.099
30	30.035	30.2	0.2	0.099
30	35.027	35.2	0.2	0.099
30	40.017	40.2	0.2	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015490.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.034	20.4	0.4	0.099
70	25.039	25.2	0.2	0.099
70	30.035	30.0	0.0	0.099
70	35.027	34.9	-0.1	0.099
70	40.018	39.7	-0.3	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 20019644.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.034	20.1	0.1	0.099
110	25.038	25.1	0.1	0.099
110	30.035	30.2	0.2	0.099
110	35.027	35.2	0.2	0.099
110	40.017	40.2	0.2	0.099

UUC*: Unit Under Calibration
The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-126-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15006704
ID No: BKK_FS0670

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanasak 40, Phatthanasak
Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 04 Jul 2022
Calibration date: 08 Jul 2022
Issue date: 12 Jul 2022

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 04 June 2022

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0032-
21

REVIEW BY: *Manon P*
APPROVED BY: *Manon P*
NEXT CAL DATE: 8/7/23

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *Manon P*
Mr. Parinya Booncharoen
Calibration Department Manager

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HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-126-65
Page 2 of 2

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: 15017681.
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.035	20.1	0.1	0.099
30	25.038	25.1	0.1	0.099
30	30.036	30.1	0.1	0.099
30	35.026	35.1	0.1	0.099
30	40.017	40.1	0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15015488.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.034	20.2	0.2	0.099
70	25.038	25.1	0.1	0.099
70	30.035	29.9	-0.1	0.099
70	35.027	34.8	-0.2	0.099
70	40.017	39.7	-0.3	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15021838.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.035	20.1	0.1	0.099
110	25.038	25.1	0.1	0.099
110	30.035	30.1	0.1	0.099
110	35.026	35.1	0.1	0.099
110	40.017	40.1	0.1	0.099

UUC*: Unit Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-040-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15006710
ID No: BKK_FS0672

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanasak 40, Phatthanasak Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 15 Feb 2023
Calibration date: 22 Feb 2023
Issue date: 23 Feb 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

REVIEW BY: *Manon P*
APPROVED BY: *Manon P*
NEXT CAL DATE: 22/2/24

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *Manon P*
Mr. Parinya Booncharoen
Calibration Department Manager

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Certificate No.: CL-040-66
Page 2 of 2

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: 15015852.
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.065	20.0	-0.1	0.099
60	25.060	25.0	-0.1	0.099
60	30.053	30.0	-0.1	0.099
60	35.047	35.0	0.0	0.099
60	40.044	40.0	0.0	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 14036714.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.065	20.1	0.0	0.099
70	25.061	24.9	-0.2	0.099
70	30.053	29.8	-0.3	0.099
70	35.047	34.7	-0.3	0.099
70	40.043	39.6	-0.4	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15021832.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.065	20.1	0.0	0.099
110	25.060	25.1	0.0	0.099
110	30.053	30.1	0.0	0.099
110	35.047	35.1	0.1	0.099
110	40.043	40.1	0.1	0.099

UUC*: Unit Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-034-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15036019
ID No: BKK_FS0678

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 07 Feb 2023
Calibration date: 13 Feb 2023
Issue date: 14 Feb 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3)°C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

REVIEW BY *Manon P.*
APPROVED BY *[Signature]*
CAL DATE 13/2/24

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *[Signature]*
Mr. Parinya Booncharoen
Calibration Department Manager

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TION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-034-66
Page 2 of 2

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: 13035045,
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.047	20.1	0.1	0.099
60	25.056	25.1	0.0	0.099
60	30.052	30.1	0.0	0.099
60	35.045	35.1	0.1	0.099
60	40.042	40.1	0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 16010556,
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.046	20.2	0.2	0.099
70	25.056	25.0	-0.1	0.099
70	30.051	29.9	-0.2	0.099
70	35.045	34.8	-0.2	0.099
70	40.041	39.6	-0.4	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15022053,
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.046	20.1	0.1	0.099
110	25.056	25.1	0.0	0.099
110	30.052	30.1	0.0	0.099
110	35.045	35.1	0.1	0.099
110	40.041	40.1	0.1	0.099

UUC* : Unit Under Calibration
The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-149-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15036021
ID No: BKK_FS0679

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwang Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 12 Sep 2022
Calibration date: 28 Sep 2022
Issue date: 03 Oct 2022

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3)°C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

REVIEW BY *Manon P.*
APPROVED BY *[Signature]*
NEXT CAL DATE 28/9/23

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *[Signature]*
Mr. Parinya Booncharoen
Calibration Department Manager

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TION HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-149-65
Page 2 of 2

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: 16008209,
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.046	19.9	-0.1	0.099
30	25.055	24.9	-0.2	0.099
30	30.053	29.9	-0.2	0.099
30	35.047	34.9	-0.1	0.099
30	40.041	39.9	-0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15037322,
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.046	20.1	0.1	0.099
70	25.055	24.9	-0.2	0.099
70	30.053	29.8	-0.3	0.099
70	35.047	34.6	-0.4	0.099
70	40.041	39.5	-0.5	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 16008203,
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.046	20.1	0.1	0.099
110	25.056	25.1	0.0	0.099
110	30.053	30.1	0.0	0.099
110	35.047	35.1	0.1	0.099
110	40.041	40.1	0.1	0.099

UUC* : Unit Under Calibration
The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★





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CERTIFICATE OF CALIBRATION

Certificate No.: CL-165-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 16002005
ID No: BKK_FS0682

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 15 Nov 2022
Calibration date: 21 Nov 2022
Issue date: 23 Nov 2022

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3)°C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22



Calibrated by
☒ Mr. Sorawit Thachalad
☒ Miss Jittrapon Lertsomphol



Approved Signatory: *Mr. Parinya Booncharoen*
Calibration Department Manager

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Certificate No.: CL-165-65
Page 2 of 2

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: 16008205.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.065	20.0	-0.1	0.14
30	25.050	24.9	-0.2	0.099
30	30.042	29.9	-0.1	0.099
30	35.040	34.9	-0.1	0.099
30	40.033	39.9	-0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 16010559.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.066	20.1	0.0	0.099
70	25.052	24.8	-0.3	0.099
70	30.042	29.7	-0.3	0.099
70	35.038	34.6	-0.4	0.099
70	40.034	39.5	-0.5	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 16008195.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.065	20.1	0.0	0.099
110	25.052	25.1	0.0	0.099
110	30.042	30.1	0.1	0.099
110	35.039	35.1	0.1	0.099
110	40.034	40.0	0.0	0.099

UUC*: Unit Under Calibration
The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



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CERTIFICATE OF CALIBRATION

Certificate No.: CL-061-66
Page 3 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 13024779
ID No: BKK_FS0640

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 11 May 2023
Calibration date: 15 May 2023
Issue date: 15 May 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No: 667682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3)°C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0038-23, Certificate number: ER-0092-
22



Calibrated by
☒ Mr. Sorawit Thachalad
☒ Miss Jittrapon Lertsomphol



Approved Signatory: *Mr. Parinya Booncharoen*
Calibration Department Manager

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Certificate No.: CL-061-66
Page 2 of 2

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: 13030281.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.000	20.0	0.0	0.099
80	25.004	25.0	0.0	0.099
80	29.999	30.0	0.0	0.099
80	35.002	35.0	0.0	0.099
80	40.000	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 13030461.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.001	20.0	0.0	0.099
110	25.004	25.0	0.0	0.099
110	30.000	30.0	0.0	0.099
110	35.002	35.0	0.0	0.099
110	39.999	40.0	0.0	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 13013672.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.001	20.1	0.1	0.099
75	25.004	24.9	-0.1	0.099
75	30.000	29.8	-0.2	0.099
75	35.001	34.7	-0.3	0.099
75	40.000	39.6	-0.4	0.099

UUC*: Unit Under Calibration
The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-207-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 17020558
ID No: BKK_FS0653

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 15 Dec 2022
Calibration date: 19 Dec 2022
Issue date: 22 Dec 2022

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%

Calibration Procedure

The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability

The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

REVIEW BY: *Parinya P.*
APPROVED BY: *Parinya P.*
NEXT CAL. DATE: 19/12/23

Calibrated by
☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved Signatory: *Parinya P.*
Mr. Parinya Booncharoen
Calibration Department Manager

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Certificate No.: CL-207-65
Page 2 of 2

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: 13035020.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.044	20.1	0.1	0.099
80	25.055	25.2	0.1	0.099
80	30.051	30.2	0.1	0.099
60	35.042	35.2	0.2	0.099
60	40.036	40.2	0.2	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 13044778.
Dimension: Diameter 14 mm. Length 150 mm.

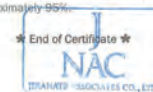
Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.047	19.7	-0.3	0.099
70	25.056	24.7	-0.4	0.099
70	30.046	29.7	-0.3	0.099
70	35.041	34.7	-0.3	0.099
70	40.031	39.7	-0.3	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 130441556.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.046	20.1	0.1	0.099
110	25.055	25.2	0.1	0.099
110	30.045	30.1	0.1	0.099
110	35.041	35.2	0.2	0.099
110	40.031	40.1	0.1	0.099

UUC*: Unit Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.



CERTIFICATE OF CALIBRATION

Certificate No.: CL-123-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: DeltaOHM
Model: HD32.2
Serial No: 15002056
ID No: BKK_FS0658

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan
Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 04 Jul 2022
Calibration date: 08 Jul 2022
Issue date: 12 Jul 2022

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 04 June 2022

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%

Calibration Procedure

The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability

The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0032-
21

REVIEW BY: *Parinya P.*
APPROVED BY: *Parinya P.*
NEXT CAL. DATE: 8/7/23

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *Parinya P.*
Mr. Parinya Booncharoen
Calibration Department Manager

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HAS BEEN OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-123-65
Page 2 of 2

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: 15006887.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.047	19.9	-0.1	0.099
30	25.041	24.9	-0.1	0.099
30	30.034	29.9	-0.1	0.099
30	35.028	34.9	-0.1	0.099
30	40.022	39.9	-0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15003274.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.047	20.5	0.5	0.099
70	25.041	24.9	-0.1	0.099
70	30.034	29.8	-0.2	0.099
70	35.029	34.7	-0.3	0.099
70	40.021	39.6	-0.4	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 18009534.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.047	19.9	-0.1	0.099
110	25.041	24.9	-0.1	0.099
110	30.035	29.9	-0.1	0.099
110	35.029	34.9	-0.1	0.099
110	40.022	39.9	-0.1	0.099

UUC*: Unit Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-064-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15006302
ID No: BKK_FS0663

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 11 May 2023
Calibration date: 15 May 2023
Issue date: 15 May 2023

REVIEW BY: *Nonkan P.*
APPROVED BY: *Wichit*
NEXT CAL. DATE: 15/5/24

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0038-23, Certificate number: ER-0092-
22

Notes: The certificate is valid only to the item calibrated on date and place of calibration

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *Mr. Parinya Booncharoen*
Calibration Department Manager

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OBTAINED IN WRITING FROM THE LABORATORY.

Certificate No.: CL-064-66
Page 2 of 2

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: 22035259.
Dimension: Diameter 3.3 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
80	20.001	19.9	-0.1	0.099
80	25.000	24.9	-0.1	0.099
80	30.003	30.0	0.0	0.099
80	35.000	35.0	0.0	0.099
80	40.004	40.0	0.0	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 20032620.
Dimension: Diameter 3.3 mm. Length 205 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.001	20.1	0.1	0.099
110	25.000	25.1	0.1	0.099
110	30.003	30.1	0.1	0.099
110	35.000	35.1	0.1	0.099
110	40.004	40.1	0.1	0.099

Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 15008018.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
75	20.001	20.2	0.2	0.099
75	25.000	25.0	0.0	0.099
75	30.004	29.9	-0.1	0.099
75	35.000	34.9	-0.1	0.099
75	40.003	39.8	-0.2	0.099

UUC*: Unit Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-163-65
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15006708
ID No: BKK_FS0671

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 15 Nov 2022
Calibration date: 21 Nov 2022
Issue date: 23 Nov 2022

REVIEW BY: *Nonkan P.*
APPROVED BY: *Wichit*
NEXT CAL. DATE: 21/11/23

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000-A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (55±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

Calibrated by
☒ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol



Approved Signatory: *Mr. Parinya Booncharoen*
Calibration Department Manager

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Certificate No.: CL-163-65
Page 2 of 2

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: 15015843.
Dimension: Diameter 14 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
30	20.064	20.1	0.0	0.099
30	25.051	25.1	0.0	0.099
30	30.044	30.1	0.1	0.099
30	35.035	35.1	0.1	0.099
30	40.033	40.1	0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 16009383.
Dimension: Diameter 14 mm. Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.059	20.1	0.0	0.099
70	25.051	24.9	-0.2	0.099
70	30.042	29.8	-0.2	0.099
70	35.033	34.6	-0.4	0.099
70	40.033	39.5	-0.5	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15015979.
Dimension: Diameter 8 mm. Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.062	19.8	-0.3	0.099
110	25.050	24.7	-0.4	0.099
110	30.042	29.7	-0.3	0.099
110	35.038	34.7	-0.3	0.099
110	40.033	39.7	-0.3	0.099

UUC*: Unit Under Calibration

The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-034-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15036019
ID No: BKK_FS0678

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 07 Feb 2023
Calibration date: 13 Feb 2023
Issue date: 14 Feb 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 23 Mar 2023
2. Digital Temperature Indicator Model: DTI-1000A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (85±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0034-22, Certificate number: ER-0092-
22

REVIEW BY *Manon P*
APPROVED BY *Manon P*
CAL DATE 13/2/24

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *Manon P*
Mr. Parinya Booncharoen
Calibration Department Manager

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Certificate No.: CL-034-66
Page 2 of 2

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: 13035045.
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.047	20.1	0.1	0.099
60	25.056	25.1	0.0	0.099
60	30.052	30.1	0.0	0.099
60	35.045	35.1	0.1	0.099
60	40.042	40.1	0.1	0.099

Table 2: This equipment was connected with temperature probe Model: TP3207.2 S/N: 16010556.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.046	20.2	0.2	0.099
70	25.056	25.0	-0.1	0.099
70	30.051	29.9	-0.2	0.099
70	35.045	34.8	-0.2	0.099
70	40.041	39.6	-0.4	0.099

Table 3: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15022053.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.046	20.1	0.1	0.099
110	25.056	25.1	0.0	0.099
110	30.052	30.1	0.0	0.099
110	35.045	35.1	0.1	0.099
110	40.041	40.1	0.1	0.099

UUC*: Unit Under Calibration
The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★



CERTIFICATE OF CALIBRATION

Certificate No.: CL-058-66
Page 1 of 2

Equipment Name: Heat Stress Monitor
Manufacturer: Delta OHM
Model: HD32.2
Serial No: 15036132
ID No: BKK_FS0680

Customer
Name: ALS laboratory group (thailand) Co., Ltd.
Address: 104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Suan Luang, Khet Suan Luang, Bangkok
10250 Thailand.

Received date: 01 Mar 2023
Calibration date: 07 Apr 2023
Issue date: 07 Apr 2023

Reference Used During Calibration
1. Standard Temperature Probe Model: STS-100 A500,
Serial No.: 667682-09, Due date: 28 Mar 2024
2. Digital Temperature Indicator Model: DTI-1000A MK
II, Serial No.: 671407-00591 Due date: 22 July 2023

Calibration Condition
Temperature: (23±3) °C
Relative Humidity: (85±15)%

Calibration Procedure
The temperature calibration was done by In-House
calibration method as WI-CL-001 according to
comparison method with standard digital temperature
indicator and standard temperature probe. The
temperature scale use was based on ITS-90.

Traceability
The measurement results are traceable to the
international system of units (SI) through National
Institute of Metrology Thailand (NIMT) Certificate
number: TT-0038-23, Certificate number: ER-0092-
22

REVIEW BY *Manon P*
APPROVED BY *Manon P*
NEXT CAL DATE 3/4/24

Calibrated by
☐ Mr. Sorawit Thachalad
☒ Miss Jitraporn Lertsomphol



Approved Signatory: *Manon P*
Mr. Parinya Booncharoen
Calibration Department Manager

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Certificate No.: CL-058-66
Page 2 of 2

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: 15015846.
Dimension: Diameter 14 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
60	20.068	20.1	0.0	0.099
60	25.060	25.1	0.0	0.099
60	30.050	30.1	0.1	0.099
60	35.041	35.1	0.1	0.099
60	40.046	40.1	0.1	0.099

Table 2: This equipment was connected with Globe thermometer probe Model: TP3276.2 S/N: 15015972.
Dimension: Diameter 8 mm, Length 170 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
110	20.068	20.0	-0.1	0.099
110	25.060	25.0	-0.1	0.099
110	30.050	30.0	-0.1	0.099
110	35.041	35.0	0.0	0.099
110	40.046	40.0	0.0	0.099


Table 3: This equipment was connected with temperature probe Model: TP3207.2 S/N: 14032362.
Dimension: Diameter 14 mm, Length 150 mm.

Immersion Depth (mm)	Standard Reading (°C)	UUC Reading (°C)	Error (°C)	Uncertainty (°C)
70	20.068	20.2	0.1	0.099
70	25.060	25.1	0.0	0.099
70	30.050	29.9	-0.1	0.099
70	35.042	34.8	-0.2	0.099
70	40.046	39.7	-0.3	0.099



UUC*: Unit Under Calibration
The reported expanded uncertainty is based on standard uncertainty multiplied by a coverage factor k=2
providing a level of confidence of approximately 95%.

★ End of Certificate ★





TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484

Certificate of Calibration

Certificate No.: 22PH446
Page: 1 of 2

Equipment: Lux Meter

Manufacturer: Tenmars

Model: TM-201L

Serial No.: 180800269

ID No.: BKK_FS0987

Condition As-Received: Used Item

Received Date: 31 August 2022

Calibration Date: 02 September 2022

Reference: 2208-1093WSC

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

Procedure used: Calibration were conducted using In-house calibration procedure CP-PH01 by measuring against luminous-intensity standard lamp (source-based method) According to the inverse square law measurement method.

Condition of this result of calibration

1. Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) High-accuracy Irradiance Standard	OL-FEL-U	F-1471	TP-1037-21	18 Oct 2022
2) Photometry & Encoder	LMGuide 9.6 m	120RC003	61-140006-1	30 Apr 2023

2. This result of calibration was made on requested at the point specified by customer.

3. Test Equipment : Programmable Voltage/Current Source (Model : OL83A, S/N : 09220284).

4. Test Equipment : Illuminance Meter (Model : 51002, S/N : 080129).

5. The certificate is valid only to the item calibrated on date and place of calibration.

6. This Certification is traceable to the International System of Unit maintained at:-
-National Institute of Metrology Thailand (NIMT)

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.

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Calibrated by: Nivat Nitaa
Issue Date: 06 September 2022

Approved Signatory:


[] Phalinee Prabpaipal
[] Chatchawan Khunpluek
[x] Nuntawat Khamchai

REVIEW BY: *Nuntawat P.*

APPROVED BY: *[Signature]*

NEXT CAL DATE: 21/9/23

B 0296365



Cert. No.: 22PH446
Page.: 2 of 2

Result of calibration:- (*) Without adjustment () After adjustment

Function: Illuminance Measurement **Range:** 200 lx

Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
0	0.0	0.0	0.060
20	19.9	-0.1	0.30
50	49.9	-0.1	0.73
100	100.1	0.1	1.5
150	150.0	0.0	2.2
190	189.6	-0.4	2.8

Function: Illuminance Measurement **Range:** 2000 lx

Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
200	200	0	3.0
500	499	-1	7.3
1000	1000	0	15
1500	1503	3	22
1900	1904	4	28

Function: Illuminance Measurement **Range:** 20000 lx


Standard Value	UUC* Reading	Error	Uncertainty
(lx)	(lx)	(lx)	(± lx)
2000	2000	0	30
3000	3010	10	45
4000	4020	20	59
5000	5030	30	74

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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484

Certificate of Calibration

Certificate No.: 22PH476
Page: 1 of 2

Equipment: Lux Meter

Manufacturer: PEAKMETER

Model: PM6612L

Serial No.: H12A-K20118

ID No.: BKK_FS1146

Condition As-Received: Used Item

Received Date: 12 September 2022

Calibration Date: 13 September 2022

Reference: 2209-0405WSC

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

Procedure used: Calibration were conducted using In-house calibration procedure CP-PH01 by measuring against luminous-intensity standard lamp (source-based method) According to the inverse square law measurement method.

Condition of this result of calibration

1. Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Photometry & Encoder	LMGuide 9.6 m	120RC003	DL-0064-22	20 Jul 2025
2) High-accuracy Irradiance Standard	OL-FEL-U	F-1471	TP-1037-21	18 Oct 2022

2. This result of calibration was made on requested at the point specified by customer.

3. Test Equipment : Programmable Voltage/Current Source (Model : OL83A, S/N : 09220284).

4. Test Equipment : Illuminance Meter (Model : 51002, S/N : 080129).

5. The certificate is valid only to the item calibrated on date and place of calibration.

6. This Certification is traceable to the International System of Unit maintained at:-
-National Institute of Metrology Thailand (NIMT)

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.

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Calibrated by: Nivat Nitaa
Issue Date: 14 September 2022

Approved Signatory:


[] Phalinee Prabpaipal
[] Chatchawan Khunpluek
[x] Nuntawat Khamchai

REVIEW BY: *Nuntawat P.*

APPROVED BY: *[Signature]*

NEXT CAL DATE: 19/9/23

B 0297390



Cert. No.: 22PH476
Page.: 2 of 2

Result of calibration:- () Without adjustment (*) After adjustment

Function: Illuminance Measurement **Range:** Autorange

Standard Value	Before Adjust	After Adjust	Error	Uncertainty
(lx)	(lx)	(lx)	(lx)	(± lx)
0	0.00	0.00	0.00	0.060
15	-	15.06	0.06	0.22
100	-	100.8	0.8	1.5
500	-	501	1	7.3
1000	956	1001	1	15
2000	-	2020	20	30
3000	-	3010	10	45
4000	-	4020	20	60
5000	4800	5030	30	75

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 %

Before adjustment light source factor setting mode : L0 = 1.000
After adjustment light source factor setting mode : L0 = 1.047
UUC* = Unit Under Calibration.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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534/4 PATTANAKARN ROAD SOI 19, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-7000-7 FAX. 0-2719-0484



Cert. No.: 22CH1222
Page.: 1 of 2

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : Seven Compact S220
Serial No. : B520948426
ID No. : BKK_EN0072
Condition As-Received : Used Item
Received Date : 09 September 2022
Calibration Date : 12 September 2022
Reference : Z209-0312DSC-1
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 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)

Calibrated by : Warakorn Lemgatrakul

Approved by :
Approved Signatory

() Malee Butkrua
() Sathip Moangmai
() Warakorn Lemgatrakul

Issue Date : 15 September 2022

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced without the full, except with the prior written
Approval of the Association of Corporate Services (ACS) Calibration and Testing Services.



Cert. No.: 22CH1222
Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Cert. No.	Due Date
Document Process Calibrator	54030049	13DR116	22E2789	24 Aug 2023

This certification is traceable to the International System of Unit maintained at:-
- Traceable to National Institute of Metrology (Thailand), NIMT

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	823320	20 June 2024
pH 6.985	CPA chem	794122	14 Feb 2023
pH 10.008	CPA chem	823323	20 June 2023

3. This certificate is valid only to the item calibrated on date and place of calibration

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4.7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input		Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
	pH	mV	mV	mV	pH		
pH Meter S/N: B520948426	4.000	177.48	177.4	4.000	0.058	2.00	2.00
	7.000	0.00	0.0	7.000	0.058	2.00	
	10.000	-177.48	-177.5	10.000	0.058	2.00	

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: PCE-65-EX1001	4.008	3.999	153.9	0.0055	2.00
	6.985	7.017	-13.7	0.0084	2.00
	10.008	9.996	-179.0	0.0078	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 %.

-060-

1126274



Certificate of Calibration

Equipment : SPECTROPHOTOMETER
Model : DR6000
Serial No. (or ID.): 1627845 (RYG_EN0037)
Manufacturer : HACH
Condition : In Condition

Certificate No.: C06220464
Issued Date: 27 September 2022
Job No.: KSPR2212224
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 23.1 °C ± 3.2 °C
Humidity 85.4 %RH ± 3.2 %RH

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. Chattaphon Folthong
Calibration Date: 27 September 2022

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 Star Scientific Limited.

The standard for Wavelength Certificate No. 91418 and 91435
The standard for Photometric Certificate No. 91441 and 101088
The standard for Stray light Certificate No. 101041 and 101040
The standard for Spectral resolution Certificate No. 101037

(Mr. Chattaphon Folthong)
Person in charge

(Mr. Thalerkwest Pongnam)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to International or national standard or other recognized national standard laboratories.

The measurement uncertainty stated in 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).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

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Phone: +66 2839 7000 Email: info.calibration@dksh.com Website: www.dksh.com/calibration

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CALFM-C06-13: 20 Jul 2022



Certificate No.: C06220464 Page 2 of 3

Calibration Results:

Without Adjustment

Wavelength Accuracy (nm), The spectral bandwidth of 81d at 2 nm and UUC at 2 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.61	418.4	0.21	0.14
536.66	536.7	-0.04	0.14
637.98	638.3	-0.32	0.14
748.48	748.8	-0.32	0.14
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
	0.5605	0.563	-0.0025	0.0045
	0.7334	0.737	-0.0036	0.0045
	1.0534	1.057	-0.0036	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.5503	0.553	-0.0027	0.0045
	0.7179	0.720	-0.0021	0.0045
	1.0312	1.034	-0.0028	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.5024	0.506	-0.0036	0.0045
	0.6693	0.672	-0.0027	0.0045
	0.9604	0.964	-0.0036	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.5168	0.519	-0.0022	0.0045
	0.8903	0.891	-0.0007	0.0045
	0.9604	0.962	-0.0016	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.5525	0.554	-0.0015	0.0045
	0.7175	0.718	-0.0005	0.0045
	1.0301	1.031	-0.0009	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.5367	0.538	-0.0013	0.0045
	0.6847	0.685	-0.0003	0.0045
	0.9823	0.983	-0.0007	0.0045

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CALFM-C06-13: 20 Jul 2022

Calibration Results:
Without Adjustment

Photometric Accuracy (Absorbance)				
Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7423	0.744	-0.0017	0.0083
257 nm	0.0000	0.000	0.0000	0.0080
	0.8609	0.861	-0.0001	0.0084
313 nm	0.0000	0.000	0.0000	0.0080
	0.2895	0.292	-0.0025	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6381	0.638	0.0001	0.0080
Stray light *				
Standard: cut-off	UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)	
260.67 +/- 0.11 nm	260.7	2.1	1.678	
391.94 +/- 0.11 nm	391.9	1.7	1.770	
Spectral Resolution *				
Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	SBW
Standard Wavelength (nm)	268.60	266.63	1.39	2.00
UUC: Wavelength (nm)	268.2	266.1		
Std Absorbance (A)	0.4810	0.3176		
Absorbance (A)	0.373	0.268		

* Calibration Marked * Not TISI Accredited * in this Certificate have been included for completeness.

The End of Certificate

DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
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CALFM-C06-13-20 Jul 2022

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดลอม

เลขที่ใบงาน: KSPR2212224

ชนิดเครื่องมือ: SPECTROPHOTOMETER รุ่น: DR6000

หมายเลขเครื่อง: 1627845

ตรวจสอบ (รับ)		รายการตรวจสอบ	ตรวจสอบ (ส่ง)		หมายเหตุ
27 Sep 2022			27 Sep 2022		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
General					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Spectrophotometer					
<input type="checkbox"/>	<input type="checkbox"/>	6. แบตเตอรี่ (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวควบคุมความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
pH Meter and Conductivity Meter					
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาตั้งอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
Turbidimeter					
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการรบกวนของแสง (>= 2.5 ไม่นาน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
Automatic Titrator					
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

เพื่อคืนข้อมูลมา:

Mr. Chattuphon Folthong
Service Engineer

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CAL-FM-R31-03-20 Jul 2022



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
534/9 PATTANAKARN ROAD SU 15, SUANLUANG, SUANLUANG BANGKOK 10250
TEL: 0-2717-3000-27 FAX: 0-2719-9256



Cert.No.: 22CG3154
Page: 1 of 2

Certificate of Calibration

Equipment:	Burette
Capacity:	50 mL
Serial No.:	-
ID. No.:	BKK_END171
Manufacturer:	Witeg
Made in:	Germany
Submitted by:	ALS Laboratory Group (Thailand) Co., Ltd. 104 Phatthanakan 40, Phatthanakan Rd. Khwaeng Phatthanakan, Khol Suan Luang Bangkok 10250 Thailand
Ambient Temperature:	(20 ± 2.5) °C
Relative Humidity:	(50 ± 10) %
Barometric Pressure:	758 mmHg
Calibration Procedure:	ASTM E 542 - 01
Calibrated by:	Panward Pramkiam
Approved by:	
	() Pornthippa Tameyakul () Malee Butkruea (x) Panpan Paipim () Srisuda Khamthia
Issue Date:	31 August 2022

The Uncertainties are for a confidence probability of approximately 95%

This Certificate may not be reproduced either in full or in part without the prior written approval of the Issuer of Corporate Services J - Equipment Calibration and Testing Services

A 0044607



Equipment: Burette
Received Date: 26 August 2022
Condition As-Received: Used Item
Calibration Date: 30 August 2022
Reference: 2208-0918DSC-2

Cert.No.: 22CG3154
Page: 2 of 2

Condition of this result of calibration

- Reference Standard Instruments:

Instruments	Model	Serial No.	ID. No.	Certificate No.	Traceability	Due date
1) Balance	AE200S	N03879	140RC001	21MM429	NIMT	22 Sep 2022
2) Thermo-Hygrograph	THDX-CE	00016540	140EC001	22H1243	NIST, NIMT	09 June 2023
3) Thermometer	-	1594592	140EC010	221181	NIMT	10 Feb 2023
- This certification is traceable to SI Unit.
- The certificate is valid only to the item calibrated on date and place of calibration.
- 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
50	49.9959	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 %.

-000-

a 1123908



Metrological Center

SCI ECO Services Company Limited

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Bangkok Tel : +668 9205 8851 , +669 8247 2360
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T221644

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cold Room)

Manufacturer : KOLDTECH

Model : KM 320

Serial No. : TBN-1012061/05

Customer Code : BKK_EN0167

ID No. : T2463A3

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250

Customer Location : Environmental Laboratory

Date of Receipt : 27 June 2022

Calibrated By : Sujjar Nakhakred (Site Calibration Manager)

Approved By : [Signature] / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 8 JUL 2022

REVIEW BY [Signature]

APPROVED BY [Signature]

NEXT CAL DATE 30/12/23

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L14 117/01-02-04



Metrological Center

SCI ECO Services Company Limited

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Certificate No. T221644

Page 2 of 4

Calibration Report

Equipment : Chamber (Cold Room)

Date of Calibration : 30 June - 1 July 2022

Environment : Temperature : 18.9-23.7 °C
Line Voltage : 222.9-226.5 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986). All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN161-TN170	T210009	30 July 2022
TC	TYPE T	TN171-TN180	T210009	30 July 2022
DATA LOGGER	34970A	T149	T210009	30 July 2022

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TIS-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

Time Constant 3 Hour - Minute At 3 °C

Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max

☐ Close

☒ Not Available

5. Adjustment :

() without adjustment (X) after adjustment.

Approved By [Signature]

FM-L15 117/15-05-61



Metrological Center

SCI ECO Services Company Limited

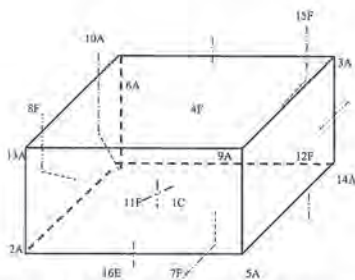
33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T221644

Page 3 of 4

Calibration Report



C = Centre, F = Centre of Face, A = Corner, E = Centre of Edge

1C =	TN161
2A =	TN162
3A =	TN163
4E =	TN164
5A =	TN165
6A =	TN166
7F =	TN167
8F =	TN168
9A =	TN169
10A =	TN170

11F =	TN171
12F =	TN172
13A =	TN173
14A =	TN174
15F =	TN175
16E =	TN176

Approved By [Signature]

FM-L15 117/15-05-61



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T221644

Page 4 of 4

Calibration Report

Measurement Results:

Calibration Point	Average Standard Reading at each position (°C)									
	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169	TN170
3	2.71	2.82	2.75	2.89	2.95	3.68	3.02	2.96	3.03	2.85
	TN171	TN172	TN173	TN174	TN175	TN176				
	2.97	3.02	2.89	3.04	2.97	3.33				

Chamber (Cold Room)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min, Max	Average					
3.0	2.9, 4.0	3.2	2.99	1.05	1.50	1.66	2.00

* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By [Signature]

FM-L15 117/15-05-61



SARTORIUS

Certificate of Calibration

Model Number : MSE224S-100-DU
Description : Analytical Balance
Serial Number : 27405555 ID# BKK_EN003
Manufacturer : Sartorius
Certificate No. : 22BC10226 rev1
Issued Date : Friday, November 18, 2022
Reference No. : 192263
Page No. : 1 of 2

Customer Name : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Suan Luang, Khet Suan Luang, Bangkok 10250

Calibrated Place : Lab Room

Calibrated By : Mr. Chonchai Inthana

Calibration Date : Wednesday, August 24, 2022

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 : 21.2 °C ± 5.0 °C
Humidity : 64.6 % RH ± 10.0 % RH
Pressure : —

Reasons for calibration

☐ New Installation ☐ Service / Required ☒ Re-calibration / Maintenance

Equipment Condition: ☒ Good Operable ☐ Fair

Measurement Method UKAS Publication Ref : Lab 14

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

Model Number	Description	Traceability	Certificate No.	Due Date
YCS011-522-00	Sartorius weight set 1mg - 5000g E2 YCS011-522-00	SPC-RT	C02212565	14-Sep-2023
MHB-382SD	Humidity/Barometer/Temp. Lutron MHB-382SD	SPC-RT	C19210498	31-Aug-2022

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.

SOP FM 33 03 February 2022

Mr. Chonchai Inthana (Technical Manager)

S
T
A
M
P



SARTORIUS

Certificate of Calibration

Model Number : MSE224S-100-DU
Description : Analytical Balance
Serial Number : 27405555 ID# BKK_EN003
Manufacturer : Sartorius
Certificate No. : 22BC10226 rev1
Issued Date : Friday, November 18, 2022
Reference No. : 192263
Page No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability		Eccentricity (Off-center loading error)	
The repeatability is the ability of a weighing instrument to display nearly identical readings under constant load conditions when the same load (or a measurement series) is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express repeatability quantitatively.		The off-center loading error is yielded by the difference between the residual 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 R111).	
Nominal Value : (Low Load)	20.0000 g	Nominal value :	100 g
20 g	20.0001 g	Tolerance	0.0001 g
Tolerance	0.0001 g		
Nominal Value : (High Load)	200.0000 g		
200 g	200.0000 g		
Tolerance	0.0001 g		
Standard Deviation	0.00005		

Linearity

The linearity, also called zero error, describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance 0.0002 g				
Nominal Value	Conventional Mass Value	Displayed Value	Deviation	Uncertainty
(g)	(g)	(g)	(g)	(g)
0.01	0.0100	0.0100	0.0000	0.00013
0.1	0.1000	0.1000	0.0000	0.00013
1	1.0000	1.0000	0.0000	0.00013
2	2.0000	2.0000	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	50.0001	0.0001	0.00013
100	100.0000	100.0000	0.0000	0.00013
200	200.0000	199.9999	-0.0001	0.00013

End of Report

SOP FM 33 03 February 2022

This Certificate is replacement with certificate No 22BC10226



Metrological Center

SCI ECO Services Company Limited

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Bangkok Tel : +668 9205 6851, +669 8247 2360
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T220139

Page 1 of 3

Certificate of Calibration

Equipment : Liquid Bath (Water)

Manufacturer : MEMMERT

Model : WNB29

Serial No. : L611.0135

Customer Code : BKK_EN0148

ID No. : T6455A4

Customer : ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : ORGANIC PREPARATION LAB

Date of Receipt : 26 January 2022

Calibrated By : Watcharapong Sangtong (Technician)

Approved By : / Sujjar Naknakred (Site Calibration Manager)

Date of Issue : 08 FEB 2022

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L14 11/01-02-94



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T. Banpa, A. Kaengkhoh, Saraburi 18110, Thailand.



Certificate No. T220139

Page 2 of 3

Calibration Report

Equipment : Liquid Bath (Water)
Date of Calibration : 31 January 2022
Environment : Temperature : 22.4-23.9 °C
Line Voltage : 221.4-225.4 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by using five resistance thermometer detectors into its water bath, (the other one thermocouple type T, use for ambient temperature measurement). The calibration was done in accordance with WIT-36 (based on ASTM E715-80 (Reapproved 2001)).

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
RTD	100 OHM	M34 (CH1-CH5)	T210115	2 February 2022
DATA LOGGER	34970A	T47	T210115	2 February 2022

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :

Time Constant : 1 Hour : Minute : At : 60 °C

5. Adjustment :

(X) without adjustment () after adjustment

Approved By :

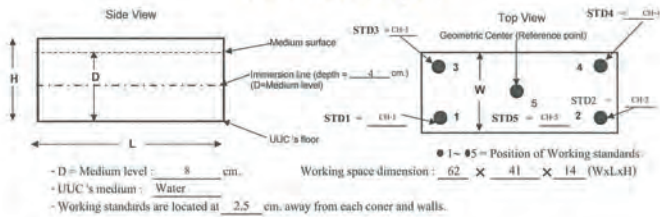
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PM-CT-11/01/15-05-02

Certificate No. T220139

Page 3 of 3

Calibration Report



Measurement Results:

Calibration Point	CH-1	CH-2	CH-3	CH-4	CH-5
60	59.95	60.04	60.12	60.01	59.89
85	85.17	84.89	85.34	84.78	84.93
95	93.46	93.14	93.81	93.05	93.28

Setting (°C)	Liquid Bath (Water)		Temperature Distribution			
	Min, Max	Average	Stability (°C)	Uniformity (°C)	Uncertainty (°C)	Coverage Factor k
61.0	60.9, 61	61.0	0.10	0.19	0.25	2.00
86.0	85.9, 86.1	86.0	0.12	0.39	0.32	2.06
95.0	94.8, 95.1	94.9	0.14	0.51	0.38	2.11

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 %.

Approved By:

FM-L15 (17)15-05-62

Certificate No. T222502

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Oven)

Manufacturer : Memmert

Model : UF 450

Serial No. : B7170531

Customer Code : BKK_EN0273

ID No. : T8042A4

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Oven Room

Date of Receipt : 23 November 2022

Calibrated By : Sujjar Nakhakred (Site Calibration Manager)

Approved By : /Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 9 DEC 2022

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.

FM-L1415151-08-64

Certificate No. T222502

Page 2 of 4

Calibration Report

Equipment : Chamber (Oven)

Date of Calibration : 29 November 2022

Environment : Temperature : 29.1-29.6 °C

Line Voltage : 221.3-223.2 V

Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine resistance thermometer detectors and nine standard thermocouples type T into its chamber, the other one resistance thermometer detector 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
RTD	100 ohm	27-CH1-10	T210004	30 December 2022
TC	TYPE T	TN261-TN270	T210010	30 December 2022
DATA LOGGER	34970A	T149	T210004	30 December 2022

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TIS-17025 CALIBRATION 0244).

4. Condition of calibrated item : good

Equipment Description :

Time Constant : 1 Hour 49 Minute At 104 °C
Fresh Air Damper : ☒ Open ☐ Min ☐ Medium ☒ Max
☐ Close
☐ Not Available

5. Adjustment :

() without adjustment (X) after adjustment

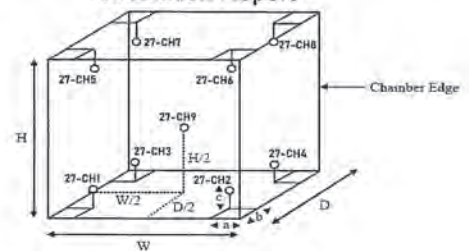
Approved By:

FM-L15 (17)15-05-62

Certificate No. T222502

Page 3 of 4

Calibration Report



Remark :

Internal Dimension of Chamber : W (Width) = 104 cm, H (Height) = 72 cm, and D (Depth) = 60 cm.
Size of Installed Standard sensor number 27-CH1 to number 27-CH9 : a = 5 cm, b = 5 cm, and c = 5 cm.
Size of Installed Standard sensor number 27-CHY : W/2 = 104 cm/2, H/2 = 72 cm/2, and D/2 = 60 cm/2

Measurement Results

Calibration Point	27-CH1	27-CH2	27-CH3	27-CH4	27-CH5	27-CH6	27-CH7	27-CH8	27-CH9
104	104.07	103.60	103.45	104.02	104.47	103.57	104.59	103.78	104.18

Setting (°C)	Chamber (Oven)		Temperature Distribution				
	Min, Max	Average	Average (°C)	Stability (°C)	Uniformity (°C)	Uncertainty (°C)	Coverage Factor k
104.0	-	104.0	103.97	0.07	0.70	0.42	2.00

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 %.

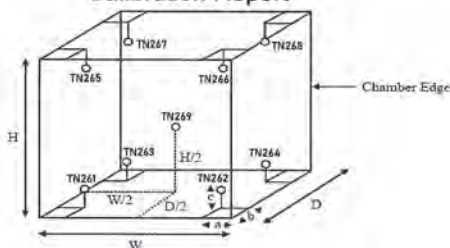
Approved By:

FM-L15 (17)15-05-62

Certificate No. T222502

Page: 4 of 4

Calibration Report



Remark :

Internal Dimensions of Chamber : W (Width) = 104 cm, H (Height) = 72 cm, and D (Depth) = 60 cm.
Size of Installed Standard sensor number TN261 to number TN268 : a = 5 cm, b = 5 cm, and c = 5 cm.
Size of Installed Standard sensor number TN269 : W/2 = 104 cm/2, H/2 = 72 cm/2 and D/2 = 60 cm/2

Measurement Results

Average Standard Reading at each position (°C)								
Calibration Point	TN261	TN262	TN263	TN264	TN265	TN266	TN267	TN268
180	179.14	179.17	179.65	179.36	180.41	179.64	181.18	180.99

Chamber (Oven)		Temperature Distribution					
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min, Max	Average					
180.0	-	180.0	179.98	0.38	1.78	1.10	2.00

* The quoted uncertainty exclude "uniformity"

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a distribution, providing a level of confidence of approximately 95 %.

Approved By:

FM-L15 11/7/15-05-63

Cert.No.: 23CH448
Page.: 1 of 2

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : Seven2Go S2
Serial No. : B617388431
ID No. : BKK_LG0004
Condition As-Received:
Received Date : 31 March 2023
Calibration Date : 03 April 2023
Reference : 2303-1080DSC-1
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 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)

Calibrated by : Walalak Sirithuan

Approved by :

(/) Malee Bulkruea
() Sathip Moangmai
() Warakorn Lemngtrakul

Issue Date : 5 April 2023

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.

A 0052849

Cert. No.: 23CH448
Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	22E2769	24 Aug 2023

This certification is traceable to the International System of Unit maintained at:-
- Traceable to National Institute of Metrology (Thailand), NIMT

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	863832	28 Dec 2024
pH 6.987	CPA chem	826589	09 July 2023
pH 10.010	CPA chem	863835	28 Dec 2023

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4,7,10)

Unit Under Calibration	Nominal Value		Standard Voltage Input		Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
	pH	mV	mV	pH	mV	pH		
pH Meter S/N.: B617388431	4.00	177.48	177	4.00	0.58	4.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	7.00	0.58	2.00
	10.00	-177.48	-178	10.00	0.58	10.00	0.58	2.00

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.: 2026288	4.008	4.02	183	0.0079	2.00
	6.987	6.99	10	0.011	2.00
	10.010	10.01	-166	0.0096	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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Malee

a 1156511

Cert. No.: 23LM84
Page.: 1 of 2

Certificate of Calibration

Equipment : pH Meter with Sensor
Manufacturer : Mettler Toledo
Model : Seven2Go S2
Serial No. : B617388431
ID No. : BKK_LG0004
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Location : TPA On Site Calibration Laboratory

Received Order : 31 March 2023
Calibrated Date : 11 April 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V

Calibrated by : Malee Bulkruea

Approved by :


() Pornthippa Tameyakul
(/) Suwit Imjai

Issue Date : 17 April 2023

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.

A 0053187



Equipment: pH Meter with Sensor
Condition As-Received: Used Item
Reference: 2303-1080DSC-2
Procedure Used :-

Cert. No.: 23LM84
Page: 2 of 2

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.
 The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Digital Thermometer	1502A	A52847	2211325	31 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.

Result of Calibration :- (°) Without Adjustment

Function : Temperature measurement.


This instrument was connected with temperature sensor, S/N.: 2026288

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
20.0	100	19.996	20.2	0.204	0.16	2.00
25.0	100	24.999	25.2	0.201	0.16	2.00
30.0	100	30.011	30.3	0.289	0.16	2.00
35.0	100	35.007	35.3	0.293	0.16	2.00
40.0	100	40.012	40.3	0.288	0.16	2.00
45.0	100	44.997	45.3	0.303	0.16	2.00
50.0	100	49.997	50.3	0.303	0.16	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 1157214

 Agilent CrossLab Compliance Services

Agilent CrossLab
 From Insight to Outcome

EQUIPMENT QUALIFICATION REPORT (EQR)

Agilent CrossLab Compliance

Qualification Type: ICPMS-QQ

System ID: JP12091612

EQP Name: AgilentRecommended

EQP Revision: ICPMS.02.50

EQP Publish Date: March 2020

Date: June 14, 2022 10:32:16 AM

Report Type: Report

Org. Name: ALS Laboratory Group (Thailand) Co.,Ltd.

Org. Location: 104 Phatthanakarn 40, Suan Luang, Bangkok 10250 Thailand.

REVIEW BY Tattaporn C.
 APPROVED BY Suwan N.
 NEXT CAL. DATE 11/12/23

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Integrated Sample Introduction System (ISIS) Check : ISIS2	9
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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Test Summary

Purpose

This section includes a status for each scheduled test and the overall qualification. For each test that is run, (1) the status is automatically determined based on pre-defined limits, and (2) the total number of times the test was run is displayed. For detailed results and specifications for a test, refer to the test results in this EQR.

Details	Status	Runs
Test		
Autosampler Check : ASX-520	Pass	1
Integrated Sample Introduction System (ISIS) Check : ISIS2	Pass	1
Autolune : G3281A	Pass	1
Background (No Gas Mode) : G3281A	Pass	1
Background (Gas Modes) : G3281A	Pass	1
20-Minute Stability (No Gas Mode) : G3281A	Pass	1
Overall Qualification Status		
Pass		

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Service Details

Purpose
This section includes local contact and delivery details for this service.

General Details	
Service Order No./Request:	6005218484
EQP Name:	AgilentRecommended
EQP Revision:	ICPMS.02.50
Report Type:	Report
Organization Details	
Name:	ALS Laboratory Group (Thailand) Co.,Ltd.
Location:	104 Phatthanakarn 40, Suon Luang, Bangkok 10250 Thailand.
Local Contact Details	
Name:	Khan Chatchanal
Job Title:	Lab Manager
Qualification Location:	Spectro Room
Operator Details	
Name:	Panluep Krasathain
Job Title:	Field Service Engineer
Data Acquisition Details	
Acquisition Software Name:	MassHunter
Acquisition Software Revision:	D.01.01
Customer Data System (CDS):	icpMs: MassHunter

Instrument Details

Purpose
This section describes the as found system configuration.

Details	
ICP-MS 1	
Manufacturer	Agilent Technologies
Name	7700x
Model Number	G3261A
Detector Type	SQ
Nebulizer	Mira Mist (G3161)
Spray Chamber	Quartz
Torch	Quartz
Sampling Cone	Ni
Skinmer Cone	Ni
Serial Number	JP12091612
Firmware Revision	D.01.01
ISIS 1	
Manufacturer	Agilent Technologies
Name	ISIS2
Model Number	G4911A
Installed Options	#003; 2 pumps, 1 valve, auto dilution and discrete sampling
Type	Peristaltic pump system
Autosampler 1	
Manufacturer	Agilent Technologies
Name	ASX-520
Model Number	G3265A
Serial Number	G31403AB20
Chiller 1	
Manufacturer	Agilent Technologies
Name	Chiller
Model Number	G3292A
Serial Number	4N1220700

Calculation Formulas

Purpose
This section includes calculation formulas for all available tests. Depending upon which tests are scheduled, all or some apply to your qualification.

For a description of calculations for ICP-MS tests performed by the MassHunter software, refer to the MassHunter application and documentation.

Protocol Details

Purpose
This section lists the revisions for all test units used in this report. For complete test-specific and high-level change details, refer to the Revision History document.

Test Revision	Test
ICPMS.02.50	20-Minute Stability (No Gas Mode)
ICPMS.02.50	Autosampler Check
ICPMS.02.50	Autotune
ICPMS.02.50	Background (Gas Mode)
ICPMS.02.50	Background (No Gas Mode)
ICPMS.02.50	Integrated Sample Introduction System (ISIS) Check

Autosampler Check

Purpose

This test demonstrates that the autosampler module is correctly installed and connected. It does not test module performance.

Setpoint

Results	Criteria	Observed Result	Expected Result	Status
After the self test, is probe in the home position?		Yes	Yes	Pass
As commanded, is the probe positioned at vial 2?		Yes	Yes	Pass
Setpoint Status:	Pass			Runs: 1

Overall Autosampler Check Test Status

Pass

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Integrated Sample Introduction System (ISIS) Check

Purpose

This test demonstrates that the ISIS module is correctly installed and connected. It does not test module performance.

Setpoint

Results	Criteria	Observed Result	Expected Result	Status
As commanded, does the pump rotate?		Yes	Yes	Pass
As commanded, do the valves load and inject?		Yes	Yes	Pass
Setpoint Status:	Pass			Runs: 1

Overall Integrated Sample Introduction System (ISIS) Check Test Status

Pass

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Autotune

Purpose

This test uses traceable checkout standards to run a software-executed autotune in all modes. The tune report provides values for peak width, mass axis, sensitivity, oxide species, and doubly-charged species tests.

Setpoint

Results	Criteria	Observed Result	Expected Result	Status
Peakwidth Mass 7		0.735	AMU	
Agilent Recommended:		>= 0.65	<= 0.80	
Status:	Pass			
Peakwidth Mass 89		0.732	AMU	
Agilent Recommended:		>= 0.65	<= 0.80	
Status:	Pass			
Peakwidth Mass 205		0.746	AMU	
Agilent Recommended:		>= 0.65	<= 0.80	
Status:	Pass			
Mass Axis 7		7.00	AMU	
Agilent Recommended:		>= 6.9	<= 7.1	
Status:	Pass			
Mass Axis 89		89.00	AMU	
Agilent Recommended:		>= 86.9	<= 89.1	
Status:	Pass			
Mass Axis 205		205.00	AMU	
Agilent Recommended:		>= 204.9	<= 205.1	
Status:	Pass			

Date: June 14, 2022 10:32:16 AM
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Mass 7 Sensitivity No Gas	81.18	Mcps/ppm
Agilent Recommended:	>= 25.5	
Status:	Pass	
Mass 89 Sensitivity No Gas	247.61	Mcps/ppm
Agilent Recommended:	>= 85	
Status:	Pass	
Mass 205 Sensitivity No Gas	164.67	Mcps/ppm
Agilent Recommended:	>= 51	
Status:	Pass	
Mass 59 Sensitivity He	84.66	Mcps/ppm
Agilent Recommended:	>= 20.4	
Status:	Pass	
Oxide Ratio 156/140	1.118	%
Agilent Recommended:	<= 1.36	
Status:	Pass	
Doubly Charged Species Ratio 70/140	1.140	%
Agilent Recommended:	<= 2.3	
Status:	Pass	

Setpoint Status: Pass Runs: 1

Overall Autotune Test Status

Pass

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Background (No Gas Mode)

Purpose

This test examines the background of the ICP-MS in no gas mode by monitoring ions during a blank run.

Setpoint

Conditions

Masses: 7 AMU
89 AMU
205 AMU

Measurements and Results

Masses (AMU):

Measured Value:

Agilent Recommended:

Status:



Setpoint Status: Pass

Runs: 1

Overall Background (No Gas Mode) Test Status:

Pass

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Background (Gas Mode)

Purpose

This test examines the background of the ICP-MS in the various gas modes by monitoring ions during a blank run.

Setpoint

Gas Mode: Helium

Conditions

Mass: 78 AMU
Integration Time: 1.0 sec
Cycles: 20

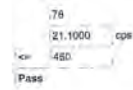
Measurements and Results

Mass (AMU):

Measured Value:

Agilent Recommended:

Status:



Setpoint Status: Pass

Runs: 1

Overall Background (Gas Mode) Test Status:

Pass

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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20-Minute Stability (No Gas Mode)

Purpose

This test monitors the abundance of ions present in the checkout standard over a 20-minute period to verify that the signal is stable. The %RSD of the abundance of given ions is calculated internally by the software and compared to the limit.

Setpoint

Conditions

Mode: Spectrum
Masses: 7, 9, 89, 140, 205
Integration Time: 9.99 sec
Peak Pattern: 3 points/peak
Repetitions: 20
Sweeps/Replicates: 100

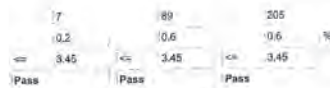
Measurements and Results

Masses (AMU):

Stability RSD:

Agilent Recommended:

Status:



Setpoint Status: Pass

Runs: 1

Overall 20-Minute Stability (No Gas Mode) Test Status:

Pass

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Declaration of Change Control

This document is under change control. Revision history is maintained and printed on each document. Access to the master documents is limited to process owners. Documents receive periodic review and cannot be assigned an evergreen status. The qualification performed according to this document refers only to the hardware/software configuration in place at the time of the qualification. Agilent Technologies recommends that instrument configuration change management procedures be in place in order to maintain the validation process. Any changes to the analytical or computer hardware or software must be clearly specified. A change management system provides a means for determining the degree of requalification required according to the extent of the changes made. All details of the changes must be thoroughly recorded and documented, together with details of completed tests and their results. Note: Hardware/software configuration management is the customer's responsibility.

Date: June 14, 2022 10:32:16 AM
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Attachments

Training requirements note: The delivery engineer attaches an ACE technique-specific training certificate to the Equipment Qualification Report (EQR). Obtaining ACE technique-specific certification includes pre-requisite trainings for Data Integrity, General Compliance topics (GMP, GLP, ALCOA, etc.), instrument hardware and software components, and the ACE technique itself. The one certificate encompasses all pre-requisite trainings as documented in the Agilent Learning Management System called Success Factors.


Location	Category	Document Name	Page
EQR	General	Certificate of System Qualification	17
EQR	General	Operator's training certificate and qualifications	18
EQR	General	Certificate of Qualification for ACE	19
EQR	General	Certificate of Qualification for ACE	20
EQR	General	Tune reports	21
EQR	General	Test Report	24
EQR	General	Test Report	25

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Certificate of System Qualification

 Agilent Technologies

Agilent Compliance Engine Self Qualification

Date: September 16, 2021 4:58:15 PM
Drive Serial #: AGA29508 Platform Revision: ACE 3.11

Individual self-qualification reports for each specific technique installed are also available upon request. They provide additional details on the general report from the concise summary and are generated by the actual algorithms developed during the process. There is not a one-to-one relationship between algorithms and OQ program tests, because some algorithms are used by several tests and across multiple similar hardware components of the qualified systems.

Technique Type	Tests Completed	Result
Atomic Absorption	7	Confirms
Capillary Electrophoresis	10	Confirms
Distillation	6	Confirms
Emission Spectroscopy	5	Confirms
Gas Chromatography - GC/MS	17	Confirms
Gas Chromatography	29	Confirms
Gas Permeation Chromatography	8	Confirms
ICP-MS	6	Confirms
Infrared Spectroscopy	7	Confirms
Liquid Chromatography	17	Confirms
Liquid Chromatography - LC/MS	9	Confirms
Monofluoride	18	Confirms
Sample Preparation - Gas Chromatography	3	Confirms
Sample Preparation - Liquid Chromatography	6	Confirms
Supercritical Fluid Chromatography	15	Confirms
Software	6	Confirms
UV-Vis Spectrophotometer	13	Confirms

Overall Qualification Status:
Confirms

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Operator's training certificate and qualifications

 Agilent Technologies

Certificate of Completion

Learnr Name: Prashant Bhatnagar

Title Of Course: AN-CE-4/CPMS-2-017-B/7800/7800s ICP-MS Instr., OpenJLW.S/W & DO/FV

Completion Date: November 22, 2012

Certified By Company: Learning at Agilent

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Certificate of Qualification for ACE

 Agilent Technologies

Certificate of Completion

Learnr Name: Prashant Bhatnagar

Title Of Course: AN-CE-SS-1-010-A: ACE 3.X User Update Training

Completion Date: July 7, 2020

Certified By Company: Learning at Agilent

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Certificate of Qualification for ACE

Agilent Technologies

Certificate of Completion

Lesson Name: Pauliney Kuratstein

Title Of Course: AN-CE-ICPMS-2-015-IF: CrossLab Compliance Hardware Specific Delivery for Agilent ICP-MS Systems

Completion Date: October 31, 2020

Certified By Courseway: Learning at Agilent

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091812

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General


Document Name: Tune reports

Tune Report

Operator Name: Supriya Mah
Any/Gen Set: C:\Agilent\ICPMS\1\Users\Tula.B
Acq. Date-Time: 6/14/2022 9:53:15 AM
Report Comment: PMOD 14 June 2022
Instrument Name: Q2031A-SP12091812

[No Gen]

Sensitivity

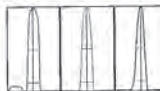


Time	Height	Area	Height	Height
1	10000	6116	15950	18880
10	10000	7470	11120	11180
20	10000	12457	15850	15450

Sampling Period (sec): 0.211
Integration Time (sec): 0.1

Gas/Carrier Charged Ratio:
On/Off: 158 / 146 : 1.15 %
Duty Cycle Charged: 75 / 140 : 1.54 %

Headspace/Headspace



Time	Peak Height	Area	Height	Height
1	10000	11	10000	10000
10	10000	11	10000	10000
20	10000	11	10000	10000

Integration Time (sec): 0.1
Acquisition Time (sec): 22.75
Y Axis: Linear

Tune Parameters

Parameter	Value	Unit	Parameter	Value	Unit
Plasma Mode	—		Headspace Gas	1.05 L/min	
RF Power	1500 W		Gasoline Gas	—	
RF Modulation	1.60 V		Headspace Temp	0.16 °C	
Sample Depth	8.0 mm		SG Temp	2 °C	
Line Parameters			Direct Limit	3.8 V	
Exhaust 1	0.0 V		Cell Entrance	-38 V	
Exhaust 2	-180.0 V		Cell Exit	-89 V	
Exhaust 3	-89 V		Cell Parameters		
Cell Gas	—		Cell Gas Flow	—	
Cell Flow	0.0 mL/min		Cell Gas	0.0 V	
			Energy Discrimination	0.0 V	

1 of 5 6/14/2022 9:53 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091812

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Document Name: Tune reports

Tune Report

IC Flow: —
QF Parameters: —
Mass Gain: 152
Mass Offset: 123


Hardware Settings

Tube: —
Tube H: 4.4 mm
Tube V: 0.0 mm

EM: —
Electrode: 4.5 mm
Analog HV: 1100 V
Pulse HV: 035 V

[PM]

Sensitivity



Time	Height	Area	Height	Height
1	10000	6441	15360	18700
10	10000	10701	11120	11180
20	10000	12457	15850	15450

Sampling Period (sec): 0.211
Integration Time (sec): 0.1

Gas/Carrier Charged Ratio:
On/Off: 158 / 146 : 1.15 %
Duty Cycle Charged: 75 / 140 : 1.54 %

Tune Parameters

Parameter	Value	Unit	Parameter	Value	Unit
Plasma Mode	—		Headspace Gas	1.05 L/min	
RF Power	1500 W		Gasoline Gas	—	
RF Modulation	1.60 V		Headspace Temp	0.16 °C	
Sample Depth	8.0 mm		SG Temp	2 °C	
Line Parameters			Direct Limit	3.8 V	
Exhaust 1	0.0 V		Cell Entrance	-38 V	
Exhaust 2	-180.0 V		Cell Exit	-89 V	
Exhaust 3	-89 V		Cell Parameters		
Cell Gas	—		Cell Gas Flow	—	
Cell Flow	0.0 mL/min		Cell Gas	0.0 V	
			Energy Discrimination	0.0 V	

QF Parameters: —
Mass Gain: 152
Mass Offset: 123

Hardware Settings

Tube: —
Tube H: 4.4 mm
Tube V: 0.0 mm

1 of 5 6/14/2022 9:53 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091812

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Document Name: Tune reports

Tune Report

EM: —
Electrode: 4.5 mm
Analog HV: 1100 V
Pulse HV: 035 V

1 of 5 6/14/2022 9:53 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091812

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General

Document Name: Test Report

Batch Summary Report							
Batch Folder:		D:\Agilent_Software\MSDC\15-6-22\MS_1451					
Analysis File:		B0744003346					
Test Step:		#1 Top					
Run	Analysis Time	Sample Name	Time	Level	Stability		
1	6/14/2022 10:03:39 AM	B0744003346	1.00 min	Sample		1.0000	

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6/14/2022 10:03:39 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Document Name: Test Report

Batch Summary Report							
Analysis Title:		MS - 1 Top					
Sample Name	CPS	CPS STD	CPS	CPS STD	CPS	CPS STD	CPS
1.00 min	15.1000		15.1000		15.1000		15.1000

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6/14/2022 10:03:39 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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General

Document Name: Test Report

Batch Summary Report							
Batch Folder:		D:\Agilent_Software\MSDC\15-6-22\OQ_20 MS_01					
Analysis File:		OQ_20 MS_01					
Test Step:		#1 Top					
Run	Analysis Time	Sample Name	Time	Level	Stability		
1	6/14/2022 9:55:27 AM	B0744003346	2.00 min	Sample		1.0000	

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6/14/2022 9:55:27 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Document Name: Test Report

Batch Summary Report							
Analysis Title:		MS - 1 Top					
Sample Name	CPS	CPS STD	CPS	CPS STD	CPS	CPS STD	CPS
1.00 min	15.1000		15.1000		15.1000		15.1000

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6/14/2022 9:55:27 AM

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Electronic Signature

Purpose

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Details

Full Name of Signer: Panthep Kumasthain
Logged On User Name: panthep_kumasthain@agilent.com
Signature Creation Date: June 14, 2022
Reason for Signature: Executed protocol and published this original version of document

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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User Name: panthep_kumasthain

Username: ASB00007212

System ID: JP12091612

Print Date: June 14, 2022 10:32:20 AM

ALS OQHW 7708 14-Jun-2022 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:14:43 AM Audit		Session Created	Session	None
June 14, 2022 10:14:43 AM Start		Configuration	Session	None
June 14, 2022 10:14:43 AM Audit		Exit/Logout	Linking	User is Field Engineer and does not require an unlock code
June 14, 2022 10:19:18 AM Audit		Sign/Logout	Session	EQP data is for primary technique (ICPMS) - File path: [Protocol\Records\Signatures\Configurations\22_0614_10_19_18_00_00_00] EQP File Name: [Sign_02_50_00], EQP Name: [AgilentRecommended]
June 14, 2022 10:19:20 AM End		Configuration	Session	None
June 14, 2022 10:19:24 AM Start		Qualification	Session	IQ
June 14, 2022 10:19:24 AM Start		Execution	Autosampler Check : ASD-500	None (Autosampler Check)
June 14, 2022 10:19:42 AM End		Execution	Autosampler Check : ASD-500	Run Count : 1 (Autosampler Check)
June 14, 2022 10:19:43 AM Start		Execution	Integrated Sample Introduction System (ISIS) Check : ISIS2-Integrated Sample Introduction System (ISIS) Check	None
June 14, 2022 10:19:47 AM End		Execution	Integrated Sample Introduction System (ISIS) Check : ISIS2-Integrated Sample Introduction System (ISIS) Check	Run Count : 1
June 14, 2022 10:19:59 AM Start		Execution	Autotune : Q3281A: Autotune 1	None
June 14, 2022 10:22:22 AM End		Execution	Autotune : Q3281A: Autotune 1	Run Count : 1

Page 1/2

Page 1 / 2

Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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User Name: panthep_kumasthain
Username: ASB00007212

System ID: JP12091612
Print Date: June 14, 2022 10:32:39 AM

ALS OQHW 7708 14-Jun-2022 Transaction Log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:22:24 AM Start		Execution	Background (No Gas Mode) : Q3281A: No Gas Mode Background 1	None
June 14, 2022 10:22:49 AM End		Execution	Background (No Gas Mode) : Q3281A: No Gas Mode Background 1	Run Count : 1
June 14, 2022 10:22:49 AM Start		Execution	Background (Gas Mode) : Q3281A: Gas Mode Background Helium	None
June 14, 2022 10:23:35 AM End		Execution	Background (Gas Mode) : Q3281A: Gas Mode Background Helium	Run Count : 1
June 14, 2022 10:23:37 AM Start		Execution	20-Minute Stability (No Gas Mode) : Q3281A: 20-Minute Stability (No Gas Mode) 1	None
June 14, 2022 10:24:08 AM End		Execution	20-Minute Stability (No Gas Mode) : Q3281A: 20-Minute Stability (No Gas Mode) 1	Run Count : 1
June 14, 2022 10:24:08 AM End		Qualification	Session	IQ
June 14, 2022 10:24:08 AM Start		Reporting	Session	None
June 14, 2022 10:30:26 AM Audit		Reporting	Session	Report Generated : CellBase
June 14, 2022 10:30:38 AM Audit		Reporting	Session	Report Generated : Report

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Date: June 14, 2022 10:32:16 AM
System ID: JP12091612

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Certificate of System Qualification

ICPMS-QQ

System ID: JP12091612
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Phatthanakarn 40, Suan Luang, Bangkok 10250 Thailand.

Date: June 14, 2022 10:32:51 AM
EQP Name: AgilentRecommended
EQP Revision: ICPMS.02.50
Overall Qualification Status: Pass

Autosampler Check

Overall Autosampler Check Test Status

Pass

Integrated Sample Introduction System (ISIS) Check

Overall Integrated Sample Introduction System (ISIS) Check Test Status

Pass

Autotune

Peakwidth Mass 7	Pass
Peakwidth Mass 89	Pass
Peakwidth Mass 205	Pass
Mass Axis 7	Pass
Mass Axis 89	Pass
Mass Axis 205	Pass
Mass 7 Sensitivity No Gas	Pass
Mass 89 Sensitivity No Gas	Pass
Mass 205 Sensitivity No Gas	Pass
Mass 59 Sensitivity He	Pass
Oxide Ratio 156/140	Pass
Doubly Charged Species Ratio 70/140	Pass

Overall Autotune Test Status

Pass

Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Background (No Gas Mode)

Setpoint Status: Pass

Masses (AMU):	7	89	205
Measured Value:	4,900	7,100	18,400 cps
Agilent Recommended:	10	10	30
Status:	Pass	Pass	Pass

Overall Background (No Gas Mode) Test Status

Pass

Background (Gas Mode)

Gas Mode: Helium

Setpoint Status: Pass

Mass (AMU):	78
Measured Value:	21,100 cps
Agilent Recommended:	480
Status:	Pass

Overall Background (Gas Mode) Test Status

Pass

20-Minute Stability (No Gas Mode)

Masses (AMU):	7	89	205
Stability RSD:	0.2	0.6	0.6 %
Agilent Recommended:	3.45	3.45	3.45
Status:	Pass	Pass	Pass

Overall 20-Minute Stability (No Gas Mode) Test Status

Pass

Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Instrument Details

Purpose

This section describes the as found system configuration.

Details

ICP-MS 1

Manufacturer:	Agilent Technologies
Name:	7700x
Model Number:	G3281A
Detector Type:	SQ
Nebulizer:	Mira Mist (G3101)
Spray Chamber:	Quartz
Torch:	Quartz
Sampling Cone:	Ni
Skinner Cone:	Ni
Serial Number:	JP12091612
Firmware Revision:	D.01.01

ISIS 1

Manufacturer:	Agilent Technologies
Name:	ISIS2
Model Number:	G4911A
Installed Options:	#003: 2 pumps, 1 valve, auto dilution and discrete sampling
Type:	Peristaltic pump system

Autosampler 1

Manufacturer:	Agilent Technologies
Name:	ASX-520
Model Number:	G3286A
Serial Number:	031403A520

Chiller 1

Manufacturer:	Agilent Technologies
Name:	Chiller
Model Number:	G3292A
Serial Number:	4N1229700

Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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Electronic Signature

Purpose

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Details

Full Name of Signer:	Panthep Kurasthai
Logged On User Name:	panthep_kurasthai@agilent.com
Signature Creation Date:	June 14, 2022
Reason for Signature:	Executed protocol and published this original version of document

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Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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User Name: panthep_kurasthai
Username: ASXXXXX213
System ID: JP12091612
Print Date: June 14, 2022 10:32:51 AM

ALS QGRY F180 14Jun2022 Transaction log:

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:14:43 AM Audit	SessionCreated	Session	Session	None
June 14, 2022 10:14:43 AM Exec	Configuration	Session	Session	None
June 14, 2022 10:14:43 AM Audit	Entered	Loading	Session	User is PantEngineer and status not require an priority code
June 14, 2022 10:18:18 AM Audit	Entered	Session	Session	EQP details for primary exclusive profile - File path: Protocol\Protocol\MuConfig\autosam02.10\rights.02.50.e ig; EQP File Name: (ICM) 02.50.4eq; EQP Name: (AgilentRecommended)
June 14, 2022 10:19:20 AM (Int)	Configuration	Session	Session	None
June 14, 2022 10:19:24 AM Start	Qualification	Session	Session	OD
June 14, 2022 10:19:24 AM Start	Execution	Autosampler Check: ASX-520	Session	None
June 14, 2022 10:19:42 AM End	Execution	Autosampler Check: ASX-520	Session	None
June 14, 2022 10:19:43 AM Start	Execution	Autosampler Check: ASX-520	Session	None
June 14, 2022 10:19:47 AM End	Execution	Integrated Sample Introduction System (ISIS) Check: ISIS; Integrated Sample Introduction System (ISIS) Check	Session	None
June 14, 2022 10:19:50 AM Start	Execution	Autosampler Check: ASX-520	Session	None
June 14, 2022 10:22:02 AM End	Execution	Autosampler Check: ASX-520	Session	None

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Date: June 14, 2022 10:32:51 AM
System ID: JP12091612

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User Name: paritad_koravithorn
Hostname: ASB6000313
System ID: JP12001812
Print Date: June 14, 2022 10:32:51 AM

ALS OQRW 7706 14Jun2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:22:24 AM Start	Execution	Background (No Gas Mode)	None	
June 14, 2022 10:22:49 AM End	Execution	Background (No Gas Mode)	Run Count: 1	
June 14, 2022 10:22:49 AM Start	Execution	Background (Gas Mode)	None	
June 14, 2022 10:23:35 AM End	Execution	Background (Gas Mode)	Run Count: 1	
June 14, 2022 10:23:37 AM Start	Execution	20-Minute Stability (No Gas Mode)	None	
June 14, 2022 10:24:09 AM End	Execution	20-Minute Stability (No Gas Mode)	Run Count: 1	
June 14, 2022 10:24:09 AM End	Quiescence	Session	OK	
June 14, 2022 10:24:09 AM Start	Reporting	Session	None	
June 14, 2022 10:30:29 AM Audit	Reporting	Session	Report Generated: Certificate	
June 14, 2022 10:30:30 AM Audit	Reporting	Session	Report Generated: Report	

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Date: June 14, 2022 10:32:51 AM
System ID: JP12001812

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User Name: paritad_koravithorn
Hostname: ASB6000313
System ID: JP12001812
Print Date: June 14, 2022 10:32:51 AM

ALS OQRW 7706 14Jun2022 Transaction log :

Time	Transaction State	Activity Performed	Type of Transaction	Optional Information
June 14, 2022 10:32:29 AM Audit	Reporting	Session		Report signed: Present PDF Name: ALS OQRW-7706 14Jun2022_20220614_OC Report_1.pdf User Name: paritad_koravithorn@agilent.com Full Name of Signer: Paritad Koravithorn Reason for signature: Extended protocol test published into original version of document

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Date: June 14, 2022 10:32:51 AM
System ID: JP12001812

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Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhloi, Saraburi 18110
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T220730

Page 1 of 6

Certificate of Calibration

Equipment : HEATING BLOCK
Manufacturer : Environmental Express
Model : SC 196
Serial No. : 6974CECW3285
Customer Code : BKK_EL0054
ID No. : TS306A3
Customer : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250
Customer Location : Acid Digestion Lab
Date of Receipt : 30 March 2022
Calibrated By : Watcharapong Sangtong (Technician)
Approved By : / Sujar Nakhakred (Site Calibration Manager)
Date of Issue : 12 APR 2022

REVIEW BY
APPROVED BY
NEXT CAL. DATE 7/10/23

The uncertainties are for a confidence probability of approximately 95%.

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FM-L12 109/30-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhloi, Saraburi 18110
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T220730

Page 2 of 6

Calibration Report

Equipment : HEATING BLOCK
Date of Calibration : 7 April 2022
Environment : Temperature : 21.8-23.1 °C
Line Voltage : 221.6-226.3 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

- This equipment was calibrated by insert nine standard thermocouples type T into its chamber, the other one standard thermocouples type T use for ambient temperature measurement. The calibration was done in according to WI-T20.
All data show below were final values and the initial data from customer request. The temperature scale used was based on ITS-90.
- Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN221-TN230	T210008	08 June 2022
TC	TYPE T	TN231-TN240	T210008	08 June 2022
DATA LOGGER	34970A	T149	T210008	08 June 2022
- This certificate is traceable to : National Institute of Metrology (Thailand) through Metrological Center (NSC-TIS-TIS 17025 CALIBRATION 0244.)
- Condition of calibrated item : good
Equipment Description :
Time Constant : 2 Hour 25 Minute At 95 °C
Fresh Air Damper : ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available
- Adjustment :
() without adjustment (X) after adjustment

Approved By:

FM-L13 108/30-05-57



Metrological Center

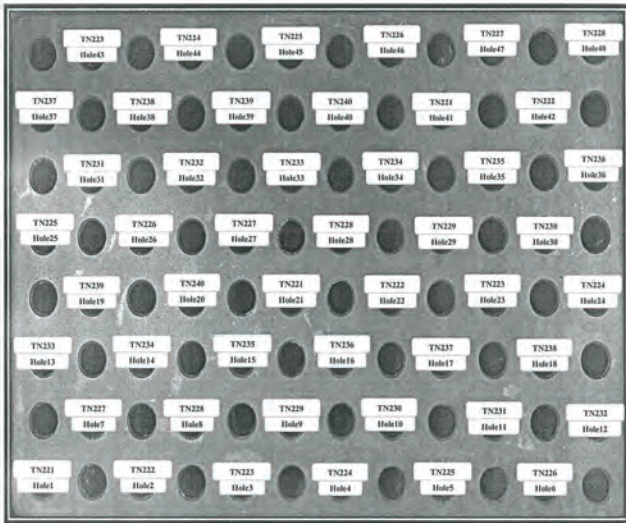
SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T220730

Page 3 of 6

Calibration Report



FRONT CONTROL

Approved By.

FM-L13 108/30-05-57



Metrological Center

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Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T220730

Page 4 of 6

Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6		TN221	TN222	TN223	TN224	TN225	TN226
CAL. POINT	Max	93.60	93.82	94.05	94.20	94.36	94.26
	Min	93.07	93.26	93.51	93.66	93.82	93.71
	Average	93.33	93.54	93.78	93.93	94.09	93.98
R2 Hole7-Hole12		TN227	TN228	TN229	TN230	TN231	TN232
	Max	94.59	94.79	94.63	94.55	94.82	95.00
	Min	94.05	94.25	94.08	93.97	94.26	94.44
	Average	94.32	94.52	94.36	94.26	94.54	94.72
R3 Hole13-Hole18		TN233	TN234	TN235	TN236	TN237	TN238
	Max	95.03	94.54	94.76	94.84	95.06	94.73
	Min	94.46	93.98	94.20	94.28	94.49	94.18
	Average	94.74	94.26	94.49	94.56	94.78	94.45
R4 Hole19-Hole24		TN239	TN240	TN221	TN222	TN223	TN224
	Max	94.89	94.82	95.73	95.85	95.73	96.10
	Min	94.33	94.26	95.51	95.62	95.51	95.85
	Average	94.61	94.54	95.62	95.73	95.62	95.97
R5 Hole25-Hole30		TN225	TN226	TN227	TN228	TN229	TN230
	Max	96.28	96.39	96.37	96.54	96.19	96.04
	Min	96.01	96.10	96.02	96.20	95.89	95.71
	Average	96.15	96.24	96.20	96.37	96.04	95.88
R6 Hole31-Hole36		TN231	TN232	TN233	TN234	TN235	TN236
	Max	96.84	96.97	97.03	96.48	96.33	95.76
	Min	96.53	96.65	96.71	96.08	95.98	95.43
	Average	96.68	96.81	96.87	96.28	96.16	95.60
R7 Hole37-Hole42		TN237	TN238	TN239	TN240	TN221	TN222
	Max	96.46	96.15	96.19	96.06	96.95	97.09
	Min	96.13	95.84	95.85	95.72	96.64	96.78
	Average	96.30	95.99	96.02	95.89	96.80	96.93
R8 Hole43-Hole48		TN223	TN224	TN225	TN226	TN227	TN228
	Max	96.91	96.58	96.13	96.19	96.34	96.19
	Min	96.55	96.21	95.80	95.87	96.03	95.88
	Average	96.73	96.40	95.96	96.03	96.18	96.03

Approved By.

FM-L13 108/30-05-57



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110
Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109
Website : www.scieco.co.th E-Mail : calibrate@scg.co.th

Certificate No. T220730

Page 5 of 6

Calibration Report

Measurement Results

Calibration Point		Average Standard Reading at each position (°C)					
R1 Hole1-Hole6		TN221	TN222	TN223	TN224	TN225	TN226
CAL. POINT	Max	104.47	104.65	104.79	105.31	105.47	105.46
	Min	104.15	104.27	104.45	104.98	105.14	105.20
	Average	104.31	104.46	104.62	105.15	105.31	105.33
R2 Hole7-Hole12		TN227	TN228	TN229	TN230	TN231	TN232
	Max	105.55	105.73	105.65	105.84	105.97	106.07
	Min	105.28	105.43	105.35	105.52	105.68	105.83
	Average	105.42	105.58	105.50	105.68	105.82	105.95
R3 Hole13-Hole18		TN233	TN234	TN235	TN236	TN237	TN238
	Max	106.14	106.06	105.81	106.05	105.81	105.87
	Min	105.85	105.81	105.55	105.80	105.53	105.64
	Average	106.00	105.94	105.68	105.92	105.67	105.75
R4 Hole19-Hole24		TN239	TN240	TN221	TN222	TN223	TN224
	Max	105.86	105.60	104.44	104.51	104.28	104.78
	Min	105.61	105.37	104.27	104.35	104.12	104.61
	Average	105.74	105.48	104.35	104.43	104.20	104.69
R5 Hole25-Hole30		TN225	TN226	TN227	TN228	TN229	TN230
	Max	104.94	104.93	104.97	105.08	104.68	104.69
	Min	104.77	104.75	104.76	104.90	104.51	104.49
	Average	104.85	104.84	104.86	104.99	104.60	104.59
R6 Hole31-Hole36		TN231	TN232	TN233	TN234	TN235	TN236
	Max	105.44	105.45	105.61	104.95	104.84	104.42
	Min	105.27	105.27	105.44	104.76	104.66	104.25
	Average	105.36	105.36	105.53	104.86	104.75	104.33
R7 Hole37-Hole42		TN237	TN238	TN239	TN240	TN221	TN222
	Max	105.17	104.70	104.59	104.51	105.22	105.53
	Min	105.00	104.53	104.41	104.35	105.04	105.37
	Average	105.08	104.62	104.50	104.43	105.13	105.45
R8 Hole43-Hole48		TN223	TN224	TN225	TN226	TN227	TN228
	Max	105.61	105.45	105.10	104.77	104.87	105.02
	Min	105.44	105.28	104.92	104.60	104.70	104.85
	Average	105.53	105.37	105.01	104.69	104.79	104.93

Approved By.

FM-L13 108/30-05-57



Metrological Center

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Certificate No. T220730

Page 5 of 6

Calibration Report

Measurement Results:

HEATING BLOCK			Temperature Distribution	
Setting (°C)	Reading (°C)		Stability (±°C)	Uncertainty (±°C)
	Min , Max	Average		
100.0	100.0 , 100.4	100.1	0.29	0.83
105.0	105.0 , 105.4	105.1	0.20	0.79

* The quoted uncertainty exclude * uniformity *

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 %.

Approved By.

FM-L13 108/30-05-57

HACH COMPANY

C/O AB Sciex (Thailand) Limited, Building D Room No. 03 11, 3rd Floor, No. 735/4, Srinakarin Road, Pattanakarn, Suanluang, Bangkok
 Phone +66 (02) 026-3529 Ext. 0 | Fax +66(02) 026-3572 | www.sea.hach.com

LABX 2300072

Test Report

Customers	: ALS Laboratory Group (Thailand) Co., Ltd.	Manufacturer	: HACH
Equipment	: Chlorine Meter	Sensor Model	: -
Controller Model	: DR300	Sensor Serial No.	: BKK_LG0042
Controller Serial No.	: 20080800004	Period	: 1 Year
Date of test	: 19/01/2023	Humidity	: 60.0 %RH
Environment temperature	: 25.0 °C		

Results

Instrument Checked

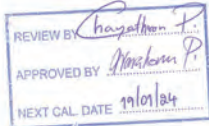
Item	Characteristic	Before	After	Remark
1	Visual Inspect	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
2	Power Supply (4.5 ~ 8.0 VDC)	6.0 VDC	6.0 VDC	
3	Display Check	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
4	Keyboard Check	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
5	Function System Program	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	

Warning and Error Checked

Item	Event	Before	After
6	Error list	<input checked="" type="checkbox"/> None <input type="checkbox"/> Appear	<input checked="" type="checkbox"/> None <input type="checkbox"/> Appear

Check with Standard

Item	Characteristic	Before	After	Remark
DPD-CHLORINE-LR				
7	Blank (0.00 mg/l)	0.00 mg/l	0.00 mg/l	
8	Standard C2 No. 1 (0.23 ± 0.08 mg/l)	0.21 mg/l	0.23 mg/l	
9	Standard C2 No. 2 (0.89 ± 0.10 mg/l)	0.85 mg/l	0.88 mg/l	
10	Standard C2 No. 3 (1.64 ± 0.14 mg/l)	1.60 mg/l	1.63 mg/l	
DPD-CHLORINE-HR				
11	Blank (0.0 mg/l)	0.0 mg/l	0.0 mg/l	
12	Standard C2 No. 1 (2.2 ± 0.2 mg/l)	2.2 mg/l	2.2 mg/l	
13	Standard C2 No. 2 (3.9 ± 0.3 mg/l)	3.9 mg/l	3.9 mg/l	
14	Standard C2 No. 3 (6.9 ± 0.6 mg/l)	6.8 mg/l	6.9 mg/l	



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LABX 2300072

Summary of checked

- ☒ The instrument can work normally and efficiently. (เครื่องมือวัดสามารถทำงานได้ปกติและมีประสิทธิภาพ)
- ☐ The instrument can work but it's requiring to maintenance. (เครื่องมือวัดสามารถทำงานได้แต่ต้องบำรุงรักษา)
- ☐ The instrument could not work (it's requiring to repair). (เครื่องมือวัดไม่สามารถทำงานได้และต้องการซ่อมบำรุง)

Remark:

Standard Equipment Used

Equipment	Lot No.	Equipment I.D.
Standard Chlorine DPD-CHLORINE-LR	A2131	Exp date : May-24
Standard Chlorine DPD-CHLORINE-HR	A1019	Exp date : Jan-23
Digital multi meter	SN : 02270010	Due date : 23-Jun-23
Thermo hygrometer	SN : 41413945	Due date : 17-Aug-23

Test By :

WILAILAK S.
 (Miss Wilailak Sawangpun)
 Service Engineer



(Mr. Sunan Sartyangkool)
 Assistant Service Division Manager



ภาคผนวก ช-1

สำเนาหนังสืออนุญาตขึ้นทะเบียน
ห้องปฏิบัติการวิเคราะห์เอกชน

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๔



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๕๐๐

๒๘ มกราคม ๒๕๖๕

เรื่อง คัดอาชญาบัตรขึ้นทะเบียนผู้ประกอบการวิเคราะห

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขอรับการตรวจของห้องปฏิบัติการวิเคราะห

ลงวันที่ ๓๐ กรกฎาคม ๒๕๖๓

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห จำนวน ๑ แผ่น

๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห จำนวน ๕ แผ่น

๓. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุ

หนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห เลขทะเบียน ๖-๒๐๔๔ สถานที่ตั้งเลขที่ ๓๐๔

ขอพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร

ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย)

จำกัด คัดอาชญาบัตรขึ้นทะเบียนห้องปฏิบัติการวิเคราะห โดยเมืองประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห จำนวน ๖ ราย ตามสิ่งที่ส่งมาด้วย ๑

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห จำนวน ๑๖๒ ราย ตามสิ่งที่ส่งมาด้วย ๒

ค. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนให้วิเคราะหในน้ำเสีย จำนวน ๕๙ รายการ น้ำเสีย

จำนวน ๑๖๒ รายการ อากาศเสีย ๑๖ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๑๕ รายการ และดิน

จำนวน ๑๖๕ รายการ รวมทั้งสิ้นจำนวน ๑๖๒ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะมีผลตั้งแต่วันที่ ๒ กันยายน ๒๕๖๕ หากประสงค์จะต่ออายุหนังสือ

รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห เลขทะเบียน ๖-๒๐๔๔ ขอต่ออายุพร้อมเอกสารประกอบคำขอ

ต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นสุดของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห

เลขทะเบียน ๖-๒๐๔๔ ขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายศิระ จันทร์เกิด)

อธิบดีกรมโรงงานอุตสาหกรรม

ผู้อำนวยการกองบริหารความปลอดภัยโรงงาน

ปฎิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนากฎหมายโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะหทดสอบและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๔๔๔๖ - ๐ ๒๒๐๒ ๔๔๐๒

โทรสาร ๐ ๒๒๕๔ ๓๒๐๔ - ๐ ๒๒๕๔ ๓๒๐๕

เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ๖-๒๐๔๔

ที่ อก ๐๓๑๐(๑)/

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

๓. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห จำนวน ๖ ราย

๑) นางสาวยุพพร จันทน์ปลั่ง

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๔๗๐๐

๒) นางสาวจันทน์ โกมารกุล ณ นคร

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๔๗๐๑

๓) นายศราวุธ จิตราชนันท์

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๔๗๐๒

๔) นางสาวกนกพร เอนก

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๑

๕) นายสุริยา สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๒

๖) นายวิฑูรย์ ชุมพร

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๓

(นายศิระ จันทร์เกิด)

อธิบดีกรมโรงงานอุตสาหกรรม

ผู้อำนวยการกองบริหารความปลอดภัยโรงงาน

ปฎิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ๖-๒๐๔๔

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๔

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

๓. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห จำนวน ๑๖๒ ราย

๑) นางสาวจินดา โขกุลธรรม

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๑

๒) นางสาวสิริวิทย์ น้อยเสถียร

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๒

๓) นางสาวชัญญะอุบล อัมม

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๓

๔) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๔

๕) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๕

๖) นางสาวศรีวิภา อธิษฐาน

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๖

๗) นางสาวสิริวิทย์ น้อยเสถียร

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๗

๘) นางสาวสิริวิทย์ น้อยเสถียร

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๘

๙) นายพนมกร จันทร์ทิพย์

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๑๙

๑๐) นายพนมกร จันทร์ทิพย์

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๒๐

๑๑) นายพนมกร จันทร์ทิพย์

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๒๑

๑๒) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๒๒

๑๓) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๒๓

๑๔) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๒๔

๑๕) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๒๕

๑๖) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๒๖

๑๗) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๒๗

๑๘) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๒๘

๑๙) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๒๙

๒๐) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๓๐

๒๑) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๓๑

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ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๓๓

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ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๓๔

๒๕) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๓๕

๒๖) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๓๖

๒๗) นางสาวนันทิณี สอนแก้ว

ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๓๗

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ทะเบียนเลขที่ ๖-๒๐๔๔-๓-๕๑๔๕

(นายศิระ จันทร์เกิด)

อธิบดีกรมโรงงานอุตสาหกรรม

ผู้อำนวยการกองบริหารความปลอดภัยโรงงาน

ปฎิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

๓๕) นางสาวปรางค์ทิพย์...

(นายศิระ จันทร์เกิด)

อธิบดีกรมโรงงานอุตสาหกรรม

ผู้อำนวยการกองบริหารความปลอดภัยโรงงาน

ปฎิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

๓๖) นายสมบุญ...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
19	Copper	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
20	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
21	2,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
33	Formaldehyde	Distillation, Colorimetric Method ⁽⁴⁾
34	Free Chlorine	1) DPD Ferrous Titrimetric Method ⁽⁴⁾ 2) Iodometric Method ⁽⁴⁾
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
36	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
37	Hexavalent Chromium	Filtration, Colorimetric Method ⁽⁴⁾
38	3-Hydroxycarbofuran	High-Performance Liquid Chromatographic Method ⁽⁴⁾
39	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
40	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
41	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/Mass spectrometric Method ⁽⁴⁾
42	Methiocarb	High-Performance Liquid Chromatographic Method ⁽⁴⁾
43	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾

วิมล
(นางสาววิมล นักร้องกุล)

44 Methomyl...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
44	Methomyl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
45	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
46	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ⁽⁴⁾ 2) Soxhlet Extraction Method ⁽⁴⁾
47	Oxamyl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
48	Propoxur	High-Performance Liquid Chromatographic Method ⁽⁴⁾
49	pH	Electrometric Method ⁽⁴⁾
50	Phenols	1) Distillation, Chloroform Extraction Method ⁽⁴⁾ 2) Distillation, Direct Photometric Method ⁽⁴⁾
51	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
52	Sulfide	Iodometric Method ⁽⁴⁾
53	Temperature	Laboratory and Field Methods ⁽⁴⁾
54	Total Dissolved Solids	Dried at 180 °C ⁽⁴⁾
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method ⁽⁴⁾
56	Total Suspended Solids	Dried at 103-105 °C ⁽⁴⁾
57	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
58	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾
59	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁴⁾

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ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

วิมล
(นางสาววิมล นักร้องกุล)

3 Aldrin...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
8	Barium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

วิมล
(นางสาววิมล นักร้องกุล)


18 Bis(2-ethylhexyl)phthalate...

ลำดับที่	สารเคมี	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	Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾

วิมล
(นางสาววิมล นักร้องกุล)


34 Chromium (III)...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
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	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⁾


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 กรมวิทยาศาสตร์บริการ


51 cis-1,2-Dichloroethylene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
57	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
58	Diethyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
63	Di-n-Octyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
64	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
65	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾


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 กรมวิทยาศาสตร์บริการ


68 Fluorene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
74	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
75	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
76	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
81	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
83	Mercury	1) Cold Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾


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84 Methanol...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾ 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1248 - PCB 1254 - PCB 1260	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾


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97 Pentachlorophenol...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
98	pH	Electrometric Method ⁽⁴⁾
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
100	Phenol	1) Distillation, Direct Photometric Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
103	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
109	TPH (C ₈ -C ₁₀)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,24)
110	TPH (C ₁₀ -C ₁₆)	Solvent Extraction, Gas Chromatographic Method ^(8,21)
111	TPH (C ₁₅ -C ₂₅)	Solvent Extraction, Gas Chromatographic Method ^(8,21)
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

114 1,1,2-Trichloroethane...

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ลำดับที่	สารเคมี	วิธีวิเคราะห์
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
120	Vinyl Acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
121	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
122	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
123	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
124	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
126	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾

ตารางรายชื่อ (ปล่องระบาย) จำนวน 16 รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Antimony	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
2	Arsenic	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁴⁾

3 Carbon Monoxide...

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ลำดับที่	สารเคมี	วิธีวิเคราะห์
3	Carbon Monoxide	1) Sampling Bag Non-Dispersive Infrared Method ⁽³⁾ 2) Non-Dispersive Infrared Method ⁽³⁾ 3) Instrumental Analyzer Method ⁽³⁾
4	Chlorine	1) Absorption Sampling, Ion Chromatographic, Method ⁽⁵⁾ 2) Isokinetic Sampling, Ion Chromatographic Method ⁽⁵⁾
5	Copper	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
6	Dioxins	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) ⁽⁵⁾
7	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method ⁽⁵⁾ 2) Isokinetic Sampling, Ion Chromatographic Method ⁽⁵⁾
8	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ⁽⁵⁾
9	Lead	Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
10	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁵⁾ 2) Isokinetic, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾
11	Opacity	Ringelmann's Method ⁽⁴⁾
12	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method ⁽⁵⁾ 2) Chemiluminescence Method ⁽⁵⁾ 3) Instrumental Analyzer Method ⁽⁵⁾
13	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾ 2) UV Fluorescence Method ⁽⁵⁾ 3) Instrumental Analyzer Method ⁽⁵⁾
14	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾
15	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ⁽³⁾
16	Xylene	Absorption Sampling, Gas Chromatographic Method ⁽⁵⁾

สิ่งปฏิกูล...

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
สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,3,25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,13) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,14)
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,13) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,14)
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,13) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,14)
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,13) 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,14)

6 Cadmium...


(นายวิภากร จงษ์ อัครกุลวิไล)
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กรมควบคุมมลพิษ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.15,17) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.6.16,17) 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.15,17) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.16,17)
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^(1.6.17) 2) Alkaline Digestion, Colorimetric Method ^(8.17)


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 กระทรวงพาณิชย์


11 Cobalt....

ลำดับที่	สารเคมี	วิธีวิเคราะห์
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
14	DDD	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25)


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
2) Soxhlet....

ลำดับที่	สารเคมี	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.6.18)


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2) Waste Extraction...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
23	Methoxychlor	2) Waste Extraction, Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^(1.6.19) 3) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^(1.6.20) 4) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.6) 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^(1.9) 6) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.25) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10.22) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22.31)
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.6.15) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.6.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.15) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.16)


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
27 Polychlorinated...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4',5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',3,4'-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) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)


 (นางทิพย์ จิตกมลกุล)

28 Pentachlorophenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)
29	pH	Electrometric Method ^(29,30)
30	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,13) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14)
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,13) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,23) 2) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(22,31)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,13)


 (นางทิพย์ จิตกมลกุล)

4) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
35	Zinc	4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,13) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,6,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,13) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)

เพิ่ม จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
2	Acetone	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
4	Anthracene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(7,13) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(7,13) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic Method ^(10,23) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^(7,13) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)


 (นางทิพย์ จิตกมลกุล)

9 Benz(a)anthracene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Benz(a)anthracene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
11	Benzo(b)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
12	Benzo(k)fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
13	Benzoic acid	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
14	Benzo(a)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
15	Benzog,h,i,perylene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(7,13) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
17	Bis(2-chloroethyl)ether	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
18	Bis(2-ethylhexyl)phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
21	Butanol	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(14,20)
22	Butyl Benzyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(7,13) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,14)
24	Carbazole	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(25,31)
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(14,20)


 (นางทิพย์ จิตกมลกุล)

26 Carbon tetrachloride...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
28	p-Chloroaniline	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
32	2-Chlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7,15,17) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7,15,17)
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(8,17)
36	Chrysene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(26,28)
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
39	DDD	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)

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40 DDE...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
40	DDE	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22)
41	DDT	2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31) 1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22)
42	Dibenz(a,h)anthracene	2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
43	Di-n-Butyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
47	3,3-Dichlorobenzidine	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
53	2,4-Dichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)

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57 Dieldrin...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
58	Diethyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
59	2,4-Dimethylphenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
60	2,4-Dinitrophenol	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
61	2,4-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
62	2,6-Dinitrotoluene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
63	Di-n-Octyl Phthalate	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
67	Fluoranthene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
68	Fluorene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
70	Heptachlor Epoxide	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)

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71 Hexachlorobenzene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(14,24)
74	α-HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
75	β-HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
76	γ-HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(16,22) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
77	Hexachlorocyclopentadiene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
78	Hexachloroethane	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
79	Indeno(1,2,3-cd)pyrene	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
80	Isophorone	Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(25,31)
81	Lead	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ^(7,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7,16)
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹⁸⁾

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2) Thermal...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
84	Methanol	2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ⁽¹⁾⁽⁹⁾ 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁰⁾ Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ⁽¹²⁾⁽²¹⁾
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²²⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
88	2-methylphenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
89	2-Methylnaphthalene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
91	Naphthalene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹³⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁷⁾⁽¹⁶⁾
93	Nitrobenzene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
94	N-Nitrosodiphenylamine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
95	N-Nitrosodi-n-propylamine	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232	1) Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²³⁾

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- Aroclor 1242...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
	- Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2,3,4,5-Pentachlorobiphenyl - 2,2,4,5,5-Pentachlorobiphenyl - 2,3,3',4,6-Pentachlorobiphenyl - 2,2,3,4,4,5-Hexachlorobiphenyl - 2,2,3,4,5,5'-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',5,5',6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Norachlorobiphenyl	
97	Pentachlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
98	Phenanthrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
99	Phenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
100	Pyrene	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾

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101 Selenium...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
101	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹³⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁷⁾⁽¹⁶⁾
102	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹³⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁷⁾⁽¹⁶⁾
103	Styrene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
106	Toluene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²²⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
108	TPH (C ₉ -C ₁₀)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
109	TPH (C ₁₀ -C ₁₅)	1) Solvent Extraction, Gas Chromatographic Method ⁽¹⁾⁽²¹⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic Method ⁽²³⁾⁽³¹⁾
110	TPH (C ₁₆ -C ₂₀)	1) Solvent Extraction, Gas Chromatographic Method ⁽¹⁾⁽²¹⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic Method ⁽²³⁾⁽³¹⁾
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
115	2,4,5-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾

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116 2,4,6-Trichlorophenol...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
116	2,4,6-Trichlorophenol	Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽²³⁾⁽³¹⁾
117	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
118	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹³⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁷⁾⁽¹⁶⁾
119	Vinyl Acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
120	Vinyl Chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
121	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
122	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
123	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
124	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
125	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁷⁾⁽¹³⁾ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁽⁷⁾⁽¹⁶⁾


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
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 กรมวิทยาศาสตร์บริการ

ศูนย์มาตรฐานวิธีการวิเคราะห์และทดสอบเป็นห้องปฏิบัติการ ก่อตั้งขึ้นและดำเนินงานตาม กรมวิทยาศาสตร์บริการ พ.ร.บ. ๑๒๐๑๖ ๔๐๑๖



บริษัท เอแอลเอส แล็บอราทอรี กรุ๊ป (ประเทศไทย) จำกัด (สำนักงานใหญ่)

104 ซอยพัฒนาการ 40 ถนนพัฒนาการ

แขวงพัฒนาการ เขตสวนหลวง กรุงเทพฯ 10250

ติดต่อเรา

